

The Endogenous Trade Network, External Trade Network and Exporters' Border Expansion

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Abstract

Trade network is an important way to transmit trade information. This article uses the database of China's industrial enterprises and the database of the General Administration of Customs of China from 2000 to 2006, and takes 3,030 companies that exported continuously in the past 7 years as the research object, empirically research the relationship between trade network of enterprises and export border expansion. We define export border expansion as enterprises export to a market which they didn't export to in the previous period. The results show that both endogenous trade network and external trade network can reduce the cost of information search and increase the rate of exporters' border expansion.

Keywords

Endogenous Trade Network; External Trade Network; Export Border Expansion; Neighbor.

1. INTRODUCTION

Trade networks play important roles in the information collection for the exporting firms and the risk for a firm stepping into a new market would be significantly reduced with the help of trade information network. The endogenous trade network refers to the information network of a new exporting market formed by the firms from their past exporting experience (Rudai Yang, 2019), while the exogenous trade networks are the learning effect gained from the exporting experience of other firms, thereby establishing a connection between the targeted export markets.

The marginal expansion of exporting is a firm entering a new export market (Castagino, 2010). This article defines the export marginal expansion of a firm in a certain year as the export to a market that has not been exported in the previous year. Zhenyu Ge and Tingting Wang (2018) have studied similar issues of marginal expansion of enterprises, but their research focused on the neighboring countries of existing export markets. In this article, if firm f was not exporting to country i in period t , but started exporting to i in $t+1$, then it is deemed that firm f has carried out an export marginal expansion in period $t+1$.

The definition of endogenous network is illustrated in Figure 1. Chinese firm f integrates the searching process of various exporting markets in period $t-1$ into an "exotic" search, which is used as the main channel reflecting network effect of the firms' internal trade, and it helps to reduce the searching cost and sunk cost of entering the target market i in period t (Lawless, 2013). The existing export markets of a firm are spread globally, they are able to serve as a springboard to gather information for a firm attempting to exporting to a new market (Rudai Yang, 2019). The sunk cost and search cost will be reduced due to the firm's previous export experience, which means that the firm's previous export experience is useful.

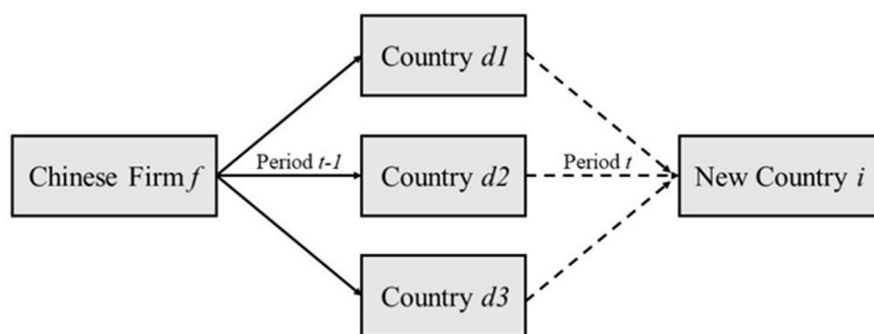


Figure 1. Endogenous network

For external trade networks, various literature has given many different definitions. This article selects neighbors of Chinese export firms as a specific dimension to measure the impact of the external network formed by neighbors on the marginal expansion of Chinese firms. The definition of the external network is shown in Figure 2. The exporting behavior of neighbors of Chinese export firms in this period will be the main reflection of neighboring external networks. For the Chinese firm f itself, it may choose the similar or nearby market i of the neighbors' export market d as the export destination, because neighbors have already gathered in the d market, which has compressed the export space. It may be a better choice to enter a similar or nearby market i of the neighboring export markets. Entering this type of markets can not only gain a larger market space, but also obtain a learning effect from neighbors' export experience (Ana P. Fernandes, 2014), and increase their own probability of entering the destination market i .

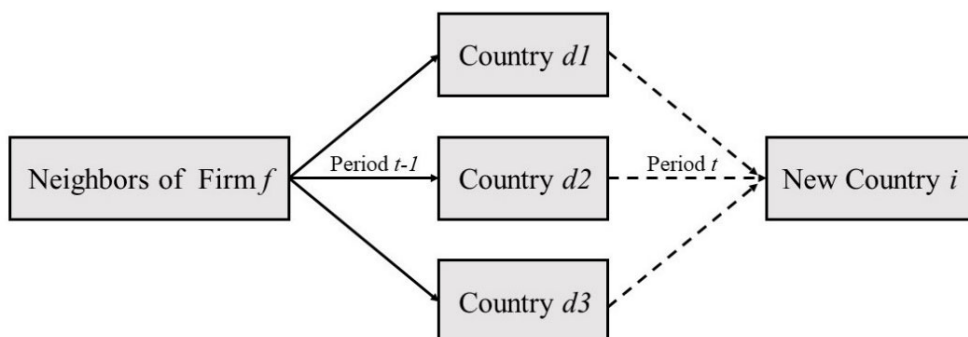


Figure 2. External Trade Network

2. THEORETICAL ANALYSIS

The enterprise trade networks have a significant impact on the decision-making of export enterprises. Exporting requires the payment of fixed costs and variable costs; thus, the export decision of a firm is the result of weighing costs and profits. Only firms expect sufficiently high profits from exporting choose to pay the costs and export products. When the profits generated from export are lower than the costs incurred, the firm will not choose to export products. Moreover, firms have to meet certain thresholds when entering a brand-new market (Melitz, 2003). Entering new markets through the trade network can significantly reduce the firms' information collection costs and sunk costs. This reflects the impact of trade networks is mainly on firm's information searching. Therefore, this article argues that both endogenous networks built by a firm itself and external networks built by neighbors can reduce the cost of information searching and improve the success rate of corporate marginal expansion.

3. EMPIRICAL ANALYSIS AND RESULTS

3.1. Empirical Modelling

In this section, a discussion of the impact of the endogenous network built by the enterprise and the external network of neighbors on the marginal expansion of exports will be presented. For the external network of neighbors, the impact of the town-level neighbor network and the municipal-level neighbor network on the enterprise are the main topics that will be examined. A benchmark regression model is set out, which is

$$P(Entry_{fi,t+1}) = \alpha + \beta_1 InNet_{fit} + \beta_2 ExNet_{fit} + \gamma lnDistance_{fi} + \delta_1 lnLaborProd_{ft} + \delta_2 lnSize_{ft} + \delta_3 lnTotal_{Export}_{ft} + \delta_4 lnGDP_{it} + \rho Nummar_{fit} + \{FE\} + \varepsilon_{fi,t+1}$$

Where $Entry_{fi,t+1}$ is the probability of firm f entering market i in period $t+1$, $InNet_{fit}$ is the endogenous network strength of firm f in market over period t , and $ExNet_{fit}$ is the external network strength of firm f in market i in period t . $Distance_{fi}$ refers to the distance between China and the target market country, and $lnDistance_{fi}$ is brought into the equation. $Labor_Prod_{ft}$ is the labor productivity of firm f in period t and $Labor_Prod_{ft}$ is included in the equation. Its calculation method is the industrial added value divided by the number of employees. $Size_{ft}$ is the scale of firm f in period t , and $lnSize_{ft}$ is presented in the equation, which is represented by the number of employees over period t . $Total_Export_{ft}$ is the total export value of firm f in period t . GDP_{it} is the total GDP of the target market country i in year t , and $lnGDP_{it}$ is included in the equation. $Nummar_{fit}$ is measured by the number of export markets of firm f in period t , $\{FE\}$ is the year-country fixed effect and $\varepsilon_{fi,t+1}$ is the error term.

The explained variable $Entry_{fi,t+1}$ takes only the value 0 or 1 to indicate whether the firm exports to market i in period $t+1$. The calculation method of the explained variable is

$$Entry_{fi,t+1} = \begin{cases} 1, & \text{if } Exp_{fit} = 0 \text{ and } Exp_{fi,t+1} > 0 \\ 0, & \text{if } Exp_{fit} = 0 \text{ and } Exp_{fi,t+1} = 0 \end{cases}$$

Where Exp_{fit} is the export value of firm f to country i in period t . $Entry_{fi,t+1}$ is equal to zero if the firm f did not export to country i in neither the period t nor the period $t+1$. It is equal to one if the firm f did not export to country i in the period t but export in $t+1$.

The endogenous network strength $InNet$ and the external network strength $ExNet$ are the core explanatory variables in the benchmark regression. This article refers to Rudai Yang's (2019) product-level network strength calculation method and summarizes it into firm-level trade network strength. The calculation method is

$$InNet_{fit} = \sum_{d \neq \text{China}} ExportShare_{fdt} \times \frac{Export_{dit}}{Import_{it}}$$

Where f represents a Chinese firm, d, i represents the destination-country, and d is the country where the firm f has exported in the period t , i is the target market for the firm f to start the marginal expansion in the next period. $ExportShare_{fdt}$ is the share of export value of firm f to country d in year t , $Export_{dit}$ is the export value of country d to country i in year t , and $Import_{it}$ is the import value of country i in year t . $InNet_{fit}$ measures the weighted average sum of the export intensity of each destination market d of firm f to country i in year t , where the weight is the export share of the firm to each destination market in year t . This indicator measures the endogenous network strength of Chinese firms to target market over the next period i in year t .

$$ExNet_{fit} = \frac{1}{N_{fmt}} \sum_{f' \neq f} \sum_{d \neq \text{China}} ExportShare_{f'dt} \times \frac{Export_{dit}}{Import_{it}}$$

Similar to the endogenous network strength, m is the city or town where firm f is located, and f' is the neighboring firm of Chinese firm f . According to the firm's postal code, this article defines the firm that is located in the same town or city as firm f as the neighbor of f , $N_{f_{mt}}$ is the sum of neighbors in the city or town where firm f is located. This indicator is the average result of summation of the endogenous network strengths of neighbors in the same town or city and it relates to the external network strength of firm f . The calculation of this indicator refers to the study of Ana P. Fernandes (2014), who uses the average export growth rate of the firm's neighbors in the same city to the target market i as an indicator to measure export signals.

3.2. Empirical Results and Analysis

First, the endogenous network strength InNet is examined. The regression coefficients are all significantly positive, and all of them have passed the 1% significance level, which means that the greater the strength of the firm's endogenous network, the higher the success rate of marginal export expansion. The result from the regression coefficients shows that for every 1% increase in the endogenous network strength, the success rate of the marginal expansion of a firm's exports will increase by 0.21%-0.28%. Therefore, the regression results are in line with the expectations of the previous theoretical analysis. When firms establish stronger information network connections with new export destinations, firms will be more motivated to export.

Table 1. Empirical Results

	Explained Variable: Entry							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
InNet		0.28*** (0.02)			0.21*** (0.02)	0.26*** (0.02)	0.21*** (0.02)	0.26*** (0.02)
ExNet (Urban)			1.33*** (0.06)		1.21*** (0.06)		1.21*** (0.06)	
ExNet (Town)				0.37*** (0.04)		0.33*** (0.04)		0.33*** (0.04)
ln Labor Prod	-0.01 (0.004)	-0.005 (0.004)	-0.01 (0.004)	-0.01 (0.004)	-0.01 (0.004)	-0.01 (0.004)		
ln Total Exp	0.02*** (0.003)	0.02*** (0.003)	0.02*** (0.003)	0.02*** (0.003)	0.02*** (0.003)	0.02*** (0.003)	0.02*** (0.003)	0.02*** (0.003)
Nummar	0.07*** (0.0004)	0.07*** (0.0004)	0.07*** (0.0004)	0.07*** (0.0004)	0.07*** (0.0004)	0.07*** (0.0004)	0.07*** (0.0004)	0.07*** (0.0004)
ln Distance	-0.10*** (0.01)	-0.10*** (0.01)	-0.10*** (0.01)	-0.10*** (0.01)	-0.10*** (0.01)	-0.10*** (0.01)	-0.10*** (0.01)	-0.10*** (0.01)
ln Size	0.10*** (0.004)	0.10*** (0.004)	0.10*** (0.004)	0.10*** (0.004)	0.10*** (0.004)	0.10*** (0.004)	0.10*** (0.004)	0.10*** (0.004)
ln GDP	0.61*** (0.002)	0.61*** (0.002)	0.61*** (0.002)	0.61*** (0.002)	0.61*** (0.002)	0.61*** (0.002)	0.61*** (0.002)	0.61*** (0.002)
Observation s	3,291,77 6	3,291,77 6	3,291,77 6	3,291,77 6	3,291,77 6	3,291,77 6	3,291,77 6	3,291,77 6
Pseudo R2	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22

Notes: * indicates significance at 10% level, ** at the 5% level, and *** at the 1% level. Standard errors in parentheses.

Second, the strength of the external network ExNet is examined. Both the town-level neighbor ExNet (Town) and the city-level neighbor ExNet (Urban) of the firm are studied to observe the different impacts of various ranges of neighbor networks on the firm's export marginal expansion. The regression results show that the regression coefficients of the town-level neighbors' external network strength and the city-level neighbors' external network strength are both positive, and have passed the 1% significance level. This shows that neighbors can act

as "pioneers" of exports, and firms can learn export-related experience from their neighbors and use it for export marginal expansion. By observing the coefficients, it can be found that the coefficient range of the city-level neighbor network is 1.21-1.33, which means that for every 1% increase in the average network strength of the neighbors in the same city to the export destination, the probability of the firm itself completing marginal expansion to this destination will increase by 1.21%-1.33%. While the coefficient range of the town-level neighbor network is 0.33-0.37, which is smaller than the strength coefficient of the city-level neighbor network, indicating that the firms can extend their learning examples to the level of prefecture-level cities, and that city-level neighbors have a greater influence on the choice of firm export marginal expansion.

4. CONCLUSION

This article uses the detailed data of 3,030 firms that exported continuously from 2000 to 2006 to construct the endogenous network and neighbor's external network indicators, and empirically analyze the influence of the firm's endogenous network and neighbor's external network on the marginal expansion of exports.

Based on the analysis, this article concludes that the endogenous network of a firm has a significant effect on promoting marginal expansion. For every 1% increase in the strength of the endogenous network, the success rate of marginal export expansion will increase by 0.26%; for every 1% increase in the strength of the external network of city-level neighbors, the success rate of marginal export expansion will increase by 1.2%; for every 1% increase in the strength of the external network of town-level neighbors, the success rate of marginal export expansion will increase by 0.33%. It can be seen that both the endogenous network and the neighbor's external network can have a positive impact on the export marginal expansion of a firm.

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