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The impact of co-agglomeration of distributive trades and manufacturing industry on export decision: mechanism and empirical

Hongying Peng
The Research Center of Industrial Economics, Xingzhi College of Zhejiang Normal University, Jinhua, (CHINA)
E-mail : cocokendy@139.com

ABSTRACT

From the perspective of industry association, this paper examines the impact mechanism of co-agglomeration of distributive trades and manufacturing industry on the consumer goods manufacturers' export decisions, and makes an empirical test using industry and enterprise data of 17 eastern cities in China for 2005-2009. The results show that the co-agglomeration of distribution trades and manufacturing industry is an significantly positive determinant of consumer goods manufacturers' export decisions. The tests of sub-samples divided by manufacturing sub-sectors and enterprise scales also support the above conclusions. In its policy meaning, to facilitate consumer goods export of small and medium enterprises, we should strengthen the co-agglomeration of distributive trades and manufacturing industry.

KEYWORDS

Co-agglomeration; Agglomeration; Export decision; Distributive trades.

INTRODUCTION

There are two types of industrial agglomeration: one is a single industry group, another is multi industry mixed. The latter type is also known as the co-agglomeration, which is a focus of research in recent years in the field of New Economic Geography. Studies on industrial agglomeration emphasize on its externality, which is concerned about the impact mechanism of agglomeration on manufacturer's export decision in the field of international trade. But most studies only discuss the agglomeration of manufacturing industry; there are rare researches about this problem from the perspective of industry association. From the China reality, the co-agglomeration of distributive trades and manufacturing industry in eastern China greatly promotes the manufacturer's export, which is one of the distinctive features of China's exports. It can't avoid the study of this phenomenon when one research the rapid development of Chinese exports over the past thirty years.

From a global perspective, the co-agglomeration of distributive trades and manufacturing industry is not universal, and the manufacturers in Europe and America do not export with the help of professional market. But there are co-agglomeration of distributive trades and manufacturing industry in many eastern coastal cities of China, and many local manufacturers export through the export mode of market procurement. Taking Zhejiang Yiwu as an example, it exported $4.9 billion of goods through the export mode of market procurement in 2012, accounting for 54.44% of the entire city's own exports; it exported $13.35 billion of goods through the export mode of market procurement in 2013, accounting for 73.35% of the entire city's own exports. The reason for rapidly development of the export mode of market procurement in eastern China may be lies in that the main export products are consumer goods; many distributors compete and form a "price depression"; the full range of products makes transaction easier to reach and a single transaction amount greater, so as to reduce the transaction costs per unit, which are attracting foreign businessmen "one-stop" procurement and also increase the possibility of local manufacturers' export.

This paper attempts to build a model to explore the influence mechanism of the co-agglomeration of distributive trades and manufacturing industry on manufacturer's export decision, and then does an empirical test. By revealing the factors affecting the manufacturers' export decision, it provides more reliable policy suggestions or implications for the steady development of manufacturers' export during the transfer process of manufacturing industry from eastern China to central and western China. The following sections of this paper are organized as follows. The next section describes empirical model derivation. Section 3 presents the results of parametric analysis. Section 4 concludes with policy implications.

EMPIRICAL MODEL DERIVATION

When discussing the manufacturer's export decision; usually based on ex ante "export self-selection" theory. Roberts *et al* (1997)[1], Bernard *et al* (1999)[2] and Bernard *et al* (2001)[3] suggested that only the more profitable enterprises can export through ex ante "export self-selection" mechanism. The reason is that, compared to domestic sales, a firm need to pay higher costs when it export, which are associated with international transport costs, foreign distribution costs, administrative costs of foreign networks, and the need to adjust product characteristics to meet the preference of foreign consumers. These costs and more competitive environment of foreign markets erect entry barriers that are difficult for less profitable enterprises to overcome.

Early studies suggested that certain characteristics of manufacturer make it more profitable, such as age, size, productivity; subsequent researchers found that manufacturing industry agglomeration is also an influence factor, but few studies have discussed the impact mechanism of co-agglomeration of distributive trades and manufacturing industry on manufacturer profit and export decision.

This article argues that, the co-agglomeration leads to lower production and distribution costs, so that the manufacturer profit and possibility of export can be improved. On the one hand, in the co-agglomerated areas there are a large number of suppliers of raw materials and intermediate products, the fierce competition between them has reduced procurement costs of manufacturer. As the transport distance is short, the manufacturer does not have to keep a large amount of raw materials and intermediate products, which can reduce the inventory cost. These will lead to the production costs of manufacturer decreased. On the other hand, co-agglomeration allows manufacturer to gather timely access to the demand for finished goods and the customer requirements, which helps the enterprise improve the distribution management methods and strategies. Co-agglomeration can also reduce transportation costs of finished goods and consumer search costs, thereby contributing to lower distribution costs of manufacturer. Those two kinds of cost reductions will increase the manufacturer profit in co-agglomerated areas, so as to make it an exporter through ex ante "export self-selection" mechanism. This paper will employ parametric approach to assess the contribution of co-agglomeration to export entry of manufacturers.

This article provides a theoretical model based on Aitken *et al* (1997)[4] and Barrios *et al* (2003)[5] by introducing co-agglomeration of distributive trades and manufacturing industry, constructs the export spillover of agglomeration model from the perspective of industry association.

First, it is assumed that each manufacturer's cost consists of the production costs, h, and distribution costs, m; all products are produced in the domestic production (d) but can be sold in domestic and foreign market (countries d and f). Let q_d and q_f represent the manufacturer' domestic sales and foreign sales respectively, the total cost function C of Manufacturer can be expressed as

$$C = h(q_d + q_f) + m_d(q_d) + m_f(q_f) \quad \textbf{(1)}$$

Secondly, it is considered that the manufacturing industry agglomeration that may exist in the region. Barrios *et al* (2003)[5] and some other researchers suggested that, manufacturing industry agglomeration has positive externalities in the following two aspects: one is the "learning by exporting" effect of export enterprise agglomeration, i.e. the export enterprises who have a lot of foreign market knowledge produce "knowledge spillover" effect through the agglomeration of enterprises, which reduces the production costs and foreign distribution costs of manufacturers in agglomerated area. Therefore, it can be assumed that the production costs and foreign distribution costs are decreasing functions of the overall export activity in the sector (Γ_{EX}).

$$\frac{\partial h(q_f + q_d)}{\partial \Gamma_{EX}} \le 0 \quad \textbf{(2)}$$

$$\frac{\partial m_f(q_f)}{\partial \Gamma_{EX}} \le 0 \quad \textbf{(3)}$$

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The other is the "knowledge spillover" effect of manufacturing industry agglomeration, i.e. the R & D activities of some enterprises can reduce the other enterprises' production costs and distribution costs in the same agglomerated area. So it can be assumed that the production costs, the domestic and foreign distribution costs are decreasing function of the R & D activities at the sector level (Γ_{RD}).

$$\frac{\partial h(q_f + q_d)}{\partial \Gamma_{RD}} \le 0 \quad \textbf{(4)}$$

$$\frac{\partial m_d(q_d)}{\partial \Gamma_{RD}} \le 0 \quad \textbf{(5)}$$

,

$$\frac{\partial m_f(q_f)}{\partial \Gamma_{RD}} \le 0 \quad \textbf{(6)}$$

,

The improvement of this paper is to continue to consider the possibility existence of co-agglomeration of distributive trades and manufacturing industry in the area. As the aforementioned analysis has revealed that the co-agglomeration reduce production costs and distribution costs of manufacturer, therefore, it is further assumed that the production costs, domestic and foreign distribution costs are decreasing function of co-agglomeration at the sector level(Γ_{Coagg}).

$$\frac{\partial h(q_f + q_d)}{\partial \Gamma_{Coagg}} \le 0 \quad \textbf{(7)}$$

$$\frac{\partial m_d(q_d)}{\partial \Gamma_{Coagg}} \le 0 \quad \textbf{(8)}$$

,

$$\frac{\partial m_f(q_f)}{\partial \Gamma_{Coagg}} \le 0 \quad \textbf{(9)}$$

,

For empirical tractability, it is assumed that the following simple function forms for the production and distribution cost functions:

$$h(q_d + q_f) = \frac{a}{2}(q_d + q_f)^2 + g(q_d + q_f) \quad \textbf{(10)}$$

$$m_d(q_d) = \frac{b_1}{2} {q_d}^2 + c_d(q_d) \quad \textbf{(11)}$$

$$m_f(q_f) = \frac{b_2}{2} q_f^{\,2} + c_f(q_f) \quad \textbf{(12)}$$

where a, b_1, b_2 are scalars and g, c_d, c_f are functions of cost variables for the production cost, domestic and foreign distribution cost functions, respectively. Specifically, g, c_d, c_f can be expressed as

$$g = g(X, \Gamma_{EX}, \Gamma_{RD}, \Gamma_{Coagg}) \quad \textbf{(13)}$$

$$c_d = c_d(X, Z_d, \Gamma_{RD}, \Gamma_{Coagg}) \quad \textbf{(14)}$$

$$c_f = c_f(X, Z_f, \Gamma_{EX}, \Gamma_{RD}, \Gamma_{Coagg}) \quad \textbf{(15)}$$

Where X represents production cost variables for both markets. Z_d and Z_f represents distribution cost variables in the home and foreign markets respectively, assuming $Z_d \le Z_f$.

Let p_d and p_f be the selling prices in domestic and foreign markets respectively, the maximization problem of the representative producer located in co-agglomerated area is

$$\max_{q_d, q_f} [p_d q_d + p_f q_f - h(q_d + q_f) - m_d(q_d) - m_f(q_f)] \quad \textbf{(16)}$$

assuming that $q_d, q_f \ge 0$.

Using (10), (11) and (12), it can be expressed as

$$\max_{q_d, q_f} [p_d q_d + p_f q_f - \frac{a}{2}(q_d + q_f)^2 - g(q_d + q_f) - \frac{b}{2} q_d^{\,2} - c_d q_d - \frac{b}{2} q_f^{\,2} - c_f q_f] \quad \textbf{(17)}$$

The first-order derivative of q_d give

$$\begin{aligned} & p_d - \frac{a}{2} \times 2 \times (q_d + q_f) - g - \frac{b}{2} \times 2 \times q_d - c_d = 0 \\ & p_d - a q_d - a q_f - g - b q_d - c_d = 0 \\ & p_d - a q_f - g - c_d - (a + b) q_d = 0 \end{aligned} \quad \textbf{(18)}$$

Similarly, the first-order derivative of q_f give

$$p_f - a q_d - g - c_f - (a + b) q_f = 0 \quad \textbf{(19)}$$

Using (18) and (19), first order solution gives

$$q_d = \frac{1}{a + b}(p_d - a q_f - g - c_d) \quad \textbf{(20)}$$

$$q_f = \frac{1}{a + b}(p_f - a q_d - g - c_f) \quad \textbf{(21)}$$

For purposes of getting estimable expressions for a typical firm i belonging to a sector j, it is assumed that equations (20) and (21) can be rewritten as

$$q_{d,ij} = \alpha_1 p_{d,ij} + \alpha_2 q_{f,ij} + \alpha_3 X_{ij} + \alpha_4 Z_{d,ij} + \alpha_5 \Gamma_{RD,j} + \alpha_6 \Gamma_{EX,j} + \alpha_7 \Gamma_{Coagg,j} + u_{d,ij} \quad \textbf{(22)}$$

$$q_{f,ij} = \beta_1 p_{f,ij} + \beta_2 q_{d,ij} + \beta_3 X_{ij} + \beta_4 Z_{f,ij} + \beta_5 \Gamma_{RD,j} + \beta_6 \Gamma_{EX,j} + \beta_7 \Gamma_{Coagg,j} + u_{f,ij} \quad \textbf{(23)}$$

It is assumed that $u_{d,ij}$ and $u_{f,ij}$ to be normally distributed error terms with zero mean and constant variance. Equations (20) and (21) represent a system of simultaneous-equation, given our interest is in the export decision; it is focused on by estimating the dummy variable $y_{i,j}$, which represents the firm decision to export.

$$\begin{cases} y_{i,j}=1 \text{ ,if } q_{f,ij}>0 \\ y_{i,j}=0 \text{ ,otherwise} \end{cases} \quad \textbf{(24)}$$

It follows from equation (22)-(24) that the probability for firm i belonging to a sector j to export is given by

$$\begin{aligned} &P_r\left(y_{i,j}=1\right)=P_r\left(q_{f,ij}>0\right) \\ &=P_r(\beta_1 p_{f,ij}+\beta_2 q_{d,ij}+\beta_3 X_{ij}+\beta_4 Z_{f,ij}+\beta_5\Gamma_{RD,j}+\beta_6\Gamma_{EX,j}+\beta_7\Gamma_{Coagg,j}+u_{f,ij}>0) \\ &=P_r[\beta_1 p_{f,ij}+\beta_2(\alpha_1 p_{d,ij}+\alpha_2 q_{f,ij}+\alpha_3 X_{ij}+\alpha_4 Z_{d,ij}+\alpha_5\Gamma_{RD,j}+\alpha_6\Gamma_{EX,j}+\alpha_7\Gamma_{Coagg,j}+u_{d,ij}) \\ &+\beta_3 X_{ij}+\beta_4 Z_{f,ij}+\beta_5\Gamma_{RD,j}+\beta_6\Gamma_{EX,j}+\beta_7\Gamma_{Coagg,j}+u_{f,ij}>0] \\ &=P_r[\beta_1 p_{f,ij}+\beta_2\alpha_1 p_{d,ij}+\beta_2\alpha_2 q_{f,ij}+\beta_2\alpha_3 X_{ij}+\beta_2\alpha_4 Z_{d,ij}+\beta_2\alpha_5\Gamma_{RD,j}+\beta_2\alpha_6\Gamma_{EX,j} \\ &+\beta_2\alpha_7\Gamma_{Coagg,j}+\beta_2 u_{d,ij}+\beta_3 X_{ij}+\beta_4 Z_{f,ij}+\beta_5\Gamma_{RD,j}+\beta_6\Gamma_{EX,j}+\beta_7\Gamma_{Coagg,j}+u_{f,ij}>0] \\ &=P_r[\beta_1 p_{f,ij}+\beta_2(\alpha_1 p_{d,ij}+\alpha_2 q_{f,ij}+\alpha_4 Z_{d,ij})+\beta_4 Z_{f,ij}+(\beta_2\alpha_3+\beta_3)X_{ij} \\ &+(\beta_2\alpha_6+\beta_6)\Gamma_{EX,j}+(\beta_2\alpha_5+\beta_5)\Gamma_{RD,j}+(\beta_2\alpha_7+\beta_7)\Gamma_{Coagg,j}+v_{ij}>0] \end{aligned} \quad \textbf{(25)}$$

where $v_{ij}=\beta_2 u_{d,ij}+u_{f,ij}$. Through the above derivation, there is the extended model of agglomeration-export impact mechanism by introducing co-agglomeration factor. Based on the above mechanism analysis and the derivation of parameter test model, this paper gives the following proposition and do empirical test in the next section.

Proposition: co-agglomeration of distributive trades and manufacturing industry helps reduce the production costs and distribution costs of potential export manufacturers and increase its profit, thereby make it become export enterprise through ex ante "export self-selection" mechanism.

RESULT AND DISSCUSS

Data

The empirical test only uses industries and enterprises' data relate to cities in eastern China, for the previous study indicated that, from a statistical point of view, the co-agglomeration of distributive trades and manufacturing industry is statistical significance only in eastern China, while it is not obvious in the central and western China. Moreover, in order to be more targeted, The paper only chooses those cities that have at least one integrated industrial goods market ranking the nation' s top 100 before 2009, namely the cities with higher distributive trades agglomeration degree. Based on the above filter conditions and data availability, it finally selects the industries data and enterprises data of 17 eastern cities for empirical analysis, including Qingdao, Yantai city of Shandong province; Foshan, Huizhou, Jieyang city of Guangdong province; Changzhou, Lianyungang, Nantong, Wuxi city of Jiangsu province; Hangzhou, Huzhou, Jinhua, Ningbo, Quzhou, Shaoxing, Taizhou, Wenzhou city of Zhejiang province.

In addition, based on the main products related to the co-agglomeration phenomenon in 17 cities, it only chooses the following 7 sub-sectors data for empirical test, namely C17 textile manufacturing; C18 clothing and other textile products manufacturing; C19 leather, fur, feather and related products manufacturing; C24 cultural and sports products manufacturing; C30 plastic products manufacturing; C34 metal products manufacturing; C39 electrical machinery and equipment manufacturing.

In this paper, the enterprise data were processed and filtered. First, for the sub-companies that counted respectively, the same company code is changed into different codes continuous; second, those enterprises with zero value of practitioners, gross outputs or sales are excluded.

All data are from the China Statistical Yearbook of Commodity Trading Markets, Chinese Industrial Enterprises Statistics Database, Zhejiang Statistical Yearbook, and 17 cities' Statistical Yearbook for the time span of 2005-2009, involving 161,457 observations.

Parametric test

The derivation of export decision model in previous section involves the effect of co-agglomeration of distributive trades and manufacturing industry on export decision, but also considers the impact of corporate heterogeneity variables, as

well as the "exporting by learning" effect and "knowledge spillover" effect of manufacturing agglomeration. The paper constructed an empirical model based on estimation of (25) in the previous section.

First of all, it is introduced the co-agglomeration of distributive trades and manufacturing industry, trying to discuss long-term trends and possible turning point. Secondly, in estimation of (25) both firm and sector-specific variables are considered, which are assumed to impact on production costs X and/or distribution costs Zd and Zf, which are difficult to obtain; therefore guided by the existing empirical literatures on export decision, some reasonable proxies are chosen, including age, size and productivity. Since Power(1998)[6] discovered that age and size was non-liner once a certain level is reached, the paper also allow the effect of age and size to be non-linear by including both variables squared for possible turning point. Finally, for manufacturing agglomeration, export ratio and R&D ratio of manufacturing industry are used to represent "exporting by learning" and "knowledge spillover" effects.

It needs not to be considered the autocorrelation problem for the panel data time series is short and there are many cross-sections. In order to reduce heteroscedasticity and non-stationarity, and take into account the relevant value may be zero, variables (with the exception of export decision) are added 1 firstly and then taking the natural logarithm. The empirical model is expressed as:

$$Cexyn = \gamma_1 LIncoagg + \gamma_2 LIncoagg^2 + \gamma_3 LCage + \gamma_4 LCage^2 + \gamma_5 LCsize + \gamma_6 LCsize^2 + \gamma_7 LCpro + \gamma_8 LInex + \gamma_9 LInrd + \varepsilon \quad \textbf{(26)}$$

Let Incoagg be the co-agglomeration value of distributive trades and manufacturing industry, which is calculated based on EG index proposed by Ellison *et al* (1997)[7]. The EG co-agglomeration index is a measure of the average co-agglomeration of industries in a group. An equivalent formula for the EG co-agglomeration index when I = 2 is

$$Incoagg = \frac{\sum_{m=1}^{M}(s_{m1} - x_m)(s_{m2} - x_m)}{1 - \sum_{m=1}^{M} x_m^2} \quad \textbf{(27)}$$

Consider two industries i=1, 2. Suppose that a geographic whole is divided into M subareas and suppose that s_{1i}, s_{2i}, . . ., s_{Mi} are the shares of industry i's employment contained in each of these areas. Let x_1, x_2, . . ., x_M be some other measure of the size of these areas, each area's share of population is chosen in this paper.

Let Cexyn be a dummy variable that is equal to 1 if the firm is an exporter and 0 if not; Cage (firm age) = statistical year - opening year; Csize (firm scale) is represented by the number of employees at the end of the year; Cpro (firm productivity) =total output value/ the number of employees at the end of the year; Inex (export ratio of manufacturing industry) = export delivery value / sales value; Inrd (R & D ratio of manufacturing industry) take new products output ratio as an alternative variable, i.e. the output value of new products / total output value; the mark L means that variables are added 1 firstly and then taking the natural logarithm. The statistical characteristics of variables are given in TABLE 1.

TABLE 1 : The statistical characteristics of variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Cexyn	0.41	0.49	0	1
LIncoagg	0.10	0.07	0.005	0.36
LIncoagg2	0.02	0.03	0.00003	0.18
LCage	1.91	0.67	0	4.74
LCage2	3.52	1.46	0	9.47
LCsize	4.53	1.00	0.69	11.98
LCsize2	9.02	2.03	0.69	23.96
LCpro	5.60	0.89	0.33	12.33
LInex	0.23	0.07	0.07	0.52
LInrd	0.12	0.05	0.03	0.29

The paper report results of Probit and Logit estimation of the determinants of whether a firm is an exporter, involving the following three levels: the overall sample, manufacturing sub-sectors samples and sub-samples divided by enterprise scale.

The overall sample

TABLE 2 presents results for Porbit and Logit estimation using overall sample of 7 manufacturing sub-sectors in 17 cities. As can be seen from the Probit test results in column 1 of TABLE 2, the first degree coefficient of co-agglomeration is positive, indicating that it has a significantly positive impact on manufacture's export decision. However, its quadratic coefficient is significantly negative, indicating that the co-agglomeration degree exceeding a certain limit will produce

negative spillover effects on export decision, which suggests a nonlinear "inverted U shape" relationship between them in the long term. For the control variables, age, size and productivity have a significantly positive relationship with the export decision; moreover, age and size have nonlinear "inverted U shape" relationship with it in the long term. "Exporting by learning" and "knowledge spillover" effects have significantly positive impacts on export decision.

For the marginal effect involved in Probit test, Column 2 of TABLE 2 shows that LIncoagg increased by 1%, the export possibility of manufacturer tend to raise 0.986%; LCsize and LInex increased by 1%, the export possibility of manufacturer tend to raise 1.725% and 1.149% respectively; the marginal effect of other variables are lower than the three factors. It can be seen that co-agglomeration of distributive trades and manufacturing industry is an important factor which affects the export decision.

In order to test the robustness of model, Logit estimation results are also reported in this section. It can be seen in column 3 and 4 of TABLE 2 that coefficient signs of all variables of Logit test are in consistent with Porbit test, and the marginal effect values of two kinds of test are very close, indicating that the model has good robustness.

TABLE 2 : The Probit and Logit estimation results of total sample

	Probit		**Logit**	
	coefficient	**marginal effect**	**coefficient**	**marginal effect**
LIncoagg	5.816***	0.986***	10.531***	0.976***
	(0.395)	(0.068)	(0.693)	(0.066)
LIncoagg2	-7.214***	-1.223***	-13.106***	-1.214***
	(0.888)	(0.152)	(1.559)	(0.146)
LCage	0.734***	0.124***	1.347***	0.125***
	(0.145)	(0.025)	(0.260)	(0.024)
LCage2	-0.217***	-0.037***	-0.400***	-0.037***
	(0.067)	(0.011)	(0.120)	(0.011)
LCsize	10.176***	1.725***	20.927***	1.939***
	(1.041)	(0.170)	(1.888)	(0.168)
LCsize2	-4.416***	-0.748***	-9.225***	-0.855***
	(0.512)	(0.084)	(0.930)	(0.083)
LCpro	0.133***	0.022***	0.229***	0.021***
	(0.014)	(0.002)	(0.025)	(0.002)
LInex	6.778***	1.149***	12.066***	1.118***
	(0.193)	(0.034)	(0.340)	(0.033)
LInrd	2.162***	0.366***	3.933***	0.364***
	(0.186)	(0.032)	(0.332)	(0.031)
_cons	-11.034***		-20.105***	
	(0.162)		(0.284)	
log likelihood	-65287		-65155	
Number of obs	161457	161457	161457	161457

Notes: The standard errors are shown in parenthesis. *p<0.1, **p<0.5, ***p<0.01.

Manufacturing sub-sectors samples

In order to study the effects of co-agglomeration on export decision in manufacturing sub-sectors, this paper further report the estimation results of manufacturing sub-sectors samples.

From the results of Probit tests (TABLE 3), co-agglomeration has significantly positive impact on the export decision of manufacturers in all sub-sectors, and in the sub-sectors C24, C17, C39, C19 and C34 there are long-term "inverted U shape" relationship between them. For control variables, age has significantly positive relationship with export decision only in sub-sectors C39, C18 and C34; size has a positive impact on it in sub-sectors C17, C39, C34 and C30; productivity has significantly positive correlation with it in nearly all sub-sectors with the except of C19; "exporting by learning" effect has significantly positive impact on it in all sub-sectors; and "knowledge spillover" effect has a significantly positive relationship with it in nearly all sub-sectors with the except of C19 and C18.

For the marginal effect involved in Probit test, the results show that LIncoagg increased by 1%, from high to low, the export possibility of manufacturer tend to raise 1.515%, 1.309%, 1.214%, 0.976%, 0.492%, 0.449% and 0.247% in

sectors C24, C17, C39, C19, C18, C34 and C30. It is shown that the impact of co-agglomeration on export decision is the greatest in the cultural and sports products manufacturing, and the least in the plastic products manufacturing. Length of be confined to, Logit estimation results of manufacturing sub-sectors samples are only listed in the appendix, and the results are almost consistent with the Porbit test, which indicates good robustness of the model.

TABLE 3 : The Probit estimation results of manufacturing sub-sectors samples (coefficient)

	C24	C17	C39	C19	C18	C34	C30
LIncoagg	8.986***	9.405***	9.611***	3.527***	1.751*	5.149***	3.359***
	(2.221)	(0.954)	(0.872)	(1.335)	(1.041)	(1.035)	(1.031)
LIncoagg2	-17.581***	-5.386**	-14.163***	-5.712**	-1.954	-5.160**	-1.784
	(5.214)	(2.400)	(1.975)	(2.553)	(2.709)	(2.374)	(2.127)
LCage	-0.288	0.004	1.178***	0.425	0.921***	1.330***	0.199
	(0.745)	(0.322)	(0.346)	(0.489)	(0.315)	(0.420)	(0.425)
LCage2	0.516	0.084	-0.504***	-0.055	-0.173	-0.410**	0.006
	(0.343)	(0.148)	(0.160)	(0.224)	(0.146)	(0.193)	(0.197)
LCsize	-14.318*	14.716***	15.307***	-4.937	3.059	11.384***	7.609**
	(7.679)	(1.869)	(2.153)	(4.492)	(2.955)	(3.249)	(3.861)
LCsize2	7.552**	-6.560***	-6.934***	2.886	-1.085	-5.040***	-3.047
	(3.795)	(0.918)	(1.060)	(2.224)	(1.461)	(1.597)	(1.898)
LCpro	0.302***	0.429***	0.138***	0.072	0.144***	0.157***	0.249***
	(0.080)	(0.032)	(0.032)	(0.047)	(0.033)	(0.037)	(0.044)
LInex	6.938***	7.643***	6.648***	4.179***	6.162***	9.534***	7.987***
	(0.956)	(0.419)	(0.478)	(0.623)	(0.451)	(0.518)	(0.548)
LInrd	2.826***	2.244***	4.016***	-0.189	0.112	1.476***	3.621***
	(0.905)	(0.357)	(0.516)	(0.677)	(0.443)	(0.479)	(0.567)
_cons	-7.492***	-14.295***	-12.360***	-5.895***	-7.406***	-12.914***	-13.494***
	(0.922)	(0.344)	(0.346)	(0.503)	(0.376)	(0.471)	(0.524)
log likelihood	-2496	-17620	-12060	-4883	-9894	-9725	-7569
Number of obs	6194	44566	31280	10659	21141	25806	21811

Notes: The standard errors are shown in parenthesis. *p<0.1, **p<0.5, ***p<0.01.

Sub-samples divided by enterprise scale

This paper also report estimation results of four sub-samples divided by enterprise scale, including micro, small, medium and large manufacturing enterprise sub-samples. According to the classification standard of the Chinese National Bureau of Statistics, micro enterprises are the ones with employees < 20; small enterprises are the ones with 20 ≤ employees < 300; medium enterprises are the ones with 300 ≤ employees < 1000; large enterprises are the ones with employees ≥ 1000.

From the results of Probit tests (TABLE 4), it is shown that co-agglomeration has significantly positive effects on export decision and there are long-term "inverted U shape" relationships between them in the micro, small and medium enterprises sub-samples, but the impact is not significant in the large enterprises sub-sample. For the control variables, age only has significantly positive impact on the export decision of small enterprises; size only has significantly positive effect on the export decisions of medium and large enterprises; productivity only has significantly positive correlation with the export decision of micro and small enterprises; "Learning by exporting" effect has significantly positive effects on four kinds of enterprises' export decision; but "knowledge spillover" effect only has positive correlation with the export decisions of micro and small enterprises.

For the marginal effect involved in Probit test, the results show that LIncoagg increased by 1%, from high to low, the export possibility of manufacturer tend to raise 0.926%, 0.597% and 0.014% in small, medium and micro enterprises sub-samples. It is shown that the impact is the greatest on small enterprises, and the least on micro enterprises. But it has no significant effect on large enterprises, the reasons of it may be lie in that large companies have more export channels and scale economy leading to lower cost, so without the help of "cost reducing" effect from the co-agglomeration the large enterprises can also overcome the export entry barrier. Length of be confined to, Logit estimation results of sub-samples divided by enterprise scale are only listed in the appendix, and the results are almost consistent with the Porbit test, which indicates good robustness of the model.

TABLE 4 : The Probit estimation results of sub-samples divided by enterprise scale (coefficient)

	small	medium	micro	large
LIncoagg	6.018***	7.968***	8.398***	4.181
	(0.449)	(1.347)	(1.934)	(3.686)
LIncoagg2	-7.391***	-13.278***	-13.622***	-4.969
	(0.980)	(3.445)	(5.084)	(10.023)
LCage	0.919***	-0.933	0.568	-1.360
	(0.159)	(0.685)	(0.788)	(2.075)
LCage2	-0.304***	0.642**	-0.301	0.948
	(0.073)	(0.313)	(0.363)	(0.957)
LCsize	1.770	1.115***	11.727	0.813***
	(3.383)	(0.112)	(7.342)	(0.206)
LCsize2	-0.288	0	-5.220	0
	(1.667)	(omitted)	(3.354)	(omitted)
LCpro	0.083***	0.071	0.230***	0.151
	(0.016)	(0.045)	(0.080)	(0.105)
LInex	6.818***	8.183***	5.713***	10.379***
	(0.219)	(0.632)	(1.034)	(1.822)
LInrd	2.348***	0.072	7.067***	2.537
	(0.207)	(0.670)	(1.068)	(1.740)
_cons	-10.238***	-8.095***	-12.448***	-7.303***
	(0.314)	(0.796)	(2.345)	(1.876)
log likelihood	-56242	-6907	-2345	-958
Number of obs	134930	16132	7541	2854

Notes: The standard errors are shown in parenthesis. *p<0.1, **p<0.5, ***p<0.01.

CONCLUSIONS

This paper firstly studies the effect mechanism of co-agglomeration of distributive trades and manufacturing industry on the consumer goods manufacturers'decision to export, i.e. the former improves the manufacturer profit by reducing its production and distribution costs, and then promotes manufacturer export decision making through ex ante "export self-selection" mechanism. Secondly, it constructs the export spillover of agglomeration model from the perspective of industry association by involving co-agglomeration factor, and gives an empirical proposition. Finally, it conducts the empirical test using 7 typical manufacturing sub-sectors data and enterprise data of 17 cities in eastern China for 2005-2009.

The empirical results show that, co-agglomeration of distributive trades and manufacturing industry is a significantly positive factor on export decision, there is nonlinear "inverted U shape" relationship between them in the long term. For manufacturing sub-sectors sub-samples, from high to low, the impacts are presented in C24 cultural and sports products manufacturing; C17 textile manufacturing; C39 electrical machinery and equipment manufacturing; C19 leather, fur, feather and related products manufacturing; C18 clothing and other textile products manufacturing; C34 metal products manufacturing; C30 plastic products manufacturing. For sub-samples divided by enterprise scale, form high to low, the impact is the greatest on small enterprises, and the least on micro enterprises, but no significant effect on the large enterprise.

Based on the above research, the paper put forwards the following policy implications: in order to promote the export decision of small and medium manufacturing enterprises involving the products such as stationery, jewelry, toys, clothing, small appliances, lamps and lanterns, footwear, hardware, plastic products, we should strengthen the co-agglomeration of distributive trades and manufacturing industry of related products. Especially in the progress of related manufacturing industry's transferring from the eastern to the central and western China, we should not only focus on the manufacturing industry agglomeration, we should also pay attention to the co-agglomeration of distributive trades and manufacturing industry, which can promote the export of related products and support the development of micro, small and medium enterprises. But given the co-agglomeration exceeding a certain limit will has a negative spillover effect on export decision, we should avoid blind expansion in areas with higher co-agglomeration degree.

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