Studies on the "Belt and Road" Initiative's Effect on Construction Companies' Financial Performance

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Abstract. Coinciding with the year 2023 is the tenth anniversary of the "Belt and Road" program, whose execution over the previous 10 years has expanded development prospects for businesses and enabled Chinese corporations to "go global". The implementation of the "Belt and Road" initiative has brought more development opportunities for enterprises, allowing Chinese enterprises to "go global". Under the "Belt and Road" initiative, Chinese construction enterprises have built a large number of infrastructure projects for developing countries along the route through their technical advantages. In light of this, this study chooses microdata from 2011 to 2022 for China's A-share listed construction companies, and uses factor analysis, double difference method (DID) and propensity matching score method (PSM) to explore the impact of the "Belt and Road" initiative on the financial performance of construction enterprises. The study concludes that the financial performance of construction companies is significantly impacted by the Belt and Road Initiative, and the findings remain valid following the robustness test. Furthermore, we look into the possibility that the financing constraint acts as a mediator between the Belt and Road Initiative and the construction companies' financial performance. Our findings indicate that the financing constraint does indeed act as a mediator between the two.

Keywords: "Belt and Road" initiative; financing constraints; financial performance; construction companies

1 Introduction

During his tour to Central and Southeast Asia in September and October 2013, President Xi presented the strategic ideas for constructing the 21st-century Maritime Silk Road and the Silk Road Economic Belt. Scholars both domestically and internationally have been actively following the Belt and Road Initiative as a national top-level plan, although opinions on how the initiative impacts businesses' financial performance are divided. Liu Qi(2018) takes listed companies of the "Belt and Road" concept stock as the research object from 2013 to 2016, and empirically analyzes it by using the double-difference method, and finds that the "Belt and Road" initiative's mediating influence through external investment can greatly enhance businesses' financial performance[1]. However, Zheng Deng Jin et al(2021) studied five different industries and found that the Belt and Road Initiative had a significant dampening effect on the short-term financial performance of the transportation, storage and postal sector[2].

The influence of the "Belt and Road" initiative continues to expand, more enterprises are willing to "go out" to make foreign investment, expanding the scale of investment, but enterprises need a lot of capital investment to ensure the sustainability of the implementation of the project, and

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only rely on the enterprise's own funds is very difficult to meet the needs of the need to obtain financial support through external financing. Ondieki A N et.al (2017) found that financing constraints contribute significantly to firms' financial performance by analyzing a sample of 49 low dividend paying firms in the FHP[3]. Chen et al(2017)found that firms that actively responded to the B&R and were supported by related policies were more likely to obtain bank loans[4]. Shao, Wen Wu and Liu, Jia(2022), Li, Jianjun and Li, Jun Cheng(2020) find that B&R can expand the credit scale of enterprises through bank loans, external financing, and reducing the degree of information asymmetry in order to alleviate the financing constraints.[5][6] To summarize, scholars have studied financial performance from different industries and perspectives, but the research conclusions have not yet reached a consensus. Therefore, research on the impact of the "Belt and Road" program on businesses' financial performance is still required.

2 Theoretical analysis and research hypothesis

The "Belt and Road" initiative's execution has accelerated China's economic growth and created additional prospects for business development. The following two factors can be used to further explain how this program has affected businesses' financial performance.

"The Belt and Road Initiative improves financial performance by enhancing the internationalization of enterprises. Existing research suggests that B&R has increased the degree of internationalization of firms, which in turn improves their performance. The "Belt and Road" Initiative encourages businesses to "go global" by reducing their financing limits, expanding the scope of credit support, and ensuring financial stability, thus enhancing the degree of internationalization of enterprises and promoting the improvement of their financial performance[7]. "The Belt and Road Initiative promotes an increase in the scale of outward foreign direct investment (OFDI) by reducing the political risks faced by enterprises, which in turn increases the degree of internationalization of enterprises and enhances their economic efficiency[8].

Government subsidies for B&R are conducive to enhancing the financial performance of corporations. Since the introduction of B&R, the government has implemented a number of measures to optimize the advantages for businesses in order to entice them to take part in the building of the Belt and Road Initiative. Specifically, governments at all levels have reduced the financial pressure on enterprises responding to B&R through measures such as subsidies and interest rate reductions, tax exemptions and tax reductions, capital subsidies to improve the financial situation of firms[9]. These preferential policies for enterprises are conducive to accelerating the pace of "going out", increasing trade cooperation with countries along the "Belt and Road", expanding the scale of overseas markets, and thus increasing the profit margins of enterprises. In summary, the following hypotheses are proposed in this paper:

H1: B&R helps construction companies perform financially.

Financing risks and costs are important factors constraining Chinese enterprises' outward investment and infrastructure in countries along the Belt and Road Initiative[10]. However, the "Belt and Road" investment is generally characterized by large capital demand and inconspicuous short-term returns, which leads to the financing issue being an unavoidable

reality in the process of China's enterprises responding to B&R. Li Yue and Wang Fei (2023)found that responding to the Belt and Road Initiative can effectively alleviate the financing constraints faced by enterprises[11]. Similarly, Dai Kui Ziao et al(2021) the study also shows that B&R can significantly alleviate corporate financing constraints[12]. Responding to B&R can reduce the mistrust in corporate surplus information on the supply side of commercial credit and increase the chances of enterprises obtaining commercial credit financing through supply chain transactions. In addition, enterprises actively responding to the "Belt and Road" initiative can receive strong support from the government, and they can enjoy more policy dividends, such as special exemptions and tax exemptions; moreover, In order to solve the difficulties of enterprise financing, in addition to the support of government departments for enterprises participating in the construction of the "Belt and Road", China's financial institutions, stock exchanges, national policy banks and other financing institutions to provide financial security for enterprises to "go global". The above analysis shows that enterprises responding to the "Belt and Road" Initiative can obtain external funds through relevant policies issued by the government and credit support from financing institutions to alleviate financing constraints. When the enterprise financing constraints are eased, the enterprise has more funds to invest in investment activities, expanding the scale of investment to improve profitability and bring profits to the enterprise. Thus, it can be seen that B&R is conducive to the expansion of financing channels and scale of financing, so as to obtain sufficient funds to participate in project investment to enhance businesses' financial performance. In summary, the following hypotheses are proposed in this paper:

H2: Financing constraints have a mediating effect between B&R and corporate financial performance.

3 Research design

3.1 Sample

The data are all from the database of Cathay Pacific, and this paper selects China's A-share listed companies in the construction industry from 2011 to 2022 as the research object. The screening principles for the samples are as follows: companies with S, *ST, ST, PT are not included; businesses with incomplete data are not included. In addition, in order to prevent the influence of outliers, all continuous variables are indented by 1% up and down. After the above treatment, 43 construction companies with a total of 516 balanced panel data are finally obtained.

3.2 Variable definitions and measurement

Construct a financial performance indicator evaluation system by selecting 12 financial indicators from the four dimensions of profitability, solvency, operating capacity and development capacity. included among these，Gross operating margin, return on assets, cost and expense margin are selected from profitability; Current ratio, cash ratio and quick ratio are selected for solvency；Current asset turnover, total asset turnover, and shareholders' equity turnover were selected from operating capacity; Total assets growth rate, operating income growth rate, sustainable growth rate are selected from the development capability. Then, the composite score calculated by factor analysis was used as the explanatory variable financial performance.

Explanatory variables: in accordance with the idea of double difference method, this paper selects the grouping dummy variable Treat, the time dummy variable Post, and the cross-multiplier of the grouping dummy variable and the time dummy variable(DID) as the core explanatory variables. Mediating variables: drawing on Hadlock C J et.al (2010)[13], the SA index is constructed from firm size and firm age. Control variables: Size is measured by the logarithm of total assets, ROE is measured by dividing net profit by net assets, Equity is measured by the percentage of the top ten shareholders. Growth measured by increase in current year's gross operating income/increase in previous year's gross operating income, Cash is calculated by dividing net cash flow from operating activities by total operating income.

3.3 Build a model

This paper adopts the propensity matching method (PSM) and double difference method (DID) to conduct research. Drawing on Xu Si's(2019)[14]method, the double difference model of this paper is constructed as follows:

$$F_{it}=\beta_0+\beta_1 Treatit+\beta_2 Postit+\beta_3 Did+\beta_4 Controls_{it}+\varepsilon_{it} \quad (1)$$

To ensure the reliability and authenticity of the data, fixed effects for individual and time dimensions were added to model (1). The model is shown below:

$$F_{it}=\beta_0+\beta_1 Did+\beta_2 Controls_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (2)$$

Where μ_i is the fixed effect of individual dimension; λt is the fixed effect of time dimension. In addition, in order to test whether financing constraints play a mediating role between the Belt and Road Initiative and financial performance, the following mediating effect model is established by drawing on Wen Zhong Lin's(2014) mediating effect methodology[15].

$$SA_{it}=\alpha_0+\alpha_1 Did+\alpha 2\ Controls_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (3)$$

$$F_{it}=\gamma_0+\gamma_1 Did+\gamma_2 SA_{it}+\gamma_3 Controls_{it}+\mu_i+\lambda_t+\varepsilon_{it} \quad (4)$$

F is for Enterprise Financial Performance, Treat is a grouping dummy variable, Post is a time dummy variable, The cross-multiplier term of Treat and Post is Did, which serves as the core explanatory variable of the paper, Controls are control variables, ε is the random error term, μ is a fixed effect in the individual dimension; λ is a fixed effect in the time dimension. SA indicates financing constraints.

4 Empirical analysis

4.1 Propensity score matching test

In order to match the samples, we use the "kernel matching method" and estimate the propensity score using the logit model. We choose firm size, return on net assets (Roe), cashflow ratio (Cash), growth rate of operating income (Growth), and equity concentration (Equity) as the matching quantities. The samples are matched using the kernel matching approach. The conditional independence and common support assumptions must be met in order to use the propensity score matching approach. Thus, testing the matching balance and common interval assumption is necessary to guarantee the accuracy and dependability of the estimation findings.

Examining the pertinent literature reveals that the sample passes the balancing test if the absolute value of the standard deviation of the indicators after matching is less than 20% and there is no discernible difference between the indicators after matching. Table 1 demonstrates that, prior to matching, there is a significant difference between enterprise size, return on net assets, and equity concentration as well as a larger absolute value of the standard deviation for each indicator. Following matching, the absolute value of the standard deviation is less than 10, and the t-statistic's absolute value is less than 1.64, indicating that there is no significant difference between the indicators. In summary, the sample passes the balance test.

Table 1 Balance test.

Variable	Unmatched	Mean		%Reduce		t-test	
	Matched	Treated	Control	%bias	bias	t	p>t
Size	U	23.579	23.164	86.7	98.4	9.98	0.000
	M	23.579	24.601	-1.4		-0.12	0.901
Roe	U	0.09782	0.6284	33.9	91.6	3.74	0.000
	M	0.09782	0.10075	-2.8		-0.37	0.713
Cash	U	0.3242	0.02524	6.7	81.4	0.73	0.463
	M	0.3242	0.03375	-1.2		-0.16	0.877
Growth	U	0.19799	0.18319	2.4	-49.0	0.27	0.784
	M	0.19799	0.22004	-3.6		-0.37	0.712
Equity	U	0.62533	0.54937	47.6	88.3	5.43	0.000
	M	0.62533	0.61645	5.6		0.56	0.574

4.2 Regression results

As can be seen from Table 2. The focus of this paper is on the core explanatory variable did, whose regression coefficient reflects the impact of B&R on the financial performance of enterprises. As can be seen from model (1) and model (2) in Table 1, the regression coefficients of the core explanatory variable DID are significant at the 1% level before and after adding the two-way fixed effects, indicating that B&R has a facilitating effect on the financial performance of construction enterprises, and Hypothesis 1 has been verified.

As can be seen from model (3) in Table 2, the regression coefficient of the core explanatory variables is 0.084, which is significant and positive at the 1% level, indicating that responding to the Belt and Road Initiative significantly reduces the level of financing constraints of enterprises. From the regression results of model (4), the regression coefficient of the mediating variable SA is 0.414, which is significant at the 1% level and the coefficient is still positive, indicating that financing constraints play a mediating role between B&R and the financial performance of enterprises. In addition, the coefficient of DID, the core explanatory variable in model (3), is 0.173, which is significant at the 1% level and the coefficient is positive, indicating that financing constraints play a partial mediating role. Therefore, the Belt and Road Initiative

partially contributes to the financial performance of construction firms by alleviating financing constraints. In summary, hypothesis 2 is verified.

Furthermore, the Belt and Road Initiative has a notable impact on construction companies' ability to innovate. Technological innovation can boost an organization's market value and financial results, making it a crucial component of competitiveness. Construction companies can benefit from economies of scale, lower product costs, and higher profits through outward foreign direct investment in the countries along the route. This can spur technological innovation and enhance the financial performance of the companies involved. Additionally, when construction companies export their goods overseas, they are subject to double the competitive pressure of competing not only with local businesses but also with foreign businesses that use cutting-edge technology. This double pressure will encourage the companies to keep up with technological innovation, which will improve their financial performance.

Table 2 Regression results.

	Model(1)	Model(2)	Model(3)	Model(4)
Variable	F	F	Sa	F
Treat	-0.121			
	(0.083)			
Post	-0.248***			
	(0.031)			
Did	0.212***	0.208***	0.084***	0.173***
	(0.040)	(0.039)	(0.016)	(0.040)
SA				0.414***
				(0.115)
Size	-0.094***	-0.118***	0.154***	-0.181***
	(0.014)	(0.019)	(0.008)	(0.026)
Roe	2.525***	2.523***	-0.046	2.542***
	(0.095)	(0.097)	(0.039)	(0.096)
Cash	-0.011	0.002	0.046	-0.017
	(0.085)	(0.085)	(0.034)	(0.084)
Growth	0.189***	0.188***	-0.020***	0.196***
	(0.015)	(0.015)	(0.006)	(0.015)
Equity	0.971***	1.117***	0.276***	1.002***
	(0.112)	(0.122)	(0.049)	(0.125)
Constants	1.602***	2.074*	-7.203	5.057***
	(0.300)	(0.425)	(0.171)	(0.925)
N	516	516	516	516
R^2-squared		0.799	0.695	0.805
Year	No	Yes	Yes	Yes
Firm	No	Yes	Yes	Yes

4.3 Robustness Check

4.3.1 Parallel trend test

B&R implementation has a favorable impact on the financial performance of construction companies, according to the findings of the prior benchmark regression, but is it possible that there was already a trend of growth in firm performance prior to the implementation of the Initiative. If this happens, it violates the parallel trend test in the double difference method. Therefore, Select the event study approach for the parallel trend test in order to guarantee the validity and precision of the empirical data. In this case, the coefficient of the core explanatory variable reflects the difference between the experimental and control groups. The parallel trend test is successful if the core explanatory variables' coefficients are not significant prior to the implementation of the policy. In addition, this paper removes the previous period when the policy occurs for the regression in order to avoid the problem of complete covariance when conducting the parallel trend test.

Figure 1 illustrates that prior to the proposal of B&R, the regression coefficients of the primary explanatory variables are not significant, indicating that the financial performance of construction enterprises has a parallel development trend before the initiative is proposed. After the initiative, the regression coefficients of the core explanatory variables generally show an upward trend. In summary, The parallel trend test is successful, indicating the robustness of this paper's empirical findings. In addition, the paper conducts tests by replacing the explanatory variables and deleting the year of the year in which the policy took place, and the results are found to be robust.

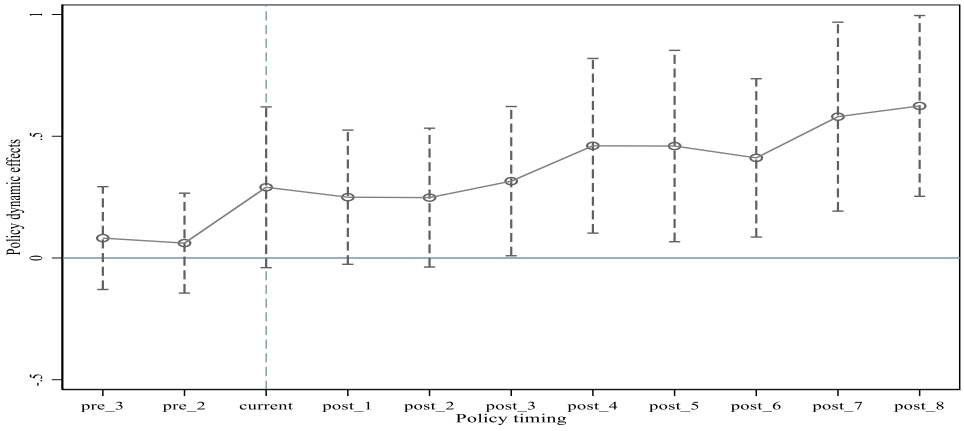

Figure 1 Parallel trend test.

4.3.2 Replacement of explanatory variables

The original explanatory variable is replaced in this work with the return on total assets (ROA) alternative, and the experimental procedure is re-validated using the fixed effect model. The table3 shows that, following the replacement of the explanatory variables, the results of the main effect regression and mediation effect tests are essentially consistent with the prior article, have

not changed much, and have all passed the robustness test. As a result, the aforementioned conclusion is sound and supports the empirical findings.

Table 3 Robustness Tests for Replacing Explained Variables.

Variable	Corporate financial performance(ROA)			
	Model(1)	Model(2)	Model(3)	Model(4)
	ROA	ROA	SA	ROA
Treat	-0.011***			
	(0.003)			
Post	-0.005***			
	(0.001)			
Did	0.011***	0.010***	0.084*	0.009*
	(0.002)	(0.002)	(0.016)	(0.002)
Sa				0.016***
				(0.006)
Size	-0.004***	-0.006***	0.154***	0.009***
	(0.001)	(0.001)	(0.008)	(0.001)
Roe	0.258***	0.260***	-0.046	0.216***
	(0.005)	(0.005)	(0.039)	(0.005)
Cash	-0.006	-0.007	0.046	-0.007*
	(0.004)	(0.004)	(0.034)	(0.004)
Growth	-0.000	-0.000	0.020***	0.000
	(0.001)	(0.001)	(0.006)	(0.001)
Equity	0.017***	0.019***	0.276	0.015**
	(0.005)	(0.006)	(0.049)	(0.007)
Constants	0.105***	0.142***	-7.203	0.260***
	(0.013)	(0.022)	(0.171)	(0.048)
N	516	516	516	516
R^2		0.886	0.695	0.888
Year	no	yes	yes	yes
Firm	no	yes	yes	yes

5 Conclusions

Based on the micro-data of China's A-share listed construction companies from 2011 to 2022, this study explores the impact of the Belt and Road Initiative on the financial performance of construction enterprises by using factor analysis, differential method and propensity matching score method. It is found that the "Belt and Road Initiative" has a significant impact on the financial performance of construction enterprises, and this impact is realized through the intermediary role of financing constraints. The research results provide a new perspective for understanding the impact of the Belt and Road Initiative on corporate financial performance, and provide a reference for relevant policy formulation and corporate strategy.

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