Financial Services Investment and Manufacturing Global Value Chain from the Perspective of Data Analysis

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Abstract. It is the general trend for producer services and manufacturing industries to advance together, in which financial services account for 36.3% of the investment in producer services and manufacturing industries., the role has become increasingly prominent. Through empirical analysis, this paper finds that the investment in financial services plays a significant role in promoting the position of China's manufacturing global value chain.

Keywords: financial services; Manufacturing industry; Cost intermediary effect; Fixed effect model; Global value chain position

1 Introduction

In recent years, with the gradual disappearance of demographic dividend, the decline of labor cost advantage and the upsurge of "re-industrialization" in developed countries, China's manufacturing industry is facing increasingly severe challenges. Under this background, more and more scholars began to pay attention to the global value chain status measurement and manufacturing upgrading path and other related issues. In terms of measuring the position of global value chain, scholars respectively measure the position of a country's specific industry in the global value chain from the perspectives of domestic value-added rate of export products and technical complexity of products. Among them, Zhi Wang et al. (2017)[1][2] The status index based on the length of industry-related production has been widely recognized. However, few literatures examine the promotion of manufacturing global value chain status from the perspective of financial service investment. From a macro perspective, financial services can accelerate the GDP growth of small-scale enterprises and their industries by eliminating the growth restriction of enterprises (Beck et al, 2004) [3]. From a micro perspective, Banda and Geoffrey(2013)[4] have proved that financial services are not

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only linked to access to funds, but also the technical capability and complexity of its internal financing channels are important to African local pharmaceutical enterprises. However, the existing literature mainly focuses on production efficiency (Markusen, 1989; Francois and Woerz,2008) [5][6], international competitiveness (Macpherson,2008)[7], industrial agglomeration, studied the impact of producer services on the global value chain position of manufacturing industry as a whole[8][9]. The individual heterogeneity of each sector in producer services is obvious, so the impact of financial service input on the global value chain position of manufacturing industry cannot be investigated through such a holistic study[10], and it is necessary to conduct a special study on financial services[11].

This paper establishes a theoretical and empirical model to describe the relationship between financial service investment and the position of China's manufacturing global value chain. Using WIOD(World Input-Output Database) and UIBE (University of International Business and Economics) and other databases, this paper studies how financial service investment affects the position of global value chain of manufacturing industry by building a panel data model.

The rest of this paper is structured as follows: The second part puts forward the hypothesis of this paper with the help of theoretical model; The third part is the research method, model setting, variable selection and data explanation. The fourth part is the empirical part, which tests whether the hypothesis is correct or not by constructing an econometric model. The fifth part is the conclusion.

2 Research Methods And Model Setting

(A) Model setting

Combined with the previous analysis, this paper constructs the panel data measurement model as follows:

$$GVC\_Pos_{it} = \gamma_0 + \gamma_1 FIN_{it} + \gamma_2 FDI_{it} + \gamma_3 FC_{it} + \gamma_4 AS_{it} + \gamma_5 OPEN_{it} + \gamma_6 ME_{it} + \mu_{it} \quad (1)$$

Among them, it means manufacturing industries, year, and position index of industry year in global value chain; Indicates the complete distribution coefficient of the financial service industry to the industry in; Indicates the capital investment of foreign businessmen, Hong Kong, Macao and Taiwan businessmen in the industry in; Indicates the financing constraint of the industry year; The asset structure of the industry year; Indicates the degree of opening to the outside world in the industry year; Represents a random disturbance

(B) Selection of variables

(1) Explained variable

The position of manufacturing industry in the global value chain is expressed by GVC_Pos position index. This paper draws on the calculation method of a certain industry's position index in a certain country by Zhi Wang et al. (2017)[2]10, and describes it by the relative ratio of the industry's production length based on forward links to that based on backward links in the global value chain. The higher the position

index (GVC_Pos), the higher the position index (GVC _ POS), indicating that the industry is located in the upstream position of the global value chain, and vice versa. The specific formula is as follows:

Where, it indicates the production length of industry year in global value chain based on forward links, and it indicates the production length of industry year in global value chain based on backward links.

(2) Core explanatory variables

The complete distribution coefficient indicates the proportion of the total output of a certain industry as the direct and indirect input of other industries (including this industry) to the total output of this industry. Therefore, in this paper, the financial services sector's input to each manufacturing sector is expressed by the complete distribution coefficient of financial services sector (Fin). Referring to the input-output analysis method of Leontief (1982), the complete distribution coefficient matrix can be obtained.

(3)Control variables

Foreign direct investment (FDI) is expressed by the proportion of the capital of industrial enterprises invested by foreign businessmen, Hong Kong, Macao and Taiwan businessmen to the total output of the industry. Financing constraint (FC) is expressed by the proportion of the net fixed assets of the industry to the total assets of the industry. The larger the index, the smaller the degree of financing constraint. The asset structure (AS) is expressed by the relative proportion of non-fixed assets and fixed assets. The degree of industry openness (OPEN) is expressed by the degree of industry participation in the global value chain. Market environment (ME) is expressed by the number of profitable industrial enterprises above designated size accounting for the total number of industrial enterprises in the industry.

(4) Descriptive statistics and data description of each variable

Table 1. Statistical indicators of each variable

variable	sample size	average value	standard deviation	minimum value	maximum
GVC_Pos	255	0.9178	0.1542	0.6466	1.4421
FIN	255	0.0329	0.0269	0.0043	0.1341
AC	255	0.2432	0.0680	0.1220	0.4472
FDI	255	0.0508	0.0280	0.0046	0.1725
FC	255	0.3282	0.0748	0.1952	0.5591
AS	255	2.0946	0.7405	0.6951	4.0000
$OPEN$	255	0.1478	0.0612	0.0295	0.2866
ME	255	0.1599	0.0543	0.0449	0.2829

Source: The author calculated and sorted through stata.

Descriptive statistics and data description of each variable as shown the table 1. The data used in this paper mainly come from UIBE database, WIOD database, China Industrial Economic Statistical Yearbook and China Statistical Yearbook. Among them, the data of the position and openness of each industry in the global value chain comes from UIBE database; Financial input data comes from the national input-output

table of WIOD database; The data of average production cost per unit output of each industry comes from SEA account in WIOD database; The investment, labor endowment and market environment data of foreign businessmen, Hong Kong, Macao and Taiwan businessmen in various industries come from the annual data of the National Bureau of Statistics; The financing constraints and asset structure data of various industries come from China Industrial Economic Statistical Yearbook and China Statistical Yearbook.

As for the classification standards of manufacturing sectors, the data of major statistical yearbooks in China are not completely consistent with WIOD and UIBE databases. According to the standards of National Economic Industry Classification (GB/T 4754-2017) and International Standard Industry Classification (ISCI Rev4), following the principle of seeking common ground, and referring to classification method of technical level of manufacturing industry, the manufacturing sector is matched and divided as follows the table 2:

Table 2. Industry Matching and Industry Technical Level Classification

International standard industrial classification	National economic industry classification	Industry technical level
C10-C12	C13-C16	Medium and low-tech manufacturing industry
C13-C15	C17-C19	Medium and low-tech manufacturing industry
C16	C20	Medium and low-tech manufacturing industry
C17	C22	Medium and low-tech manufacturing industry
C18	C23	Medium and low-tech manufacturing industry
C19	C25	Medium and low-tech manufacturing industry
C20	C26、C28	High-tech manufacturing industry
C21	C27	High-tech manufacturing industry
C22	C29	Medium and low-tech manufacturing industry
C23	C30	Medium and low-tech manufacturing industry
C24	C31-C32	Medium and low-tech manufacturing industry
C25	C33	Medium and low-tech manufacturing industry

C26	C39-C40	High-tech manufacturing industry
C27	C38	High-tech manufacturing industry
C28	C34-C35	High-tech manufacturing industry
C29-C30	C36-C37	High-tech manufacturing industry
C31-C32	C21、C24、C41	Medium and low-tech manufacturing industry

Source: finishing by the author.

3 Results and analysis of econometric model

In this paper, 255 panel data of 17 manufacturing industries from 2000 to 2014 are used as samples for econometric test. When using panel data to estimate parameters, there are three methods to choose from: mixed regression, fixed effect model and random effect model. Because the mixed regression is based on the premise that there is no individual effect, and the data used in this paper cover different industries, the individual effect must exist, so the fixed effect model and the random effect model are selected.

(A) Benchmark regression and regression results of manufacturing industries with different technical levels

Table 3. Benchmark regression results of financial services inputs

	Regression		Grouping regression			
			Medium and low technical level	Medium and low technical level	High technical level	High technical level
regression equation	(17)	(17)	(17)	(17)	(17)	(17)
Explained variable	GVC_Pos	GVC_Pos	GVC_Pos	GVC_Pos	GVC_Pos	GVC_Pos
FIN	1.3343** (2.48)	1.3890** (2.46)	2.3149** (2.47)	2.3271*** (2.74)	0.0750 (0.34)	2.9867 (1.57)
FDI	-1.2188*** (-3.25)	-1.3115*** (-3.50)	-1.2264** (-2.73)	-1.2905*** (-2.86)	-1.3468*** (-4.13)	-3.8573** (-2.37)
FC	-1.6193*** (-5.73)	-1.5969*** (-5.44)	-1.6796** (-3.16)	-1.7050*** (-3.12)	-1.3691*** (-4.06)	-0.3830 (-0.40)
AS	-0.1652*** (-4.10)	-0.1712*** (-4.22)	-0.1902** (-2.42)	-0.2006** (-2.48)	-0.1164** (-3.75)	-0.0882 (-1.18)
$OPEN$	*-0.3706***	-0.3111***	-0.4428***	-0.3998***	0.1011	0.9461**

	(-4.12)	(-3.22)	(-3.29)	(-3.06)	(0.88)	(2.39)
ME	0.2165	0.2078	0.0708	0.0646	0.6111***	0.6895**
	(1.17)	(1.12)	(0.35)	(0.31)	(4.63)	(2.08)
$\_cons$	1.8280***	1.8596***	1.9700***	1.9950***	1.5058***	1.1087**
	(8.89)	(8.23)	(5.80)	(5.26)	(7.90)	(2.38)
sample number	255	255	165	165	90	90
R^2	0.4724	0.4704	0.4731	0.4723	0.7197	0.2568
F/χ^2value	13.31	70.29	7.46	126.67	-	-
model	FE	RE	FE	RE	FE	RE

Note: * * *, * * and * respectively indicate that the regression coefficients in the regression equation are significant at 1%, 5% and 10% levels, and the values of T or Z statistics are in brackets.

Source: The author calculated and sorted through stata.

As it shown in table 3, the above-mentioned benchmark regression results are analyzed to test the correctness of the above assumptions. The second and third columns in Table 3 are the estimation results of the regression equation with the help of fixed effect model and random effect model, respectively. The coefficients of financial service investment in the two models are all significantly positive at the confidence level of 5%, which indicates that financial service investment (FIN) has significantly improved the position of manufacturing industry in the global value chain.

According to the regression results of control variables in Table 3, foreign direct investment (FDI) has a negative impact on manufacturing global value chain status, with an estimated coefficient of -1.2188 and a significant level of 1%, which means that the increase of foreign direct investment is not conducive to the promotion of manufacturing global value chain status, which is consistent with the above expectations. Financing constraint (FC) has a negative impact on manufacturing global value chain status, with an estimated coefficient of -1.6193 and a significant level of 1%, which means that the higher the level of industry financing constraint, the greater the hindrance to the promotion of manufacturing global value chain status, which is consistent with the above expectations. Structure (AS) has a negative impact on the position of manufacturing industry in global value chain, with an estimated coefficient of -0.1652 and significant at the level of 1%, which means that the larger the proportion of fixed assets in total assets (that is, the smaller), the stronger the boosting force for manufacturing industry to climb in global value chain, which is consistent with the above expectations. The degree of industry openness ($OPEN$) has a negative impact on the position of manufacturing industry in global value chain, with an estimated coefficient of -0.3706 and significant at the level of 1%, which means that the higher the degree of industry openness, the worse the position of manufacturing industry in global value chain, which is inconsistent with the above expectation of coefficient. The reason for this result may be that although the industry is highly open, it mainly participates in the low-end processing and assembly links of the global value chain. At the same time, multinational companies in developed countries in the upstream of the value chain tightly block the core technologies, which makes it difficult for China's manufacturing industry to achieve technological breakthroughs. Finally, the data regression shows inconsistent results with expectations. The market environment has a

positive impact on the promotion of China's manufacturing global value chain, but it is not significant.

Comparing the fourth and sixth columns of Table 3 with the fifth and seventh columns, it can be seen that the impact of financial service investment on manufacturing industries with different technical levels is different, with a significant positive impact on manufacturing industries with medium and low technical levels, and a positive but insignificant impact on manufacturing industries with high technical levels.

(B)The robustness test of benchmark regression

In order to strengthen the persuasiveness of the conclusion, this paper uses two methods to test the robustness of the benchmark regression equation. In order to replace the core explanatory variables, most of the financial services sector's investment in China's manufacturing sector comes from domestic financial services sector, so the domestic financial services distribution coefficient is used instead of the international and domestic overall financial services distribution coefficient. Secondly, both fixed effect and random effect models are used for estimation, and the results are shown in the following table4.

Table 4. Benchmark Regression Robustness Test Results

Explained variable / Explanatory variable	GVC_Pos	GVC_Pos
Financial service investment (FIN_D)	1.3366**	1.3924**
	(2.47)	(2.46)
Control variable	Yes	Yes
$\_cons$	1.8579***	1.8594***
	(8.88)	(8.23)
sample number	255	255
R^2	0.4723	0.4703
F/χ^2 value	13.31	70.23
model	FE	RE

Note: * * *, * * and * respectively indicate that the regression coefficients in the regression equation are significant at 1%, 5% and 10% levels, and the values of T or Z statistics are in brackets.

Source: The author calculated and sorted through stata.

According to the above table and Table 4, there is no difference between the sign and significance of financial service input coefficient and the results listed in Table 3, and the increase of input has significantly improved the position of China's manufacturing industry in the global value chain.

4 Conclusion

With the help of panel data fixed effect model, this paper analyzes the influence of financial service investment on the position of China's manufacturing industry in the global value chain theoretically and empirically, and draws the following conclusions: (1) The increase of financial service investment helps to improve the position of China's manufacturing industry in the global value chain. (2) Financial service investment has a significant direct positive effect on the promotion of China's manufacturing global value chain status. (3) Foreign direct investment, financing constraints, asset structure and the level of industry opening to the outside world have significant negative impacts on the position of China's manufacturing global value chain.

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