ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

Research on Financial Services Investment and the Global Value Chain Position of Manufacturing Industry

Lina Yu[1], Yuxi Yin[1], Tao Wang[2, *], Wei Ding[2], Xin Sun[2]

[1] Ocean University of China, School of Economics, Qingdao 266100, China

[2] Hanyang University, Seoul, 04763, Republic of Korea

LY, YY, TW, WD and XS, these authors are co-first authors.

*Corresponding author: Email: oucwangtao@163.com

Abstract

The collaborative development between productive services and manufacturing is an inevitable trend, with financial services accounting for 36.3% of productive services' investment in manufacturing, and their role is increasingly prominent. Through theoretical and empirical analysis, this paper finds that financial services investment has significantly improved the position of China's manufacturing industry in the global value chain, and this effect is multidimensional, including both the direct effect of "financial services - global value chain position" and the mesomeric effect through the average production cost. The research results indicate that financial service investment can not only directly have a significant positive impact on the global value chain position of China's manufacturing industry, but also indirectly have a significant positive impact on the global value chain position of China's manufacturing industry by reducing the average production cost of manufacturing products, and this result is consistent with the theoretical expectations. The study also found that there are differences in the impact of financial service investment on manufacturing at different technological levels.

Keywords

Financial Services; Manufacturing Industry; Mediated Effect of Cost; Fixed Effects Model; Position in the Global Value Chain.

1. Introduction

Since the beginning of 2020, COVID-19 virus has broken out worldwide, and all major economies have been greatly impacted. At the same time, China's labor cost advantage has decreased, while facing anti globalization trends and trade frictions with major trading partners, China's manufacturing industry is facing increasingly severe challenges. Against this backdrop, more and more scholars are paying attention to issues related to measuring the status of the global value chain and improving the path of the manufacturing industry. In terms of measuring the position of the global value chain, Zhi Wang et al. (2017) have widely recognized the position index constructed based on the length of industry related production. On the issue of influencing factors on the global value chain position of the manufacturing industry, researchers mainly focus on trade costs, intellectual property protection, economic policies, industrial agglomeration , FDI, entrepreneurship. Research on trade frictions and other aspects. At the same time, some scholars also focus on factors such as human capital, technological innovation, institutional environment, and government public service level.

However, there is limited literature examining the issue of enhancing the global value chain status of manufacturing from the perspective of financial service investment. As the core sector of producer services, the financial services sector covers a wide range of service activities,

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

including insurance, reinsurance and other activities, holding companies and other activities. Compared to other developed countries, the added value of China's manufacturing industry at the core of the global value chain needs to be improved, and the deep integration of financial services and manufacturing provides a good opportunity for China's manufacturing industry to effectively increase its share of added value and move towards higher end links in the value chain. Specifically, in the upstream of China's manufacturing value chain, financial services investment can assist enterprises in direct or indirect financing through loans, issuing stocks, bonds, or funds, laying a solid foundation for enterprise research and development activities, and serving as a booster for China's manufacturing sector to climb the global value chain; In the middle reaches of China's manufacturing value chain, the addition of financial services as advanced production factors can achieve more efficient operation of the manufacturing sector, promote production structure optimization, improve resource allocation efficiency, and ultimately achieve an improvement in the overall efficiency of the manufacturing industry; In the downstream of China's manufacturing value chain, for export enterprises, the efficient operation of financial services such as trusts can help reduce losses caused by uncertain factors such as exchange rates and lower export costs. At the same time, financial services have a keen insight into risks, which can enhance the risk prevention and control capabilities of enterprises, making Chinese manufacturing products more competitive on the world stage. The role played by financial service investment runs through the manufacturing value chain and plays a crucial role in unblocking the domestic circulation of China's manufacturing industry and achieving high-quality development of the manufacturing industry. The investment in financial services promotes the strengthening of China's manufacturing industry, further enhancing the irreplaceability of China's intermediate and final products in the global value chain, and is a necessary condition for China's manufacturing industry to participate more deeply in the international cycle. However, existing literature mainly studies the overall impact of producer services on the global value chain position of manufacturing. The heterogeneity of individual sectors in the productive service industry is significant, and the impact of financial service investment on the global value chain position of the manufacturing industry cannot be examined through such a holistic study. Instead, specialized research is needed on the financial service industry.

To fully leverage the role of financial services investment and further enhance the position of China's manufacturing industry in the global value chain, the following three key questions need to be answered: firstly, is the increase in financial services investment in various sectors of the manufacturing industry conducive to the latter's climb in the global value chain? Secondly, does the impact of financial services on the manufacturing industry play a role through average production costs? Thirdly, is the impact path of financial services on manufacturing at different technological levels consistent with the overall manufacturing industry? In order to make the answer more convincing, this article establishes a theory to characterize the relationship between financial service investment and the global value chain position of China's manufacturing industry; Using WIOD (World Input Output Database), UIBE (University of International Business and Economics) and other databases, this paper studies how financial services investment affects the position of the manufacturing industry in the global value chain by building a mesomeric effect model mechanism test. This not only helps to improve the global value chain theory, but also helps government agencies to organically integrate financial services industry development policies with manufacturing global value chain enhancement policies.

The marginal contribution of this study is as follows: firstly, based on the CES Production function, theoretical analysis is conducted on how financial services affect the average production cost, and empirical tests are conducted according to manufacturing industries with different technical levels; The second is to use the average production cost as an intermediary

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

variable to analyze the transmission mechanism of the impact of financial services on the position of the manufacturing industry in the global value chain, and use the data of China's manufacturing industry from 2000 to 2014 for quantitative analysis to empirically test the mesomeric effect of the average production cost; The third is to distinguish the impact of financial services on the global value chain position of manufacturing at different technological levels. The remaining structure of this article is as follows: The second part proposes the hypotheses of this article using a 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 the correctness of hypotheses by constructing an econometric model; The fifth part is the conclusion.

2. The Impact of Financial Services Investment on the Global Value Chain Position

2.1. New Division of Global Value Chains

With the closer connection between the manufacturing and service sectors (Guerrierieri and Meliciani, 2005), the manufacturing and service sectors are no longer two independent operating sectors (Castellacci, 2008). This article draws inspiration from Castellacci's classification method and constructs two dimensions to illustrate the relationship between manufacturing and financial services.

2.2. Financial Services Investment and the Global Value Chain Position of China's Manufacturing Industry

2.2.1. Analysis of Typical Facts

In 2014, the investment level of financial services in China's manufacturing sector measured by the full Partition coefficient was 4.20%, while that measured by the direct Partition coefficient was only 1.56%. At the same time, there is a significant difference in the level of financial service investment among various sectors of the manufacturing industry. High tech manufacturing sectors such as computers, electronic products, and optical products are at the forefront, while low to medium tech manufacturing industries such as wood, wood products, and cork products are at the bottom.

Generally speaking, there is a positive correlation between the level of financial service investment and the global value chain position and explicit comparative advantage of the manufacturing industry. Industries with high levels of investment in financial services, such as the manufacturing of base metals, are located upstream of the global value chain and have significant explicit comparative advantages. Industries with lower levels of investment in financial services, such as textile and clothing manufacturing, are located lower in the global value chain and have less dominant comparative advantages in international competition.

Based on the above analysis, the first hypothesis of this article is drawn:

Hypothesis 1: Increasing investment in financial services has a total positive effect on the improvement of China's manufacturing industry's position in the global value chain.

2.2.2. Theoretical Mechanism Analysis

In terms of direct effects, the direct positive effect of financial service investment on the global value chain position of the manufacturing industry mainly has the following three channels of action: the first is the production factor channel. Financial services, as a knowledge and technology intensive high-end production factor, are invested in the production process of the manufacturing industry, directly improving the quality of the latter's factor endowment and the technological content of its products, and enhancing its global value chain position. The second is risk control and transaction cost channels. Since joining the World Trade Organization in

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

2001, China has gradually relaxed its control over financial service sectors such as banking and insurance, allowing foreign enterprises to enter the market, and the increase in participants has brought about a competitive effect of survival of the fittest in the market; In addition, Premier Li Keqiang clearly pointed out in the Government Work Report that the overall advancement of key tasks such as accelerating the reform of key financial areas and key links, accelerating the development of multi-level capital markets, and strengthening and improving financial supervision has led to an upward trend in the efficiency and quality of the financial services sector's supply of services. High quality and efficient dual high financial service investment can help downstream manufacturing enterprises reduce market risks faced by sales, improve their risk resistance, create a favorable environment for manufacturing enterprises in international competition, and promote their position in the global value chain. For manufacturing export enterprises, efficient financial services such as collection can help them complete transactions as soon as possible, avoid increased transaction costs caused by exchange rate fluctuations in the international market, and improve the competitiveness of the manufacturing products in the international market. The third is the channel for financial support. Financial services can provide various sources of funding for manufacturing enterprises, providing financial support for their continued normal operation, and thereby enhancing their global value chain position.

The above channels of direct effects can be summarized as follows:

Hypothesis 2: Increasing investment in financial services can have a direct positive effect on the global value chain position of China's manufacturing industry.

In order to analyze the impact of financial service input on the average production cost of manufacturing enterprises, this paper constructs a theoretical model from the perspective of mesomeric effect. First, we assume that the Production function of a representative manufacturing enterprise is the CES (fixed substitution rate) Production function with constant Returns to scale, and simplify the production factors into two types: financial service input measured by the number of labor and other production factors. To sum up, the CES Production function of the enterprise is constructed as follows:

$$Y = f(F,M) = A[\alpha F^{\rho} + (1-\alpha)M^{\rho}]^{\frac{1}{\rho}} \tag{1}$$

Among them, A the technological progress parameters given by the exogenous are $.A > 0$; α and $(1-\alpha)$The parameters used to describe the relative importance of financial services (F) to other production factors (M) are all greater than zero; ρ Alternative parameters for two production factors.

Assuming further that the unit price of financial services is P and the unit price of other production factors is V, the total cost of production for representative manufacturing enterprises can be expressed as:

$$C(P,V) = PF + VM \tag{2}$$

(1) Cost from a Price Perspective

Enterprises that choose output for production and pursue cost minimization will choose a combination of the following two production factors:Q

$$C_{Min}(P,V) = PF + VM$$
$$s.t. f(F,M) = A[\alpha F^{\rho} + (1-\alpha)M^{\rho}]^{\frac{1}{\rho}} = Q$$

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

Construct Lagrange function:

$$L(P,V,\lambda) = PF + VM + \lambda\{Q - A[\alpha F^{\rho} + (1-\alpha)M^{\rho}]^{\frac{1}{\rho}}\} \tag{3}$$

$$\frac{\partial L}{\partial F} = P - \frac{\lambda A}{\rho}[\alpha F^{\rho} + (1-\alpha)M^{\rho}]^{\frac{1-\rho}{\rho}} \alpha\rho F^{\rho-1} = 0 \tag{4}$$

$$\frac{\partial L}{\partial M} = V - \frac{\lambda A}{\rho}[\alpha F^{\rho} + (1-\alpha)M^{\rho}]^{\frac{1-\rho}{\rho}} (1-\alpha)\rho M^{\rho-1} = 0 \tag{5}$$

$$\frac{\partial L}{\partial \lambda} = Q - A[\alpha F^{\rho} + (1-\alpha)M^{\rho}]^{\frac{1}{\rho}} = 0 \tag{6}$$

According to equations (4), (5), and (6), the representative manufacturing enterprises in terms of production output will choose the input of financial services and other production factors as follows:Q

$$F = \frac{Q}{A}\{\alpha + (1-\alpha)[\frac{(1-\alpha)P}{\alpha V}]^{\frac{\rho}{1-\rho}}\}^{-\frac{1}{\rho}} \tag{7}$$

$$M = \frac{Q}{A}\{\alpha[\frac{(1-\alpha)P}{\alpha V}]^{\frac{-\rho}{1-\rho}} + (1-\alpha)\}^{-\frac{1}{\rho}} \tag{8}$$

FSubstituting into the cost function yields:$MC(P,V)$

$$C(P,V) = PF + VM = \frac{PQ}{A}\{\alpha + (1-\alpha)[\frac{(1-\alpha)P}{\alpha V}]^{\frac{\rho}{1-\rho}}\}^{-\frac{1}{\rho}} + \frac{VQ}{A}\{\alpha[\frac{(1-\alpha)P}{\alpha V}]^{\frac{-\rho}{1-\rho}} + (1-\alpha)\}^{-\frac{1}{\rho}} \tag{9}$$

Divide equation (9) by the average production cost:QAC

$$AC = \frac{P}{A}\{\alpha + (1-\alpha)[\frac{(1-\alpha)P}{\alpha V}]^{\frac{\rho}{1-\rho}}\}^{-\frac{1}{\rho}} + \frac{V}{A}\{\alpha[\frac{(1-\alpha)P}{\alpha V}]^{\frac{-\rho}{1-\rho}} + (1-\alpha)\}^{-\frac{1}{\rho}} \tag{10}$$

Derived from equation (10) for the price deviation of financial services:

$$\frac{\partial AC}{\partial P} = \frac{1}{A}\left\{\alpha + (1-\alpha)\left[\frac{(1-\alpha)P}{\alpha V}\right]^{\frac{\rho}{1-\rho}}\right\}^{-\frac{1}{\rho}}$$

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

$$-\frac{1}{A}\left\{\alpha+(1-\alpha)\left[\frac{(1-\alpha)P}{\alpha V}\right]^{\frac{\rho}{1-\rho}}\right\}^{-\frac{1}{\rho}-1}\frac{1-\alpha}{1-\rho}[\frac{(1-\alpha)P}{\alpha V}]^{\frac{\rho}{1-\rho}}$$

$$+\frac{1}{A}\left\{\alpha\left[\frac{(1-\alpha)P}{\alpha V}\right]^{\frac{-\rho}{1-\rho}}+(1-\alpha)\right\}^{-\frac{1}{\rho}-1}\left[\frac{(1-\alpha)P}{\alpha V}\right]^{\frac{-\rho}{1-\rho}-1}(\frac{1-\alpha}{1-\rho})>0 \qquad (11)$$

In the manufacturing market, assuming that the demand for financial services by various manufacturing enterprises is and the supply of financial services is, as shown in the following figure:$F^d=a+bPF^s=c+dP$

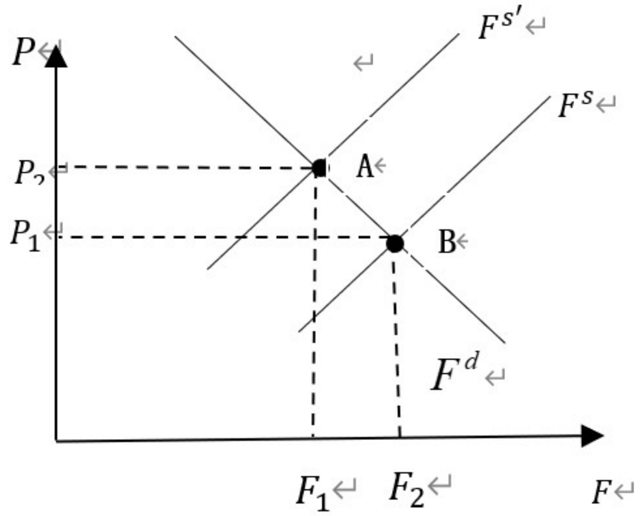

Figure 1. Direction of Balanced Changes in Financial Services

In the manufacturing market, the initial equilibrium price of financial services is P_1, the equilibrium output is F_1, and only the impact of increased supply of financial services on the unit price of the production factor is considered. According to Figure 1, with the increase of the supply of financial services, the price of financial services once again reaches the Equant B is P_2, and the equilibrium output is F_2. Compared with the initial Equant A, the price drops,$P_2 < P_1$

In summary, the following conclusions can be drawn:

According to Figure 1, the increase in investment in manufacturing by financial services has led to a decrease in the price of financial services. According to the derivation of equation (11), the decrease in financial service prices can ultimately reduce the average production cost of manufacturing enterprises.

(2) Cost from the perspective of technological progress

The above analysis was conducted under the hypothesis that the technical parameter A remains unchanged. The model is now extended to a more general level - incorporating technological progress into the model's consideration. Some scholar believes that the investment of financial services in manufacturing enterprises provides financial support for product innovation and new technology research and development to a certain extent, in order to ensure that the enterprise can carry out sustained and stable technological innovation in the long term. At the same time, as a technology intensive production factor, the increase in investment in financial services has changed the factor structure of various sectors in the manufacturing industry, resulting in a higher degree of matching between various factors, thereby promoting

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

technological progress and innovation. Therefore, rewrite technical parameter A as a function of financial service investment, i.e. (F), and substitute it into equation (10) to obtain: $A(F) = e^{\theta F}\theta > 0$

$$AC = \frac{P}{e^{\theta F}}\{\alpha + (1-\alpha)[\frac{(1-\alpha)P}{\alpha V}]^{\frac{\rho}{1-\rho}}\}^{-\frac{1}{\rho}} + \frac{V}{e^{\theta F}}\{\alpha[\frac{(1-\alpha)P}{\alpha V}]^{\frac{-\rho}{1-\rho}} + (1-\alpha)\}^{-\frac{1}{\rho}} \tag{12}$$

Taking the partial derivative of F in equation (12) yields:

$$\frac{\partial AC}{\partial F} = \frac{-\theta P}{e^{\theta F}}\{\alpha + (1-\alpha)[\frac{(1-\alpha)P}{\alpha V}]^{\frac{\rho}{1-\rho}}\}^{-\frac{1}{\rho}} - \frac{\theta V}{e^{\theta F}}\{\alpha[\frac{(1-\alpha)P}{\alpha V}]^{\frac{-\rho}{1-\rho}} + (1-\alpha)\}^{-\frac{1}{\rho}} < 0 \tag{13}$$

From this, it can be seen that the increase in investment in financial services brings about an increase in technological innovation level, there by reducing the average cost of products for manufacturing enterprises.

Based on the above analysis, the third hypothesis of this article is summarized.

Hypothesis 3: Financial services, as a high-level input factor in various sectors of the manufacturing industry, reduce the average production cost per unit of production value of the manufacturing industry, improve the competitiveness of China's manufacturing industry in the international market, and become the source of strength for China's manufacturing industry to further climb in the global value chain. Therefore, iIncreasing investment in financial services can have an indirect positive effect on the global value chain position of China's manufacturing industry by reducing average production costs.

The above analysis considers all sectors of the manufacturing industry as homogeneous entities. In reality, various sectors of China's manufacturing industry are at different technological levels, and the types, quantities, and matching degrees of various production factors used within the departments vary greatly. Especially for the utilization rate of financial services, an advanced factor of production, there will inevitably be differences among different industries, and the impact of financial service investment on manufacturing at different technological levels may not be consistent. Therefore, the final hypothesis of this article is drawn.

Hypothesis 4: There are differences in the impact of financial services investment on the global value chain position of manufacturing industries at different technological levels.

3. Research Methods and Model Settings

3.1. Research Methods

In order to further study the path through which financial services affect the global value chain position of China's manufacturing industry, this paper uses the mesomeric effect analysis method of Wen Zhonglin and Ye Baojuan (2014) [24] to study whether financial services will directly or indirectly affect the global value chain position of China's manufacturing industry through the intermediary of average production costs.

$$Y = \gamma X + \mu_{it} \tag{14}$$

$$M = \alpha X + \delta_{it} \tag{15}$$

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

$$Y = \gamma' X + \beta M + \varepsilon_{it} \tag{16}$$

3.2. Model Settings

Based on the above analysis, this paper builds an econometric model based on the mesomeric effect model as follows:

$$GVC\_Pos_{it} = \gamma_0 + \gamma_1 FIN_{it} + \gamma_2 FDI_{it} + \gamma_3 FC_{it} + \gamma_4 AS_{it} + \gamma_5 OPEN_{it} + \gamma_6 ME_{it} + \mu_{it} \tag{17}$$

$$AC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 FDI_{it} + \alpha_3 FC_{it} + \alpha_4 AS_{it} + \alpha_5 OPEN_{it} + \alpha_6 ME_{it} + \delta_{it} \tag{18}$$

$$GVC\_Pos_{it} = \beta_0 + \gamma_1' FIN_{it} + \beta_1 AC_{it} + \beta_2 FDI_{it} + \beta_3 FC_{it} + \beta_4 AS_{it} + \beta_5 OPEN_{it} + \beta_6 ME_{it} + \varepsilon_{it} \tag{19}$$

Among them, represents various industries in the manufacturing industry, represents the year, and represents the position index of the industry in the global value chain in the year; Represents the full Partition coefficient of the financial services industry to the industry in; Represents the average production cost per unit of annual output value in the industry; Represents the capital investment of foreign investors, Hong Kong, Macao, and Taiwan businessmen in the industry in the year; Represents the financing constraints of the industry year; Represents the asset structure of the industry year; Indicates the degree of openness of the industry year to the outside world; Represent random perturbation terms separately.

3.3. Variable Selection

3.3.1. The Dependent Variable

The Position of Manufacturing in the Global Value Chain Using GVC_ Pos status index refers to the calculation method used by Zhi Wang et al. (2017) for the position index of a certain industry in the global value chain, which is described by the relative ratio of the production length based on forward linkages to that based on backward linkages in the global value chain. The higher the status index (GVC_Pos), the higher the position of the industry in the upstream of the global value chain, and vice versa. The specific diagram is as follows: $GVC\_Pos_{it} = \frac{PLv\_GVC_{it}}{PLy\_GVC_{it}}$.

Among them, $PLv\_GVC_{it}it$ represents the production length of the industry year in the global value chain based on forward linkages, and $PLy\_GVC_{it}it$ represents the production length of the industry year in the global value chain based on backward linkages.

3.3.2. Core Explanatory Variables

The full Partition coefficient indicates the proportion of direct and indirect inputs to the total output of an industry as other industries (including the industry) in the total output of this industry. Therefore, the financial services sector's inputs to each manufacturing sector in this paper are expressed by the full Partition coefficient (Fin) of the financial services sector. Referring to Leontief's (1982) input-output analysis method, the complete Partition coefficient matrix can be calculated as follows:

3.4. Control Variables

Foreign direct investment (OFDI) is expressed as the proportion of capital invested by foreign investors and Hong Kong, Macao, and Taiwan businessmen in industrial enterprises to the total output of the industry. Foreign funded enterprises, represented by transnational corporations, have made some domestic funded enterprises' human Capital outflow with higher salaries and stricter staff training standards, resulting in a shortage of technical and managerial personnel

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

in domestic funded industrial enterprises. In addition, some foreign-funded enterprises leverage their inherent advantages in the upstream and downstream of the global value chain, which is not conducive to the deep participation of local enterprises in the global value chain (Yu Pei et al., 2020), and is not conducive to the upgrading of China's manufacturing industry in the global value chain. Therefore, expectations have a negative impact on. Financing constraints () are expressed as the proportion of the net value of fixed assets in the industry to the total assets of the industry. The larger the indicator, the smaller the degree of financing constraints. According to Lv Yue et al. (2016), fixed assets are regarded as one of the important indicators for measuring the difficulty of obtaining mortgage loans for enterprises in the industry. The larger the net value of fixed assets, the stronger the credit capacity of the enterprise, and the smaller the financing constraints faced by the enterprise. The enterprise will have sufficient funds to strive to improve its position in the global value chain. Therefore, expectations have a negative impact on. The asset structure is represented by the relative proportion of non fixed assets to fixed assets. Manufacturing enterprises generally expand their production scale through the expansion of fixed assets to achieve economies of scale (Zhang Hongli et al., 2008). The realization of economies of scale refers to an increase in the relative proportion of fixed assets, which is beneficial for reducing production costs of manufacturing enterprises and enhancing their international competitiveness; Therefore, expectations have a negative impact on. The degree of industry openness is expressed by the industry's participation in the global value chain. According to Zhang Jianqiang (2019), the higher the participation of an industry in the global value chain, the more it participates in international division of labor, and it is more likely to be in a core position in international division of labor, which is expected to have a positive impact. The market environment is represented by the proportion of profitable industrial enterprises above designated size to the total number of industrial enterprises in the industry.

(4) Descriptive statistics and data explanation for each variable

Table 1. Statistical indicators of each variable

variable	sample size	average value	standard deviation	minimum value	Maximum value
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: Author calculated and organized through stata.

The data used in this article mainly comes from the UIBE database, WIOD database, China Industrial Economic Statistical Yearbook, and China Statistical Yearbook. Among them, data on the status and openness of various industries in the global value chain comes from the UIBE database; Financial service input data comes from the national input-output table in the WIOD database; The data on the average production cost of each industry unit output comes from the SEA account in the WIOD database; The investment, labor endowment, and market environment data of foreign investors and Hong Kong, Macao, and Taiwan businessmen in various industries are sourced from the annual data of the National Bureau of Statistics; The financing constraints and asset structure data of various industries are from the "China Industrial Economy Statistical Yearbook" and "China Statistical Yearbook".

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

In terms of classification standards for various departments in the manufacturing industry, the data from major statistical yearbooks in China are not completely consistent with the WIOD and UIBE databases. According to the National Economic Industry Classification (GB/T 4754-2017) and the International Standard Industrial Classification Fourth Edition (ISCI Rev4) standards, following the principle of seeking common ground, and referring to the classification method of Yang Renfa and Wang Qingqing (2018) on the technical level of the manufacturing industry, the manufacturing sector is matched and divided as follows:

Table 2. Industry Matching and Industry Technical Level Classification

International Standard Industrial Classification	Classification of National Economic Industries	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: Compiled by the author.

4. Quantitative Model Results and Analysis

This paper uses 255 panel data from 17 manufacturing industries from 2000 to 2014 as samples for measurement test. When using Panel data to estimate parameters, there are three methods to choose from: mixed regression, fixed effect model and random effect model. Since mixed regression assumes the absence of individual effects, and the data used in this article covers different industries, individual effects are inevitable. Therefore, fixed effects models and random effects models are chosen.

(1) Benchmark regression and manufacturing industry regression results with different technological levels

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

Table 3. Benchmark Regression Results of the Impact of Financial Services Investment on the Global Value Chain Position of China's Manufacturing Industry as a Whole and at Different Technical Levels

	Benchmark regression		Group regression			
			Medium to low technical level	Medium to low technical level	High technical level	High technical level
regression equation	(17)	(17)	(17)	(17)	(17)	(17)
Dependent 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*** (-4.12)	-0.3111*** (-3.22)	-0.4428*** (-3.29)	-0.3998*** (-3.06)	0.1011 (0.88)	0.9461** (2.39)
ME	0.2165 (1.17)	0.2078 (1.12)	0.0708 (0.35)	0.0646 (0.31)	0.6111*** (4.63)	0.6895** (2.08)
$\_cons$	1.8280*** (8.89)	1.8596*** (8.23)	1.9700*** (5.80)	1.9950*** (5.26)	1.5058*** (7.90)	1.1087** (2.38)
Number of samples	255	255	165	165	90	90
R^2	0.4724	0.4704	0.4731	0.4723	0.7197	0.2568
F/χ^2	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 the 1%, 5%, and 10% levels. The values in parentheses represent the t or z statistics.

Source: Author calculated and organized through stata.

Analyze the benchmark regression results mentioned above to test the correctness of the previous hypothesiss. The second and third columns of Table 3 are the estimated results of regression equation (17) using fixed effects models and random effects models, respectively. The coefficients of financial services investment (FIN) in both models are significantly positive at a confidence level of 5%, indicating that financial services investment (FIN) significantly enhances the position of manufacturing in the global value chain. Verified hypothesis one.

From the regression results of Table 3 on the control variables. The degree of industry openness (FDI) has a negative impact on the global value chain position(FC) of the manufacturing industry(AS), which is inconsistent with the expectations of the coefficient mentioned above$OPEN$. The reason for this result may be that although the industry has a high degree of openness($OPEN$), it mainly participates in the low-end processing and assembly links of the global value chain. At the same time, multinational companies from developed countries upstream of the value chain tightly block core technologies, making it difficult for China's manufacturing industry to achieve technological breakthroughs. The final data regression

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

shows inconsistent results with expectations. The market environment(ME) has a positive impact on the improvement of China's manufacturing industry's global value chain position, 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 there are differences in the impact of financial service investment on manufacturing industries with different technological levels. The impact on manufacturing industries with medium to low technological levels is significantly positive, while the impact on high-tech manufacturing industries is positive but not significant.

(2) Robustness testing of benchmark regression

To enhance the persuasiveness of the conclusion, this article uses two methods to perform robustness tests on the benchmark regression equation. The first is to replace the core explanatory variable. Since most of the financial services sector's inputs to China's manufacturing sectors come from domestic financial services, the domestic Partition coefficient of financial services is used to replace the international and domestic overall Partition coefficient of financial services. The second is to use both fixed effects and random effects models for estimation, and the results are shown in the table below.

Table 4. Results of benchmark regression robustness test

Explanatory variable \ Dependent variable	GVC_Pos	GVC_Pos
Financial service investment (FIN_D)	1.3366** (2.47)	1.3924** (2.46)
control variable	Yes	Yes
$\_cons$	1.8579*** (8.88)	1.8594*** (8.23)
Number of samples	255	255
R^2	0.4723	0.4703
F/χ^2	13.31	70.23
model	FE	RE

Note: * * *, * * and * respectively indicate that the regression coefficients in the regression equation are significant at the 1%, 5%, and 10% levels. The values in parentheses represent the t or z statistics.

Source: Author calculated and organized through stata.

According to the above table and Table 4, there is no difference in the symbol and significance of the financial services investment coefficient compared to the results listed in Table 3. The increase in investment has significantly improved the global value chain position of China's manufacturing industry.

(3) Regression results of the overall mesomeric effect of China's manufacturing industry

Based on the hypothesiss made above, this paper describes part of the mesomeric effect of financial services input, and testing part of the mesomeric effect requires estimating the parameters of equations (17), (18) and (19). To obtain the most accurate estimation results, further screening is necessary. The Hausman test was performed on two econometric models, resulting in a value of 29.30 and a P-value of 0.0001. The final decision was to use a fixed effects model to estimate the parameters.χ^2.

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

Table 5. The direct impact of financial services input on the position of China's manufacturing industry in the global value chain and the regression results of mesomeric effect

regression equation Dependent variable	(17) GVC_Pos	(18) AC	(19) GVC_Pos
FIN	1.3343** (2.48)	-0.9665*** (-2.98)	1.2251** (2.25)
AC			-0.1130 (-0.60)
FDI	3.7450*** (-3.25)	0.0609 (0.48)	-1.2120*** (-3.26)
FC	-1.6193*** (-5.14)	0.2532** (2.91)	-1.5907*** (-5.52)
$OPEN$	-0.3706*** (-4.12)	-0.0644 (-0.91)	-0.3778*** (-4.05)
AS	-0.1652*** (-4.10)	0.0039 (0.29)	-0.1648*** (-4.14)
ME	0.2165 (1.17)	0.2909*** (3.93)	0.2494 (1.47)
$\_cons$	1.8580*** (8.83)	0.1260** (2.34)	1.8722*** (8.96)
Number of samples	255	255	255
R^2	0.4724	0.6186	0.4743
F-value	13.31	35.21	13.97
model	FE	FE	FE

Note: * * *, * * and * respectively indicate that the regression coefficients in the regression equation are significant at the 1%, 5%, and 10% levels. The values in parentheses represent the t-statistic.

Source: Author calculated and organized through stata.

Table 5 reports the test results of the impact path of financial services investment on the global value chain position of China's manufacturing industry. The first column is the estimated result of regression equation (17) that does not include the average production cost (AC) of the industry. At a confidence level of 5%, the coefficient of financial services investment (FIN) is significantly positive, indicating that financial services investment (FIN) significantly enhances the position of the manufacturing industry in the global value chain. The second column of Table 5 shows the estimated results of regression equation (18). At a confidence level of 1%, the coefficient of financial service investment (FIN) is significantly negative, indicating that an increase in financial service investment (AC) significantly reduces the average production cost of the manufacturing industry. The third column of Table 5 is the estimated result of equation (19) after adding the average production cost of the manufacturing industry (AC). At the 5% confidence level, the coefficient of financial service input (FIN) is significantly positive, but the coefficient of the average production cost of the manufacturing industry (AC) is not significant. At this time, it is necessary to test whether some mesomeric effect exist.

Fritz & MacKinnon (2007) compared the sample size required by six methods to test mesomeric effect, including Baron & Kenny method, sequential test method, Sobel method, multiplicative integral distribution method, nonparametric percentile Bootstrap method and deviation corrected nonparametric percentile Bootstrap method, when reaching the same level of testing

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

force through simulation experiments. MacKinnon et al. Therefore, this paper successively uses the multiplicative integral distribution method, the nonparametric percentile Bootstrap method and the bias corrected nonparametric percentile Bootstrap method to test the mesomeric effect. The three methods are used to test whether the original hypothesis is zero or not. If the calculated confidence interval does not contain zero, it proves that the mesomeric effect is significant.I$\alpha_1\beta_1$.

The 95% confidence interval of the test results of the multiplicative integral distribution method, the nonparametric percentile Bootstrap method and the bias corrected nonparametric percentile Bootstrap method does not include zero, indicating that the mesomeric effect of the average production cost ($\alpha_1\beta_1$) of the manufacturing industry is significant and the size of the mesomeric effect is 0.1092. Comparing the first and third columns of Table 5, it can be found that when the average production cost (AC) is added to the equation, the coefficient of financial services investment (FIN) decreases. This means that the direct impact of financial services investment on the global value chain position of the manufacturing industry is not as large as in regression equation (17), but its coefficient (γ'_1) is still significantly positive. It can be considered that after incorporating the average production cost of the manufacturing industry (FIN) into the influencing factors, The investment in financial services still has a positive impact on the global value chain position of the manufacturing industry, with a significant direct effect. To sum up, financial service input (FIN) can not only directly have a positive impact on the global value chain status of the manufacturing industry, but also have a positive impact on the global value chain status of the manufacturing industry by reducing the average production cost. The mesomeric effect accounts for 8.2%. Hypothesis 2 and Hypothesis 3 of this article are correct.

(4) An Analysis of the mesomeric effect of Financial Service Input on Manufacturing Industry with Different Technical Levels

The fixed effect model and Bootstrap method are used to test whether the mesomeric effect of financial service input on manufacturing industry at different technological levels exists and whether it is transmitted through the path of average production cost. The results are shown in the table below.

Firstly, for the manufacturing industry with medium to low technological levels, the regression coefficient of financial services investment on its global value chain position is positive (2.0914) and significant at the 5% level, indicating a significant direct positive effect. Since the estimated parameters of financial service input (Fin) and average production cost (AC) in the regression equations (18) and (19) are not significant, we also use the multiplicative integral distribution method, the nonparametric percentile Bootstrap method and the bias corrected nonparametric percentile Bootstrap method to test whether there is a mesomeric effect effect. Finally, the test results of the three methods show that the mesomeric effect is significant, indicating that financial service inputs can have a positive impact on the global value chain status of low and medium technology manufacturing industries through the mesomeric effect of the average production cost. Based on the above analysis, the mechanism of the impact of financial services investment on China's medium and low tech manufacturing is the same as that of the overall manufacturing industry, and is consistent with the hypothesis in this article.

Secondly, according to the last column of Table 6, the regression coefficient of 0.6197 for financial stock service investment on high-tech manufacturing is also significant at the 5% level, indicating a significant positive direct effect. At the same time, the increase in financial service investment significantly reduces the average production cost of high-tech manufacturing. However, it can be observed from the fifth column of Table 6 that the decrease in average production costs is actually not conducive to the rise of the global value chain division of labor in China's high-tech manufacturing sector. One possible reason for this phenomenon is that these industrial sectors not only need investment in financial services, but also other

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

technology-intensive production factors such as information technology to improve the quality of industrial products, The increase in demand for such production factors has increased the average production cost of the department, resulting in a discrepancy between indirect and direct effects. According to the mesomeric effect test process of Wen Zhonglin and Ye Baojuan (2014), although the total effect of financial service input on high-tech manufacturing industry is not significant, the direct effect is significantly positive and the indirect effect is significantly negative. The two functions in opposite directions, indicating that there is a masking effect in the regression of high-tech manufacturing industry.

Table 6. Test Results of the mesomeric effect of Financial Service Input on Manufacturing Industry with Different Technical Levels

		Cost mesomeric effect		
		Regression equation (17)	Regression equation (18)	Regression Equation (19)
Medium to low technical level	Financial service investment (FIN)	2.3149**	-0.5135	2.0914**
		(2.47)	(-1.66)	(2.55)
	Average production cost (AC)			-0.4352*
				(-2.01)
	control variable	Yes	Yes	Yes
	$\_cons$	1.9700***	0.1263	2.0250***
		(5.80)	(0.94)	(5.80)
	R^2	0.4731	0.5799	0.4988
	Number of samples	165	165	165
	model	FE	FE	FE
	mesomeric effect	Significant mesomeric effect mesomeric effect/total effect=9.7%		
High technical level	Financial service investment (FIN)	0.0750	-1.1073**	0.6197**
		(0.34)	(-3.63)	(2.72)
	Average production cost (AC)			0.4920**
				(2.81)
	control variable	Yes	Yes	Yes
	$\_cons$	1.5058***	0.2126	1.4012***
		(7.90)	(1.58)	(6.59)
	R^2	0.7179	0.7423	0.7578
	Number of samples	90	90	90
	model	FE	FE	FE
	mesomeric effect	mesomeric effect is not significant		

Note: * * *, * * and * respectively indicate that the regression coefficients in the regression equation are significant at the 1%, 5%, and 10% levels. The values in parentheses represent the t-statistic.

Source: Author calculated and organized through stata.

(5) Robustness test of mesomeric effect

Similar to the robustness test of the second part of the benchmark regression, the method of replacing the core explanatory variable is used here to test the robustness of mesomeric effect. The test results are listed in the following table:

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

Table 7. Robustness Test Results

Explanatory variable \ Dependent variable	GVC_Pos	AC	GVC_Pos
Financial service investment	1.3366**	-0.9770***	1.2266**
(FIN)	(2.47)	(-2.99)	(2.24)
Average production cost			-0.1126
$()AC$			(-0.59)
control variable	Yes	Yes	Yes
$\_cons$	1.8579***	0.1263**	1.8721***
	(8.88)	(2.34)	(8.95)
Number of samples	255	255	255
R^2	0.4723	0.6191	0.4742
F-value	13.31	35.17	13.94
model	FE	FE	FE
mesomeric effect	Significant mesomeric effect mesomeric effect/total effect=8.2%		

Note: * * *, * * and * respectively indicate that the regression coefficients in the regression equation are significant at the 1%, 5%, and 10% levels. The values in parentheses represent the t-statistic.

Source: Author calculated and organized through stata.

According to the results in the table above, in the regression analysis, the sign and significance of the direct effect coefficient are no different from the results listed in Table 7 above, and the mesomeric effect has been tested by the multiplicative integral distribution method, the nonparametric percentile Bootstrap method and the bias corrected nonparametric percentile Bootstrap method, which indicates that the estimation results of the econometric model used in this paper are relatively robust.

5. Conclusion

With the help of CES Production function and fixed effect model, this paper analyzes the direct effect and mesomeric effect of financial services input on the position of China's manufacturing industry in the global value chain from the theoretical and empirical aspects, and draws the following conclusions: (1) The increase of financial services input 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 improvement of China's manufacturing industry's global value chain position. (3) Financial service input has a significant indirect positive effect on the promotion of China's manufacturing global value chain status through the mesomeric effect of average production cost. (4) The regression results based on the heterogeneity of manufacturing technology level show that financial service investment not only has a significant direct positive impact on the manufacturing industry with medium to low technology levels, but also has a significant indirect positive impact through the intermediary variable of average production cost; The direct impact on high-tech manufacturing is significantly positive, while the indirect impact is significantly negative, with a masking effect.

Acknowledgments

Funding: This research was funded by [National social science fund of China] grant number [23BGJ027].

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

References

[1] Wang, Z., Wei, S. J., Yu, X., & Zhu, K. (2017). Characterizing global and regional manufacturing value chains: stable and evolving features. Centro Studi Luca d'Agliano Development Studies Working Paper, (419).

[2] WANG Z, WEI SJ, YU X, et al. Characterizing global value chains: Production length and upstreamness [J] NBER Working Paper, 2017, No. 23261.

[3] Xu Haibo, Zhang Jianmin. The impact of trade costs on the division of labor in the global value chain of China's manufacturing industry after China's accession to the WTO [J]. Modern Economic Exploration, 2018, (05): 62-69.

[4] Yu Xiao, Guo Zhifang. The impact of intellectual property protection on the income of division of labor in the global value chain - empirical analysis based on Panel data of transnational industries [J]. 2017, (06): 142-152.

[5] Zheng Shufang, Xie Huiqiang, Liu Dongdong. Research on the Impact of Economic Policy Uncertainty on China's Manufacturing Value Chain Embedding [J]. International Trade Issues, 2020, (04): 69-85.

[6] Yang Renfa, Li Nana. Industrial Agglomeration, FDI, and the Global Value Chain Position of Manufacturing Industry [J]. International Trade Issues, 2018, (6): 68-81.

[7] Tian Bifei, Chen Ziruo Entrepreneurship and Global Value Chain Division of Labor Status: Effects and Mechanisms [J]. China Industrial Economy, 2017, (06): 136-154.

[8] Xu Meiju "Low end lock-in" and the promotion of China's manufacturing value chain status [D]. Fujian: Fujian Agriculture and Forestry University, 2017.

[9] Ding Yibing, Zhang Hongyuan. The impact of trade frictions between China and the United States on the global value chain position of China's manufacturing industry [J]. Contemporary Economic Research, 2019, (01): 76-84+113.

[10] Huang Qiong, Li Nana. Analysis of Factors Influencing the Rise of Global Value Chain Position in Manufacturing Industry: Based on a Comparison between Developed and Developing Countries [J]. East China Economic Management, 2019, (01): 100-106.

[11] Beck T, Demirguc-Kunt A, Levine R. Finance, Inequality and Poverty: Cross Country Evidence [J] NBER Working Paper, 2004, No. 10979.

[12] Banda G. Finance as a 'fortten technical capability' for promoting African local pharmaceutical manufacturing [J] International Journal of Technology Management&Sustainable Development, 2013,12 (2): 117-135.

[13] Markusen Jr. Trade in producer services and in other specialized intermediate inputs 1989. The American Economic Review, 1989, 79 (1): 85-95.

[14] Francois J, Woerz J. Producer services, manufacturing links, and trade [J] Journal of Industry, Competition and Trade, 2008, 8 (3-4): 199-229.

[15] Macpherson A. Producer service links and industrial innovation: Results of a two way year tracking study of New York State manufacturers [J] Growth and Change, 2008, 39 (1): 1-23.

[16] Guerrieri P, Meliciani V. Technology and international competitiveness: The interdependence between manufacturing and producer services Structural change and economic dynamics [J], 2005,16 (4): 489-502.

[17] Castellacci F. Technical paradigms, regions and trajectories: Manufacturing and service industries in a new taxonomy of departmental patterns of innovation [J] Research policy, 2008, 37 (6-7): 978-994.

[18] Wen Zhonglin, Ye Baojuan. Analysis of mesomeric effect: Methods and Model Development [J]. Progress in Psychological Science, 2014, (5): 731~745.

[19] Yu Pei, Peng Ge. Has China's two-way FDI in manufacturing increased its division of labor position in the global value chain [J]. Modern Economic Exploration, 2020, (02): 64-74.

[20] Lv Yue, Luo Wei, Liu Bin. Financing Constraints and the Global Value Chain Leap of Manufacturing Industry [J]. Financial Research, 2016, (06): 81-96.

ISSN: 2692-7608 DOI: 10.6981/FEM.202312_4(12).0014

[21] Zhang Hongli, Jia Zongwu, Zhang Junrui. Reflections on Issues Related to the Study of Enterprise Asset Structure [J]. Monthly Journal of Finance and Accounting (Theory), 2008, (04): 54-57.

[22] Zhang Jianqiang. Research on the measurement and upgrading of China's manufacturing division status from the perspective of global value chain [D]. Xinjiang: Xinjiang University, 2019.

[23] Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. Psychological science, 18(3), 233-239.

[24] MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. Psychological methods, 7(1), 83.