

Abstract

China proposes “The Belt and Road”, a global trade plan, hoping to stimulate Chinese economy. The government believes that the plan can bring many benefits to enterprises, such as lower investment risk, preferential tax event and higher production capacity. My project is to find out the causal relationship between this trade route and national economy. I will take the enterprises involved in this trade plan in the stock market as the object of this study and use difference in difference to analyze effect of “The Belt and Road”. In the project, although DD estimate is positive and statistical significant in the regression of current ratio, the test shows that the effect is weak.

Methods

“The Belt and Road” was proposed in 2013. The government believed that it would urge companies to enlarge their investment and find an effective way to increase revenue. The plan would continue to have an impact on relevant enterprises.

Difference-in-difference can estimate the effect of event by comparing the information of control group and treatment group. The difference between processed data (actually observed) and unprocessed data (counterfactual) is my target. Difference in difference sets dummy variables for occurrence of event and groups. Considering lag effect the trade on involved companies, I will take 2014 as moment of impact. It requires companies to be divided into control group and treatment group. Whether companies registered in the key province of the trade plan could have been the division standard, but relevant business scope is a more robust way to identify how “The Belt and Road” affected business performance. Treatment group and control group are divided by whether public companies are in “The Belt and Road” sector in the stock market. Companies in the treatment group were in the sector before 2015, which is the reason why I don’t use time-varying difference-in-difference.

Difference-in-difference:

$$Y_{it} = \beta_1 + \beta_2 \text{Treat}_i + \beta_3 \text{Post}_t + \beta_4 (\text{Treat} * \text{Post})_{it} + \varepsilon_{it}$$

The dummy variable shows whether companies are in the treatment group and control group is Treat. Treat is equal to 1 if enterprises are in “The Belt and Road” sector in the stock market. Post is equal to 1 if the observation is from 2012 and 2013.

The equation takes the values:

Non B&R Pre : β_1

Non B&R Post : $\beta_1 + \beta_3$

B&R Pre : $\beta_1 + \beta_2$

B&R Post : $\beta_1 + \beta_2 + \beta_3 + \beta_4$

Hence, the Difference-in-Difference estimate : $(\text{B\&R Post} - \text{B\&R Pre}) - (\text{Non B\&R Post} - \text{Non B\&R Pre}) = (\beta_1 + \beta_2 + \beta_3 + \beta_4 - \beta_1 - \beta_2) - (\beta_1 + \beta_3 - \beta_1) = \beta_4$

DATA

I use some financial data of China-listed A-shares companies in the stock market from 2012 to 2018 to run the difference-in-difference regression. Treatment group is companies which were in the sector since 2013. Companies with missing values are removed. These in the Descriptive statistics of data are reflected in Table 1.

Table 1: Descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)
	treat 0			treat 1		
VARIABLES	N	mean	sd	N	Mean	sd
netprofit	16,150	4.082e+08	1.985e+09	1,351	1.857e+09	8.877e+09
asset_beginning	16,150	1.036e+10	3.514e+10	1,351	5.954e+10	2.242e+11
asset_end	16,150	1.194e+10	4.091e+10	1,351	6.619e+10	2.395e+11
equity	16,150	4.811e+09	1.409e+10	1,351	2.414e+10	1.122e+11
liability	16,150	7.126e+09	2.948e+10	1,351	4.205e+10	1.405e+11
current_asset	16,150	6.163e+09	2.692e+10	1,351	3.315e+10	1.077e+11
current_liability	16,150	5.061e+09	2.210e+10	1,351	3.043e+10	1.014e+11
performance	16,150	0.0345	0.963	1,351	0.0252	0.0703
current_ratio	16,150	2.553	3.869	1,351	1.667	1.780
ROA	16,150	0.0376	0.195	1,351	0.0294	0.0773
ROE	16,150	0.0555	3.635	1,351	-0.0171	1.597

The data includes net profit, asset at the beginning of year, asset at the end of year, equity, liability, current asset and current liability. Value of these variables are too large, and the ranges of fluctuation are wide. So I process the data and get some ratios to run the difference in difference. The ratios have much lower standard deviation.

$\text{asset} = \text{liability} + \text{equity}$
 $\text{performance} = \text{netprofit} / \text{asset}$
 $\text{current_ratio} = \text{current_asset} / \text{current_liability}$
 $\text{average} = (\text{asset_beginning} + \text{asset_end}) / 2$
 $\text{ROA} = \text{netprofit} / \text{average}$
 $\text{ROE} = \text{netprofit} / \text{equity}$
 $\text{Post} = 1 \text{ if year} \geq 2014$
 $\text{treat} = 1 \text{ if suitandbelt}=1$
 $\text{did} = \text{post} * \text{treat}$

Variable “performance” measures the efficiency of asset utilization. “ROA” and “ROE” measures the profitability of a company. “current_ratio” measures liquidity.

Empirical Results

Table2

	(1) performance	(2) current_ratio	(3) ROA	(4) ROE	(5) current_ratio
did	0.0336 (1.39)	0.479*** (3.39)	0.00526 (0.80)	0.00155 (0.02)	0.477*** (3.37)
treat	-0.0332 (-1.40)	-1.228*** (-6.50)	-0.0120 (-1.88)	-0.0737 (-1.43)	-1.223*** (-6.49)
post	-0.0478* (-2.01)	-0.659*** (-8.92)	-0.0217*** (-6.46)	-0.133* (-2.17)	-0.650*** (-8.81)
ROA					0.452* (2.34)
_cons	0.0686** (2.95)	3.024*** (30.74)	0.0531*** (18.10)	0.151** (3.05)	3.000*** (30.56)
N	17501	17501	17501	17501	17501

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

There are five regressions and dependent variables are performance, current ratio, ROA and ROE. These five columns are difference-in-difference regression. The first four of those are regression including only dummy variables and cross term. And I add an independent variable into regression of current_ratio and get the fifth column.

The estimate of difference-in-difference shows the extent of trade plan's effect on companies. I find that β_2 and β_3 are all negative. β_4 (difference-in-difference estimate) in five regressions are positive, which shows "The Belt and Road" have a positive effect on chinese corporate financials.

However, the estimate of difference in difference is statistical significant only in the second and fifth regression. Both dependent variables are current_ratio. The coefficients of these regressions of current ratio are statistical significant. Coefficients of dummy variables and cross term are statistical significant at 0.1% level. And coefficient of ROA in the fifth equation is statistical significant at 5% level.

In the second regression, β_2 is approximately equal to -1.228, showing that the companies in the sector had a worse liquidity than those in the control group before "The Belt and Road". $\beta_2 + \beta_4$ (0.479 - 1.228), which shows the difference of two groups in liquidity, is positive. The liquidity of treatment group is better. "The Belt and Road" urges companies to increase their liquidity. The fifth regression in the table shows the similar result.

Test

Parallel trend hypothesis

If the treatment group is not affected by event, the treatment group has the same trend with control group before and after the event.

Figure 1 shows the significance of coefficients of regressions of four variables. These regression includes not only dummy variables mentioned before, but also dummy variables of every period.

Figure 1



From the figure 1, I find that only the coefficient of pre_2 in the regression of current ratio is statistical significant, which means it breaks parallel trend hypothesis. For other coefficients, zero is in the confidence intervals. Non-statistical significance of these coefficients are in line with hypothesis. Before the trade plan, two groups have same trend in performance, ROA and ROE; after the plan was proposed, control groups and treatment groups have same trends in four variables, which means the plan hardly affected the companies. This is not identical with my expectation.

Conclusion

I find the relationship between “The Belt and Road” and enterprises through difference-in-difference. The global trade plan doesn’t help companies increase their profits. Corporates doesn’t change their efficiency of asset utilization after the trade plan. Finally, I find this trade plan has an impact on liquidity of company. The relevant chinese companies expanded their investment, especially foreign investment, which requires large amount of cash. Considering high risk and huge cost of investment, companies choose to increase current ratio compatible with capacity of

clearing off short-term debts. However, through the parallel test, the coefficient of dummy variables of first year in the current ratio regression are statistical significant, not meeting the assumption. Treatment group and control group have the same trend in current ratio, ROA, ROE, performance after current year. It shows that the trade plan has no significant effect on the companies.

Appendix

Table of Figure 1

	(1) performance	(2) ROA	(3) ROE	(4) current_ratio	(5) current_ratio
post	-0.0522 (-1.91)	-0.0404*** (-7.45)	-0.234* (-2.26)	-1.063*** (-13.93)	-1.049*** (-13.72)
treat	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)
pre_2	-0.0247 (-0.25)	-0.0109 (-0.56)	-0.0670 (-0.18)	-0.634* (-2.31)	-0.630* (-2.29)
pre_1	-0.0901 (-0.92)	-0.0326 (-1.67)	-0.259 (-0.70)	-0.397 (-1.45)	-0.386 (-1.41)
current	-0.0139 (-0.14)	-0.0169 (-0.87)	-0.351 (-0.94)	-0.106 (-0.39)	-0.0999 (-0.36)
time_1	-0.0374 (-0.38)	-0.0250 (-1.28)	-0.133 (-0.36)	0.0437 (0.16)	0.0525 (0.19)
time_2	-0.0411 (-0.42)	-0.0253 (-1.30)	-0.145 (-0.39)	-0.0813 (-0.30)	-0.0724 (-0.26)
time_3	-0.0269 (-0.27)	-0.0150 (-0.77)	-0.179 (-0.48)	-0.0363 (-0.13)	-0.0310 (-0.11)
2013.year	0.0479 (1.76)	0.00205 (0.38)	0.120 (1.16)	-0.424*** (-5.56)	-0.425*** (-5.57)
2014.year	0.0229 (0.84)	0.0245*** (4.52)	0.194 (1.89)	0.462*** (6.05)	0.453*** (5.94)
2015.year	0.0354 (1.30)	0.0216*** (3.99)	0.172 (1.66)	0.172* (2.25)	0.164* (2.15)
2016.year	0.0438 (1.61)	0.0269*** (4.97)	0.231* (2.24)	0.222** (2.90)	0.212** (2.78)
2017.year	0.0395 (1.45)	0.0257*** (4.75)	0.205* (1.99)	0.101 (1.32)	0.0917 (1.20)
2018.year	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)
ROA					0.351** (3.06)
_cons	0.0465* (2.32)	0.0528*** (13.28)	0.0976 (1.29)	3.181*** (56.79)	3.163*** (56.15)
N	17501	17501	17501	17501	17501