



# Research on the Influence of Transnational Technology Merger and Acquisition on the Rate of Domestic Added Value of Chinese Enterprises' Exports

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**Abstract.** As research samples, this paper employs the cross-border technology M&A events of 175 A-share listed companies in Shanghai and Shenzhen from 2007 to 2021. An examination of the effect and process of transnational technology M&A on the rate of domestic added value of enterprises' exports was conducted through the PSM-DID technique. The research indicates that Chinese transnational technology M&A can improve our country's manufacturing rate of domestic added value of enterprises' exports. In addition, this paper shows that there is heterogeneity of firm ownership, firm factor intensity and location.

**Keywords:** transnational technology M&A; the rate of domestic added value of enterprises' exports; PSM-DID

## 1 Introduction

How to measure the position of enterprises in different countries in the global value chain of products and the real profit situation has become an important topic for scholars to explore today. The rate of domestic added value of enterprises' exports this can clearly reflect the real profit of trade to be obtained by countries or enterprises in the global value chain, and reveals our country's status in the global value chain and the profit of significance. The rate of domestic added value of enterprises' exports was studied by Yue Wen (2018) [1] showed that the increase of the enterprise markup rate would lead to the increase of the domestic added value of the enterprise's exports. Bai Dongbei, Wang Jue, Gao Qiang (2020) [2] Innovative research proves that entrepreneurial activities can have a significant positive impact on the rate of domestic added value of enterprises' exports. And research at the industry, national level, Yang Ye and Xie Jianguo (2022) [3] found that the listing of enterprises has a significant inhibitory effect on the domestic value-added rate of exports.

In the new global value chain, a country's position in the division of labor system is determined by its technological level. In the short term, companies use technology can significantly improve their own abilities of breakthrough innovation in strategic emerging industries, which can not only solve their own technical bottlenecks, but also

save a lot of time and unknown capital costs. Technology M&A is a spontaneous behavior of enterprises seeking technological breakthroughs. Foreign scholar Hanelt (2021) [4] has mature research on transnational technology M&A and finds that transnational technology M&A can promote the renewal of enterprises' business models. Technology M&A can promote the process of enterprise digitalization. Banalieva and Dhanaraj (2019) [5] believe that enterprise digitalization will promote enterprise technological innovation. Therefore, it is of great practical and theoretical significance to study the relationship between transnational technology M&A and the rate of domestic added value of enterprises' exports.

## 2 RESEARCH MODEL AND HYPOTHESIS

Compare with independent research and development, the goal of cross-border technology M&A for enterprises is improving their own technological level. Therefore, we can conclude the paper's hypothesis: There is a positive relationship between transnational technology M&A to our country manufacturing the rate of domestic added value of enterprises' exports.

In this paper, refer to the studies in Upward (2013) [6] to measure the RFAV index of foreign value-added rates. The formulas are as follows:

$$\text{RFAV} = \frac{V^F - M^P + M^g}{x^t} \frac{[X^g / (D + X^g)]}{x_t} \quad (1)$$

The sum of foreign value added rate and domestic value added rate of export products is 1, so the specific data of the rate of domestic added value of enterprises' exports can be obtained: RDAV=1-RFAV. Based on the matching data of Guotai 'an CSMAR database, China Customs Import and export Database, and Zephyr merger and acquisition data, Measure the rate of domestic added value of enterprises' exports of 175 listed companies in China from 2007 to 2021.

In this study, the cross-border technical M&A data samples used in this paper come from the Zephyr M&A database, and the M&A events of ST or \* ST enterprises, missing values and unreasonable matching data are excluded. Finally, this paper collates 175 listed manufacturing companies, with a total of 1752 valid samples, and the obtained data is unbalanced sample data. In this paper, Shi Daqian (2018) is referred to as the model construction method, and the regression model is set as follows:

$$\text{RDAV}_{it} = \alpha_0 + \beta_1 \text{didit} + \beta_2 \text{Xit} + \varepsilon_{it} + \text{di} + \text{dt} \quad (2)$$

The paper uses LP method to calculate total productivity of factor. The following control variables are selected: (1) Human capital level (hd); (2) Enterprise duration (age); (3) Return on assets (roa); (4) Enterprise integration management efficiency (ime); (5) Enterprise size (size); Enterprise knowledge absorption capacity (kac); (6) Annual dummy variable (YEAR); (7) Industry dummy variable (IND).

### 3 EMPIRICAL RESULT

#### 3.1 Difference-difference test and robustness test

In Table 1, column (1) indicates that transnational technology M&A is helpful to enhance our country's manufacturing. Column (2) is the results of the rate of domestic added value of enterprises' exports is obtained, it explains the influence between cross-border technological M&A and the rate of domestic added value of enterprises' exports in our country is positive.

In order to reduce the estimation bias of the difference-difference method, this paper further uses the PSM-DID method to test the robustness. The estimated results of columns (3) and (4) of PSM-DID in Table 1 showed no significant difference from the previous results, which further tested and supported the empirical conclusions mentioned above, so companies' cross-border technological M&A promote the rate of domestic added value of enterprises' exports remarkably.

**Table 1.** Regression results of DID and PSM-DID results (Data source: stata17)

	(1)	(2)	(3)	(4)
VAR	rdav	rdav	rdav	rdav
did	0.088*** (6.45)	0.071*** (4.90)	0.111*** (3.79)	0.119*** (3.24)
es		-0.000 (-0.29)		0.000** (2.29)
age		0.004*** (3.70)		0.007*** (3.28)
lme		-0.001 (-1.86)		-0.002*** (-2.94)
kac		-0.000 (-0.58)		-0.000 (-0.20)
roa		0.170 (1.10)		0.170 (1.10)
hd		-0.088 (-1.25)		-0.088 (-1.25)
rr		0.374 (1.31)		0.229 (0.75)
Constant	0.830*** (87.24)	0.768*** (28.64)		0.736*** (19.98)
Observations	1,565	1,558	997	990
R-squared	0.017	0.034	0.014	0.039
code FE	YES	YES	YES	YES
year FE	YES	YES	YES	YES

r2 a	0.0167	0.0288	0.0132	0.0303
F	41.57	7.617	14.36	4.438

### 3.2 Scoring tendency matching

In this paper, the Nearest Neighbor Matching method is used to match 1 to 1. In Table 2, within the observation interval of this paper, the standardization gap of all the characteristic variables after matching is less than 20%, which proves that the robustness test can be carried out by the PSM-DID method in this paper.

**Table 2.** Matching balance test results of all matching feature variables (Data source: stata17)

VAR	SAMPLE	MEAN NUMBER		STANDARD DEVIATION (%)	t
		EXPERIMENTAL GROUP	CONTROL GROUP		
SIZE	BF MATCH	200.28	66.44	34.1	7.88
	AF MATCH	115.21	123.29	-2.1	-0.7
AGE	BF MATCH	17.731	15.485	40.5	6.89
	AF MATCH	17.502	18.271	-12.9	-1.5
IME	BF MATCH	14.746	18.732	-30.6	-4.87
	AF MATCH	14.138	14.054	0.6	0.12
KAC	BF MATCH	23.728	44.762	-18.1	-2.65
	AF MATCH	22.3	21.783	0.4	0.33
ROA	BF MATCH	0.05572	0.05516	0.9	0.15
	AF MATCH	0.05551	0.04844	11.4	1.6
HD	BF MATCH	0.22987	0.10744	69.3	12.98
	AF MATCH	0.21781	0.20164	9.2	1.26
RR	BF MATCH	0.04302	0.02727	40.1	8.11
	AF MATCH	0.04088	0.03866	5.7	1.01

### 3.3 Heterogeneity analysis

The heterogeneity study shows that transnational technology M&A has a significant positive effect on the rate of domestic added value of enterprises' exports, but the promotion effect on private enterprises is better than that on state-owned enterprises; Transnational technology M&A have a positive promoting effect on the rate of domestic added value of enterprises' exports in all regions, but the enterprises located in the east have more benefits and the significance is higher; Transnational technology M&A have significant positive effects on both technology-intensive and capital-intensive enterprises, and negative effects on labor-intensive enterprises. As show in table 3.

**Table 3.** Results of heterogeneity test (Data source: stata17)

VAR	(1) Private ENT	(2) State ENT	(3) Tech ENT	(4) Cap. ENT	(5) L. ENT	(6) East ENT	(7) West ENT
did	0.159*** (6.26)	0.151*** (4.05)	0.143*** (4.43)	0.189*** (5.28)	-0.020 (-0.42)	0.128*** (5.28)	0.063* (1.68)
es	0.000 (0.45)	-0.000 (-1.32)	-0.000 (-0.34)	0.000 (0.22)	-0.002* (-2.01)	-0.000 (-1.15)	0.000 (0.49)
age	0.005*** (2.94)	0.004 (0.95)	0.003* (1.94)	0.015*** (4.71)	0.027*** (4.03)	0.003** (2.32)	0.007* (1.87)
ce	0.003** (2.44)	0.002 (1.16)	-0.001 (-0.61)	0.008*** (5.47)	-0.001 (-0.35)	-0.001 (-0.63)	-0.002 (-1.40)
kac	-0.000 (-0.30)	0.000 (1.12)	-0.000 (-0.24)	0.000 (0.74)	0.000*** (2.70)	0.000 (0.04)	0.0009* (1.67)
roa	-0.214 (-1.47)	-0.356* (-1.76)	-0.210 (-1.25)	-0.217 (-1.11)	-0.280 (-1.16)	-0.308* (-2.38)	0.229 (0.89)
hd	-0.073 (-1.03)	-0.012 (-0.15)	-0.177** (-2.61)	-0.101 (-0.86)	0.280** (2.04)	-0.071 (-1.15)	0.128 (1.45)
Constant	0.018 (0.48)	-0.025 (-0.36)	0.085** (1.97)	-0.281* (-4.41)	-0.121 (-1.25)	0.096*** (2.67)	0.006 (0.09)
Observations	809	341	547	375	214	859	292
R-squared	0.298	0.377	0.200	0.434	0.610	0.307	0.109
code FE	YES	YES	YES	YES	YES	YES	YES
year FE	YES	YES	YES	YES	YES	YES	YES
r2 a	0.262	0.308	0.155	0.381	0.541	0.273	0.0866
F	11.38	5.489	5.367	15.20	6.061	9.342	4.943

## 4 CONCLUSIONS AND SUGGESTIONS

Based on the results of the above regression analysis, this paper draws a conclusion that transnational technology M&A of manufacturing enterprises can have a significant positive effect on the rate of domestic added value of enterprises' exports. In this paper, the heterogeneity analysis shows that the differences of enterprise ownership, enterprise factor intensity and location will lead to different results.

For the government: First, differentiated foreign investment policies should be formulated for different types of enterprises. Second, the government should provide cheap financing for Chinese enterprises to carry out cross-border technology M&A to reduce the pressure on enterprises. For enterprises, first, China's manufacturing enterprises can quickly break through technical barriers by carrying out transnational technology M&A to achieve increased added value of products. Second, Chinese enterprises should choose the target enterprises that fit with their own development, and

choose the appropriate technology M&A methods according to the technical characteristics and technical advantages of the target enterprises. Third, after the merger and acquisition, timely observe the company's operation to avoid conflicts such as system and culture. Fourth, promote the technical learning and exchange of the personnel of the two companies, so as to accelerate the internalization of foreign technical resources into the enterprise's own technical capabilities.

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