Research on How Precision Poverty Alleviation can Reduce Supply Chain Risks

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Abstract. Based on the scenario of supply chain relationship, this paper selects companies that continuously disclose information on targeted poverty alleviation from 2016 to 2020, and establishes a two-way fixed effect model to explore the impact of targeted poverty alleviation on supply chain relationships. The study found that the scale of targeted poverty alleviation by enterprises will reduce the concentration of suppliers/customers, and at the same time reduce the level of commercial credit to improve the financing constraints of enterprises, and ultimately reduce the risk of enterprise supply chain. The government-led market-oriented poverty alleviation mechanism not only brings positive benefits to the society and the public, but also helps enterprises reduce risks in the dimension of supply chain relationships and achieve the dual pursuit of social responsibility and economic goals.

Keywords: Supply Chain Concentration; Commercial Credit Level; Supply Chain Risk; Targeted Poverty Alleviation.

1. Research background

Targeted poverty alleviation is a poverty alleviation governance model with Chinese characteristics. It is obtained through continuous exploration in the practice of poverty alleviation in China. It is an important measure to convert economic growth dividends into poverty alleviation achievements. Previous studies have shown that the participation of enterprises in poverty governance can help enterprises establish a benign political and business relationship, obtain political capital [1], enhance public image and consumer identity, and enhance reputation capital [2]. With the acceleration of the process of economic globalization in various countries, the competition between enterprises is no longer the competition between products, but the competition between supply chains and supply chains [3]. Supply chain management plays an increasingly important role in the development of enterprises and enhances the core competitiveness of enterprises [4]. Suppliers are an important part of stakeholders, and social responsibility is an important way to incorporate stakeholders into their own ecological territory. Supply chain relationships are closely related to corporate social responsibility.

With the in-depth study of corporate social responsibility, people are discussing whether enterprises should undertake social responsibility. The most important goal of a company is to maximize the creation of wealth for shareholders, thus rejecting "social responsibility" [5]. Based on the theory of interest-related, many scholars believe that in addition to the pursuit of economic responsibility (seeking the maximization of shareholders' interests), it is necessary for enterprises to undertake and maintain the responsibilities and obligations of social interests [6]. From a corporate perspective, fulfilling social responsibilities can help companies reduce capital costs and improve financial performance [7]. From the perspective of consumers, corporate investment and efforts in social responsibility can have a direct positive impact on company reputation and consumer recognition [8]. In recent years, with the refinement of research, some foreign scholars have tried to study the relationship between social responsibility undertaking and corporate risk from the perspective of systemic risk and idiosyncratic risk, and based on different theoretical foundations, the risk reduction of social responsibility has been formed [9-12]. By reviewing the previous literature, the motivation of enterprises to participate in targeted poverty alleviation can be summarized into three motivations: moral motivation, economic motivation and political motivation [13-15].

In the context of the new crown epidemic, supply chain credit problems have also been magnified with the epidemic. The magnification of liquidity risk in enterprise operation increases the inhibition on enterprise development. Therefore, it is of great significance to study the precise poverty alleviation and enterprise risk taking of enterprises from the perspective of supply chain. This paper incorporates supply chain management into the research on the economic consequences of targeted poverty alleviation by enterprises, in order to enrich the research on the economic consequences of targeted poverty alleviation by Chinese enterprises.

2. Study design

The data for this article are from CSMAR. After excluding ST companies, the financial industry and companies with missing data, a sample of 324 poverty alleviation companies was obtained, with a total of 1620 observations. In order to make the research results not affected by some extreme observations, the continuous variables are abbreviated by the upper and lower 1% quantiles. This paper uses Stata 15.0 software for data processing.

In order to verify that targeted poverty alleviation can help reduce supplier/customer concentration and improve the supply chain governance structure, the regression model is setting as:

$$scc_{i,t}\left(pc_{i,t}, cc_{i.t}\right) = a_0 + a_1 input_{i,t} + \beta Control_{i,t} + \xi_{i,t} \quad (1)$$

where $\mathrm{ssc}_{i,t}$ is the supply chain concentration, $\mathrm{cc}_{i,t}$ is the customer concentration, and $\mathrm{pc}_{i,t}$ is the supplier concentration. $\mathrm{input}_{i,t}$ is invested in targeted poverty alleviation for enterprises. growth is the sales growth rate, lew is the asset-liability ratio, board is the proportion of independent directors, top10 is the ownership concentration, soe is the nature of property rights, and age is the age of the company. If the coefficient of the enterprise's investment in targeted poverty alleviation is significantly negative, it can be verified.

In order to verify that the participation of listed companies in poverty governance will help reduce the level of commercial credit and thus reduce supply chain risks, the regression model is setting as:

$$TCA_{i,t}\left(TCF_{i,t}\right) = a_0 + a_1 input_{i,t} + \beta Control_{i,t} + \xi_{i,t} \quad (2)$$

where $\mathrm{TCA}_{i,t}$ is commercial credit assets, and $\mathrm{TCF}_{i,t}$ is commercial credit liabilities. If the enterprise's targeted poverty alleviation coefficient is significantly negative, it can be verified.

3. Empirical analysis

3.1 Descriptive statistics and correlation analysis

Table. 1 shows the descriptive statistics of the main variables in this paper. The average value of enterprises' investment in targeted poverty alleviation is 5.145, the standard deviation is 2.083, the minimum value is 1.088, and the maximum value is 11.169. This shows that there is a large gap in the participation of listed companies in targeted poverty alleviation. The average value of commercial credit assets is higher than that of commercial credit liabilities, indicating that the overall performance of listed companies is to provide funds to the supply chain, and the supply chain occupies a certain amount of corporate liquidity. The average value of enterprise nature is 0.653, that is, 65% of listed companies participating in targeted poverty alleviation are state-owned enterprises, which is consistent with the fact that some Chinese enterprises bear the main responsibility in targeted poverty alleviation.

Table. 1. Descriptive statistics

variable	sample size	average value	standard deviation	minimum	maximum
scc	1620	28.457	17.112	2.340	85.300
cc	1620	27.357	22.992	1.080	99.680
pc	1620	29.619	18.084	2.240	88.420
TCF	1620	0.090	0.099	-0.058	0.414

TCA	1620	0.126	0.104	0.002	0.456
input	1620	5.145	2.083	1.088	11.169
growth	1620	0.121	0.258	-0.491	1.519
lev	1620	0.480	0.192	0.090	0.889
board	1620	0.378	0.058	0.304	0.600
*top*10	1620	0.612	0.161	0.257	0.936
soe	1620	0.653	0.476	0.000	1.000
age	1620	2.985	0.286	1.792	3.970
SLI	1620	0.137	0.120	-0.141	0.557
MKT	1294	7.721	2.11	0.740	11.146

Table. 2 lists the correlation coefficient matrix of the explained variable supply chain concentration scc and other research variables. It can be seen from Table 3 that the absolute value of the coefficient of supply chain concentration and other research variables is less than 0.5, and the multicollinearity test is carried out by the variance inflation factor (VIF) method. The VIF values of all research variables in the model are less than 10, and the mean value of VIF is less than 5, indicating that there is no serious multicollinearity problem in the model. Test other explained variables, including customer concentration cc, supplier concentration pc, commercial credit liabilities TCF, commercial credit assets TCA, the test results show that the correlation coefficients are all less than 0.5, and the VIF is less than 10, and the VIF mean is less than 5. Therefore, there is no serious multicollinearity problem in the model.

Table .2. Correlation analysis

	scc	*input*	*growth*	*lev*	*board*	*top*10	*soe*	*age*
scc	1.000							
input	-0.096***	1.000						
growth	-0.037	0.016	1.000					
lev	-0.046*	0.194***	0.080***	1.000				
board	-0.183	0.111***	-0.006	-0.030	1.000			
*top*10	0.038	0.205***	0.075***	-0.009	0.093***	1.000		
soe	0.125***	-0.084***	-0.035	0.205***	0.008	0.146***	1.000	
age	-0.004	-0.026	-0.083***	0.066***	-0.058**	-0.193***	0.072***	1.000

3.2 Regression results

Column (1) in Table.3 reports the regression results of enterprises' participation in targeted poverty alleviation on supply chain concentration. The results show that the coefficient of explanatory variables is significantly negative at the level of 1%, indicating that the participation of enterprises in targeted poverty alleviation will reduce the concentration of the supply chain of enterprises. Columns (2) and (3) in Table 3 report the regression results of the customer concentration ratio and supplier concentration ratio of enterprises participating in precise poverty alleviation respectively. The results show that the coefficients of the explanatory variables are all significantly negative at the 1% level, indicating that Enterprises' participation in targeted poverty alleviation will reduce customer concentration and supplier concentration at the same time.

Table. 3. The impact of targeted poverty alleviation on supply chain concentration

	ssc (1)		cc (2)		pc (3)	
	coefficient	T value	coefficient	T value	coefficient	T value

input	-0.748***	-4.481	-0.675***	-2.912	-0.799***	-3.947
growth	-2.019	-1.667	-2.706	-1.610	-1.427	-0.971
lev	-11.457***	-5.606	-8.262***	-2.913	-14.612***	-5.893
board	-23.746***	-4.205	-33.223***	-4.240	-15.302**	-2.234
*top*10	-1.340	-0.580	9.029***	2.815	-12.034***	-4.293
soe	-2.433***	-3.093	-0.963	-0.882	-4.181***	-4.381
age	-5.149***	-3.955	-7.230***	-4.001	-3.150**	-1.994
intercept term	64.805***	-12.990	64.377***	9.297	66.200***	10.936
industry	controlled		controlled		controlled	
year	controlled		controlled		controlled	
sample size	1620		1620		1620	
$Adj.R^2$	0.533		0.480		0.358	
F	17.59		9.97		18.94	

Table. 4 reports the impact of corporate participation in targeted poverty alleviation on business credit levels. Columns (1) and (2) are the regression results of commercial credit assets and commercial credit liabilities, respectively. The regression results show that the coefficients of explanatory variables are all significantly negative at the level of 1%, indicating that the participation of enterprises in targeted poverty alleviation will reduce corporate commercial credit assets and corporate commercial credit liabilities.

Table .4. Impact of targeted poverty alleviation on commercial credit level

	TCA (1)		TCF (2)	
	coefficient	T value	coefficient	T value
input	-0.602***	-5.849	-0.392***	-3.646
growth	2.429***	3.250	1.254	1.605
lev	6.606***	5.241	1.513	1.148
board	2.938	0.844	5.015	1.378
*top*10	-1.711	-1.200	-2.600*	-1.746
soe	0.104	0.213	-0.760	-1.499
age	-0.900	-1.121	-0.631	-0.752
intercept term	14.775***	4.801	12.189***	3.789
industry	controlled		controlled	
year	controlled		controlled	
sample size	1620		1620	
$Adj.R^2$	0.497		0.396	
F	10.39		3.56	

3.3 Robustness test

According to the above regression results, the participation of enterprises in targeted poverty alleviation will reduce the concentration of the supply chain and the level of business credit. However, this result may also be due to the fact that the enterprises that participate in the targeted poverty alleviation with greater efforts are precisely the enterprises with better performance and better supply chain governance structure, that is, the regression sample may have the problem of self-selection bias. In order to solve the impact of the differences in performance and quantity of poverty alleviation enterprises on the research results, this paper adopts the propensity score matching method (PSM). Table. 5 lists the balance test results. The test results show that the standard deviation (absolute value) after matching is less than 10%, indicating that there is no significant difference between the treatment group and the control group after matching, which ensures the validity of the matching results. Figure 1 lists the results of the common support test. The test results show that most of the observations are

within the common value range, so only a small number of samples are lost when propensity score matching is performed.

Table. 5. Balance test results

Variable Name		Mean		Deviation	Standard deviation reduction (%)	t-statistic	t-test (p>t)
		Treatment group	Control group				
growth	Before match	0.127	0.118	3.7	29.3	0.66	0.508
	After match	0.126	0.132	-2.6		-0.42	0.678
lev	Before match	0.529	0.455	39.8	90.6	7.43	0.000
	After match	0.528	0.521	3.7		0.62	0.538
board	Before match	0.386	0.374	19.3	91.5	3.80	0.000
	After match	0.385	0.384	1.6		0.26	0.795
*top*10	Before match	0.659	0.588	45.3	97.4	8.55	0.000
	After match	0.657	0.659	-1.2		-0.20	0.845
soe	Before match	2.970	2.993	-7.8	94.0	-1.51	0.132
	After match	2.972	2.970	0.5		0.07	0.942
age	Before match	0.585	0.687	-21.3	93.6	-4.08	0.000
	After match	0.591	0.584	1.3		0.20	0.838

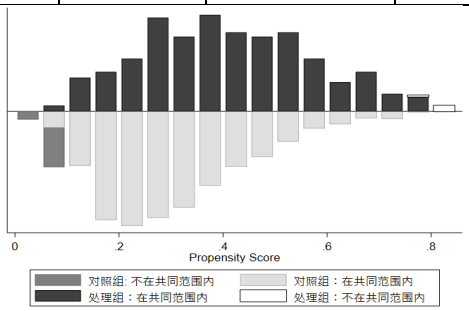

Figure 1. Common support test results

Table. 6 presents the results based on the kernel matching method, where column (1), column (2), and column (3) are supply chain concentration, commercial credit assets, and commercial credit liabilities, respectively. The T value corresponding to the average processing effect after supply chain concentration matching is significant at the 5% level, and the T value corresponding to the average processing effect after commercial credit asset matching is significant at the 1% level. The T value corresponding to the average treatment effect after credit liability matching is significant at the level of 1%, indicating that the participation of enterprises in targeted poverty alleviation can reduce the concentration of supply chain and the level of commercial credit. The result is still statistically significant. It shows that the results of this study are robust

Table. 6. Average treatment effects

	SCC (1)				TCA (2)				TCF (3)			
Type	Treatment group	Control group	Gap	T value	Treatment group	Control group	Gap	T value	Treatment group	Control group	Gap	T value
Not matched	25.92	29.73	-3.81	-4.24***	10.98	13.39	-2.41	-4.44***	7.54	9.69	-2.16	-4.15***
ATT	25.92	28.40	-2.47	-2.46**	10.93	13.81	-2.89	-4.91***	7.47	9.71	-2.24	-3.95***
ATU	29.74	27.76	-1.98		13.65	10.43	-3.22		9.86	7.41	-2.45	
ATE			-2.15				-3.11				-2.37	

Manufacturing companies have more visible suppliers and customers, and more complex supply chain relationships. In order to further illustrate the robustness of the conclusions of this paper, only listed manufacturing companies are used as samples, and the previous model is re-regressed. The regression results are shown in Table. 7. It is found that the coefficients of the explanatory variables

are still significant and consistent with the results of the full sample, thus confirming the robustness of the conclusions of this paper.

Table .7. Regression results of manufacturing enterprises

	SCC（1）	CC（2）	PC（3）	TCA（4）	TCF（5）
input	-0.566*** (-3.049)	-0.563** (-2.270)	-0.568** (-2.461)	-0.699*** (-4.801)	-0.465*** (-3.160)
growth	-0.270 (-0.190)	0.265 (0.140)	-0.770 (-0.437)	3.025*** (2.721)	0.897 (0.797)
lev	-12.10*** (-5.250)	-7.764** (-2.521)	-16.42*** (-5.733)	6.307*** (3.491)	1.141 (0.624)
board	-18.74*** (-2.986)	-19.90** (-2.373)	-17.60** (-2.257)	4.186 (0.851)	6.693 (1.345)
*top*10	4.754* (1.879)	9.307*** (2.752)	0.374 (0.119)	-3.513* (-1.771)	-4.417* (-2.200)
soe	-0.475 (-0.589)	2.447** (2.271)	-3.431*** (-3.425)	-0.439 (-0.695)	-1.015 (-1.587)
age	-5.815*** (-3.606)	-9.251*** (-4.294)	-2.338 (-1.167)	-3.839*** (-3.036)	-3.820** (-2.986)
intercept term	56.61*** (9.629)	58.71*** (7.474)	54.27*** (7.427)	27.73*** (6.015)	25.41*** (5.448)
industry	controlled	controlled	controlled	controlled	controlled
year	controlled	controlled	controlled	controlled	controlled
sample size	959	959	959	959	959
$Adj.R^2$	0.343	0.273	0.291	0.386	0.349
F	11.99	8.06	11.06	7.42	4.09

This paper selects the degree of corporate financing constraints, adopts the stepwise regression method, and builds the model as follows:

$$KZ = a_1 + \beta_1 input_{i,t} + Control + \xi_{i,t} \tag{3}$$

$$TCA_{i,t}\left(TCF_{i,t}\right) = a_2 + \beta_2 input_{i,t} + Control_{i,t} + \xi_{i,t} \tag{4}$$

$$KZ = a_3 + \beta_3 TCA_{i,t}\left(TCF_{i,t}\right) + \beta_4 input_{i,t} + \ Control_{i,t} + \xi_{i,t} \tag{5}$$

For the degree of financing constraints, the KZ index is used to measure. The test results are shown in Table. 8.

Table .8. Intermediary mechanism inspection

	Taking commercial credit assets as an intermediary variable			Taking commercial credit liabilities as an intermediary variable		
	KZ（1）	TCA（2）	KZ（3）	KZ（4）	TCF（5）	KZ（6）
input	-0.162*** (-7.956)	-0.602*** (-5.849)	-0.148*** (-7.257)	-0.162*** (-7.956)	-0.392*** (-3.646)	-0.154*** (-7.606)
TCA			0.0247*** (4.917)			
TCF						0.0200*** (4.160)
growth	-0.696*** (-4.671)	2.429*** (3.250)	-0.741*** (-5.001)	-0.696*** (-4.671)	1.254 (1.605)	-0.723*** (-4.875)
lev	6.784*** (26.953)	6.606*** (5.241)	6.607*** (26.181)	6.784*** (26.953)	1.513 (1.148)	6.741*** (26.904)

board	0.520 (0.760)	2.938 (0.844)	0.460 (0.678)	0.520 (0.760)	5.015 (1.378)	0.419 (0.616)
*top*10	-1.940*** (-6.921)	-1.711 (-1.200)	-1.897*** (-6.818)	-1.940*** (-6.921)	-2.600* (-1.746)	-1.890*** (-6.774)
soe	0.176* (1.831)	0.104 (0.213)	0.171* (1.794)	0.176* (1.831)	-0.760 (-1.499)	0.189* (1.981)
age	0.0883 (0.551)	-0.900 (-1.121)	0.112 (0.707)	0.0883 (0.551)	-0.631 (-0.752)	0.103 (0.646)
intercept term	-1.484** (-2.423)	14.77*** (4.801)	-1.849*** (-3.019)	-1.484** (-2.423)	12.189*** (3.789)	-1.724** (-2.817)
industry	controlled	controlled	controlled	controlled	controlled	controlled
year	controlled	controlled	controlled	controlled	controlled	controlled
sample size	1562	1620	1562	1562	1620	1562
Adj R^2	0.543	0.467	0.550	0.543	0.396	0.567
F	124.29	10.39	113.46	124.29	3.56	112.10

In order to verify the adjustment effect of the horizontal market competition position of enterprises, the regression model is set as follows:

$$cc_{i,t}\left(pc_{i,t}\right)=a_0+a_1 input_{i,t}+a_2 SLI_{i,t}+a_3 input\times SIL_{i,t}+\beta Control_{i,t}+\xi_{i,t} \quad (6)$$

In order to verify the moderating effect of the institutional environment, the regression model is set as follows:

$$ssc_{i,t}\left(pc_{i,t},cc_{i,t},TCA_{i,t},TCF_{i,t}\right)=a_0+a_1 input_{i,t}+a_2 MKT_{i,t}+a_3 input\times MKT_{i,t}+\beta Control_{i,t}+\xi_{i,t} \quad (7)$$

4. Conclusion

Based on the scenario of supply chain relationship, this paper selects enterprises that continuously disclose information on targeted poverty alleviation from 2016 to 2020 as a sample to empirically test the impact of enterprises' participation in targeted poverty alleviation on supply chain relationships. The study found that the participation of enterprises in targeted poverty alleviation will reduce the concentration of the supply chain, and enterprises with a higher horizontal market competition position are more able to reduce the concentration of the supply chain through targeted poverty alleviation. These effects can help companies reduce risk in the dual context of the Covid-19 and China scenarios. The research conclusions of this paper reflect that the government-led market-oriented poverty alleviation mechanism not only brings positive benefits to the society and the public, but also helps enterprises to reduce corporate risks in the dimension of supply chain relations and achieve the dual pursuit of social responsibility and economic goals.

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