RIETI Discussion Paper Series 19-E-020

The Effect of Social Interactions on Exporting Activities:
Evidence from Micro, Small, and Medium-Sized Enterprises in rural Vietnam

SHIMAMOTO, Daichi
Kindai University

KIM, Yu Ri
Sophia University

TODO, Yasuyuki
RIETI

The Research Institute of Economy, Trade and Industry
https://www.rieti.go.jp/en/

RIETI Discussion Paper Series 19-E-020
March 2019

The Effect of Social Interactions on Exporting Activities: Evidence from Micro, Small, and Medium-Sized Enterprises in rural Vietnam[1]

Daichi SHIMAMOTO
Kindai University

Yu Ri KIM
Sophia University

Yasuyuki TODO
Research Institute of Economy, Trade and Industry and Waseda University

Abstract

This study examines the effect of social interactions on exporting activities of micro, small, and medium-sized enterprises (MSMEs) in traditional apparel and textile clusters in Vietnam. To deal with econometric issues due to the reflection problem of Manski and endogeneity of network formation, we apply the estimation method developed by Bramoullé et al. (2009). Specifically, we eliminate the sub-network fixed effects using within transformation and instrument the average share of exports among peers of the focal firm by attributes of its peers' peers. This method enables us to identify the effects of exporting activities of the focal firm's peers on its own exporting activities (the endogenous effect according to Manski) and the effect of its peers' attributes (the exogenous effect). We find that peers' export share has a negative and significant effect on own export share, suggesting that the negative competition effect surpasses the positive learning effect. We also find that firms are encouraged to export by their large peers, possibly because firms can obtain technology spillovers from large peers and thus can be productive enough to start exporting.

Keywords: social interactions, exporting, social networks
JEL classification: F14, L14

[1] This study is conducted as a part of the Project Research on 'Global Inter-Firm Networks and Related Policies' undertaken at the Research Institute of Economy, Trade and Industry (RIETI). Financial support from JSPS KAKENHI Grant Numbers JP25101003 and 18H03642 is gratefully acknowledged. The authors would like to thank Yuki Higuchi and seminar participants at the Hayami Conference for their helpful comments. The opinions expressed and arguments employed in this paper are the sole responsibility of the authors and do not necessarily reflect those of RIETI, Kindai University, Sophia University, Waseda University, or any institution with which the authors are affiliated.

1. Introduction

Determinants of exporting activities have been examined extensively in the literature. Besides productivity, a major determinant found in the literature (Bernard and Jensen, 2004; Bernard et al., 2007; Bernard et al., 2012; Bernard and Wagner, 2001; Clerides et al., 1998; Mayer and Ottaviano, 2007; Melitz, 2003; Wagner, 2007, 2012), another important factor influencing decisions to start exporting is uncertainty in profitability and demand in foreign markets. The literature has theoretically and empirically found that because of export uncertainty, firms start exporting a small amount of a single product to a single destination and expand their export volumes, products, and destinations after they learn demand and costs in foreign markets from their experiences (Albornoz et al., 2012; Araujo and Ornelas, 2007; Eaton et al., 2007; Freund and Pierola, 2010; Iacovone and Javorcik, 2010; Nguyen, 2012; Rauch and Watson, 2003).

In addition to productivity and self-learning, more recent studies emphasize learning of costs for and demand in foreign markets from experienced neighbors and peers. Several theoretical models suggest that because of uncertainty in costs of exporting and demand in foreign markets, firms are more likely to start exporting if their neighbors are already exporting and thus they can learn from the neighbors (Fernandes and Tang, 2014; Krautheim, 2012). This theoretical prediction is empirically supported by many studies using firm-level data (Aitken et al., 1997; Fernandes and Tang, 2014; Kamal and Sundaram, 2016; Kneller and Pisu, 2007; Koenig, 2009; Koenig et al., 2010). However, neighbors may have an opposing effect on firms' decisions to start exporting, as they generate greater competition and thus lower markups to new entrants as theorized in the models of Ottaviano et al. (2002) and Melitz and Ottaviano (2008). Negative effects of agglomeration on exporting decisions are empirically found in Bernard and Jensen (2004) for the United States and Bao et al. (2016) for China.

The mixed empirical results may be due to the following two empirical issues. First, the causal effect of social learning from neighbors and peers is usually difficult to identify, as argued by Manski (1993). Because a focal firm may learn from its peer firms while its peers learn from the firm, the mutual interactions make it impossible to distinguish between the two-way causality. In addition, because peers and neighbors often share similar attributes, the correlation between their exporting activities may simply reflect the unobservable similarity, not any causal effect of peers. However, the empirical studies on export spillovers, such as Bernard and Jensen (2004), Koenig (2009), Koenig et al. (2010), Fernandes and Tang (2014), and Bao et al. (2016), rely on incorporating lagged independent variables or various types of fixed effects and did not fully correct for biases due to the reflection problem of Manski or endogeneity of peer formation. The growing literature on peer effects in general, not specifically related to exporting activities, often utilizes natural and randomized experiments for peer formation to identify causal effects (Aral and Walker, 2011; Banerjee et al., 2013; Bobonis and Finan, 2009; Brunello et al., 2010; Cai and Szeidl, 2016; Dahl et al., 2014; De Giorgi et al., 2010; Duflo and Saez, 2003; Fafchamps and Quinn, 2015; Falk and Ichino, 2006; Sacerdote, 2014; Zimmerman, 2003). However, because of difficulty in conducting randomized experiments to provide exporting opportunities to firms and in

finding natural experimental situations for firms' exporting activities, the literature on peer effects on exporting activities, or export spillovers, has not incorporated these methods.

Second, it is often difficult to define neighbors or peers from which the focal firm receives information on foreign markets. Because the existing studies above typically define neighbors as those in the same geographical region, such as the same city or province, or the same industrial sector, the focal firm may not be actually linked with or obtain information from its neighbors defined so. Recently, economics has paid much attention to networks of agents at the micro level, including individuals, households, and firms, and examined determinants of such networks and their effects on economic performance. For example, Fafchamps and Lund (2003) and Fafchamps and Gubert (2007) investigate how networks for mutual help among rural households in the Philippines are formed. Barrot and Sauvagnat (2016) and Bernard et al. (2018) explore effects of firms on their suppliers and customers, whereas Elliott et al. (2014) and Acemoglu et al. (2015) examine networks of financial institutions.

Given these two remaining issues in the literature on export spillovers, this study identifies causal effects of exporters linked with the focal firm through information-sharing networks on its exporting activities, using a unique dataset for micro, small, and medium-sized enterprises (MSMEs) in traditional industrial clusters in suburban Vietnam. Due to the non-experimental nature of the data, we use the method developed by Bramoullé et al. (2009) in which the reflection problem and endogeneity are carefully corrected for by instrumenting a measure of exporting activities for a firm's peers by attributes of peers of the firm's peers. Because the firm's indirect peers which are not directly linked with the firm should not affect its decisions but influence decisions of its direct peers, these instruments should be valid.

Our empirical results show a negative effect of the average share of exports of the firm's peers on the firm's own export share, implying that the negative competition effect of peers outperforms their positive learning effect. In addition, we find a positive effect of the average size of the firm's peers on its exporting activities, possibly because the firm receives productivity spillovers from large peers and thus become productive enough to start exporting.

This study contributes to the literature on the effects of social learning on exports in the following two ways. First, because we utilize the information-sharing network of MSMEs within each cluster to define peers, it is certain that peers in our data exchange business information. This contrasts with the previous literature on export spillovers in which neighbors are broadly defined and may not exchange information. Second, our work is the first to identify the causal effect of exporting activities of a firm's peers on its own exporting. This is possible using attributes of peers of each firm's peers as instruments for the export share of the firm's peers based on the data for the firm-level networks. Third, we clearly distinguish between the effect of peers' exporting and the effect of peers' attributes through, for example, productivity spillovers, finding that the former is negative while the latter is positive. In the previous literature, the two types of spillovers were mixed.

The rest of the paper is organized as follows. The next section explains our conceptual framework and the estimation strategy. Section 3 outlines data, whereas Section 4 shows empirical results and discussion. Section 5 concludes.

2. Methodology

2.1 Conceptual framework

Theoretically, a firm's decision to start exporting is affected by its neighbors' or peers' exporting activities in two opposing ways. One hand, theories of social learning often suggest a positive effect of neighbors on the focal agent's activities (Bandiera and Rasul, 2006; Banerjee, 1992; Bikhchandani et al., 1992, 1998; Conley and Udry, 2010; Fernandes and Tang, 2014; Foster and Rosenzweig, 1995). For example, Fernandes and Tang (2014) develop a heterogeneous-firm trade model incorporating learning about foreign demand from neighboring exporters as assumed in the model of social learning of Jovanovic (1982). They predict that currently non-exporting firms are more likely to start exporting when more of their neighbors are exporters because of learning about foreign demand from exporters. Using firm-level data from China and defining neighbors as firms in the same city, Fernandes and Tang (2014) find evidence supporting this prediction. Defining neighbors at both geographic and sectoral levels, Koenig (2009) and Koenig et al. (2010) find similar evidence of learning from neighbors in France. Using customs data on exports of textile and apparel products from Bangladesh to the United States, Kamal and Sundaram (2016) also find the presence of exporters in the same city transacted with a US importer raises the probability of firms' exporting to the same importer. In addition, Aitken et al. (1997) and Kneller and Pisu (2007) find evidence of learning about exporting activities from multinational enterprises.[†]

On the other hand, the presence of current exporters generates greater competition and thus lower markups for new entrants as theorized in the models of Ottaviano et al. (2002) and Melitz and Ottaviano (2008). Lu et al. (2012) find empirical evidence for the negative relation between agglomeration and markups, using firm-level data for China. Therefore, the effect of neighboring exporters on firms' propensity to start exporting through this competition channel should be negative. In fact, Bernard and Jensen (2004) find a negative effect of exporters in same industry and state in the US on firms' exporting activities. Bao et al. (2016) find the relation between current exporters in the same region or industry and firms' exporting activities is inverted U-shaped, implying that the relation is negative when exporters are congested in a region or industry.

Therefore, theoretically, a non-exporter is more likely to start exporting when it has more peer firms which are currently exporting if the positive effect through learning exceeds the negative effect through competition. By contrast, if the competition effect surpasses the learning effect, the effect of peer

[†] Social learning is found to be important also in adoption of new agricultural technologies in developing countries (Bandiera and Rasul, 2006; Foster and Rosenzweig, 1995).

exporters on the firm's probability to start exporting is negative. We will examine which is the case empirically.

2.2 Estimation strategy

To identify peer effects theoretically predicted above, one needs to consider two issues in empirical analysis. First, causality of peer effects through social interactions is usually difficult to identify. Notably, Manski (1993) argues that there are three main channels of correlation between outcomes of an agent and its peers. The first channel is the endogenous effect, i.e., the effect peers' outcomes on the agent's outcome, which is of our great interest. In the context of export spillovers, a positive endogenous effect indicates that a firm starts exporting through learning information about exporting activities and foreign markets from its peers' experiences. A negative endogenous effect implies that the firm hesitates to start exporting because it observes greater competition among current peer exporters. The second is the exogenous effect, i.e., the effect of peers' attributes on the agent's outcome. This effect arises when, for example, firms start to export because they are influenced by their peers' high productivity or skills. Finally, the correlation between outcomes of the agent and its peers may reflect correlation of unobservable attributes shared among agents in a group, or the correlated effect. In our case, this can be because firms in a region share similar characteristics, such as high (or low) productivity and skills and geographical and historical advantages. Manski (1993) shows that it is usually impossible to identify the endogenous and the exogenous effect because agents interact and influence each other, which he calls the reflection problem. In addition, the correlated effect generates endogeneity and thus results in biases in standard estimations.

However, the empirical studies on export spillovers, such as Bernard and Jensen (2004), Koenig (2009), Koenig et al. (2010), Fernandes and Tang (2014), and Bao et al. (2016), rely on incorporating lagged independent variables or various types of fixed effects and did not fully correct for biases due to the reflection problem of Manski or endogeneity. By contrast, there is growing literature to estimate peer effects through social interactions in more general contexts. Notably, a number of studies have utilized natural and randomized experiments in peer formation to identify peer effects (Aral and Walker, 2011; Banerjee et al., 2013; Bobonis and Finan, 2009; Brunello et al., 2010; Cai and Szeidl, 2017; Dahl et al., 2014; De Giorgi et al., 2010; Duflo and Saez, 2003; Fafchamps and Quinn, 2015; Falk and Ichino, 2006; Sacerdote, 2014; Zimmerman, 2003). However, it is difficult to conduct a randomized experiment or find a natural experimental situation in which firms are randomly selected to engage in exporting activities or to be linked with current exporters, although it is not impossible as shown by Atkin et al. (2017), Fafchamps and Quinn (2015) and Cai and Szeidl (2017).

Second, it is also difficult to define peers from which the focal firm receives spillovers of information on foreign markets and with which it competes in foreign markets. The existing studies on peer effects on exporting activities, such as Bernard and Jensen (2004), Koenig (2009), Koenig et al. (2010), Fernandes and Tang (2014), and Bao et al. (2016), typically define peers of the focal firm as "neighbors," or firms in the same geographical region, such as the same city or province, or industrial

sector. Therefore, the focal firm may not obtain information from its neighbors or view its neighbors as competitors.

However, some studies on peer effects in other aspects employ actual links between individual agents in social networks to identify channels of spillovers of information, behaviors, and performance (Aral and Walker, 2011; Banerjee et al., 2013; Bobonis and Finan, 2009; Brunello et al., 2010; Cai and Szeidl, 2016; Dahl et al., 2014; De Giorgi et al., 2010; Fafchamps and Quinn, 2015; Falk and Ichino, 2006; Sacerdote, 2014; Zimmerman, 2003). This new literature on peer effects is in line with the recent trend in economics that networks at the micro level are utilized to investigate determinants and effects of networks. For example, Fafchamps and Lund (2003) and Fafchamps and Gubert (2007) investigate how networks for mutual help among rural households in the Philippines are formed. Barrot and Sauvagnat (2016) and Bernard et al. (2018) explore effects of firms on their suppliers and customers, whereas Elliott et al. (2014) and Acemoglu et al. (2015) utilize networks of financial institutions. Compared with this growing literature, the literature on peer effects on exporting activities has not yet utilized firm-level networks to identify the channel of diffusion of information on foreign markets and competitors.

Given these two issues, this study identifies causal effects of peer exporters on a firm's exporting decision, using a method developed by Bramoullé et al. (2009). Bramoullé et al. (2009) consider a structural equation in which outcomes of agents are affected mutually by their peers' outcomes and attributes and unobservable attributes, i.e., fully incorporating the three channels of peer effects argued by Manski (1993), the endogenous, exogenous, and correlated effect. This method is suitable to our case, because, as we will explain later in detail, we utilize non-experimental data for firms in several industrial clusters that include detailed information-sharing networks within each cluster at the firm level. We define each firm's peers as information-sharing partners reported by the firm or its partner, assuming that peers defined so affect each other.

Specifically, we consider an econometric model for the decision to export, following Bramoullé et al. (2009):

$$y_{li} = \alpha_l + \beta_1 \sum_{j \in P_i} y_{lj}/n_i + \beta_2 x_{li} + \beta_3 \sum_{j \in P_i} x_{lj}/n_i + \varepsilon_{li}, \qquad E[\varepsilon_{li}|\mathbf{x_l}, \alpha_l] = 0, \qquad (1)$$

where y_{li} is the share of exports in total sales for firm i in sub-network l, P_i and n_i represent the set and the number of firm i's peers, respectively, and x_{li} is a vector of attributes of firm i. All of firm i's peers are assumed to be in the same sub-network l, part of the full network within the village. The first term on the right-hand side, α_l, is fixed effects specific to sub-network l, representing the correlated effect, i.e., the correlation between unobserved attributes shared by all firms in the sub-network, such as common knowledge and culture, and their behaviors. Because we define each sub-network within the village, α_l also capture any village fixed effects. The second term, $\sum_{j \in P_i} y_{lj}/n_i$, indicates the average of the export share for firm i's peers. Thus, β_1 represents the endogenous effect, denoting how peers' decisions affect the firm's own decision. The third term is the effect of the firm's own attributes, such as size and experiences, on its exporting decision. The fourth term, $\sum_{j \in P_i} x_{lj}/n_i$, signifies the average of attributes

of firm *i*'s peers and thus shows the exogenous effect, i.e., how a firm's decision is affected by its peers' attributes, besides their decisions.

To identify causality in equation (1), we first eliminate cluster fixed effects, α_l, by averaging equation (1) over all peers of firm *i* and subtracting it from (1). This method is analogous to within transformation in panel data analysis. Then, we obtain in matrix notation the following structural equation:

$$(\mathbf{I}-\mathbf{G})\mathbf{y} = \beta_1(\mathbf{I}-\mathbf{G})\mathbf{G}\mathbf{y} + \beta_2(\mathbf{I}-\mathbf{G})\mathbf{X} + \beta_3(\mathbf{I}-\mathbf{G})\mathbf{G}\mathbf{X} + (\mathbf{I}-\mathbf{G})\boldsymbol{\varepsilon}, \quad (2)$$

where $\mathbf{y}$ is an $n \times 1$ vector of y_{li} (n is the total number of firms). $\mathbf{G}$ is an $n \times n$ matrix where $G_{ij} = 1/n_i$ if firm *j* is firm *i*'s peer and zero otherwise. Thus, $(\mathbf{I}-\mathbf{G})\mathbf{y}$ is the vector of the difference between firm *i*'s export share and the average of its peers' export shares, whereas $(\mathbf{I}-\mathbf{G})\mathbf{G}\mathbf{y}$ is the difference between the average over *i*'s peers ($\mathbf{G}\mathbf{y}$) and the average over *i*'s peers' peers ($\mathbf{G^2}\mathbf{y}$). The third and fourth terms in equation (2) can be interpreted similarly. In this model, we assume that $E[\boldsymbol{\varepsilon_l}|\boldsymbol{\alpha_l}, \boldsymbol{x_l}, \boldsymbol{G_l}] = 0$. In other words, network structure ($\boldsymbol{G_l}$) is exogenously given conditional on sub-network fixed effects (α_l) and firm attributes ($\boldsymbol{x_l}$).

Equation (2) still faces two econometric problems, the reflection problem of Manski (1993) and endogeneity of formation of peers. The reflection problem arises because $\mathbf{y}$ is included in both sides of equation (2). Endogeneity arises because peers' exporting activities may be correlated with the peers' unobservable attributes not included in α_l and thus with the firm's unobservable attributes ε. Thus, it is impossible to identify the endogenous and exogenous effect of peers by applying standard regression models such as ordinary least squares (OLS).

To tackle these econometric issues, Bramoullé et al. (2009) propose to instrument $(\mathbf{I}-\mathbf{G})\mathbf{G}\mathbf{y}$ in equation (2) by $(\mathbf{I}-\mathbf{G})\mathbf{x}$, $(\mathbf{I}-\mathbf{G})\mathbf{G}\mathbf{x}$, and $(\mathbf{I}-\mathbf{G})\mathbf{G^2}\mathbf{x}$ and apply a 2SLS estimation. Because attributes of peers of peers of firm *i* (hereafter, two-step peers) should not directly influence firm *i*'s decision to export but may be related to its direct peers' exporting activities, the instruments are valid, and thus biases due to endogeneity can be corrected for using the instruments. This method can avoid the reflection problem, because in the second stage of the 2SLS estimation, $\mathbf{y}$ in the right hand side of equation (2) will be replaced with its predicted value. Bazzi et al. (2017) also apply this estimation strategy to panel data of manufacturing firms in Indonesia to estimate productivity spillovers. Instead of the attributes of two-step neighbors, they utilize trade shocks faced by two-step neighbors as instrument for direct neighbors' productivity to estimate productivity spillovers.

We should note the following three remarks about this estimation methodology. First, according to our definition, firm *i*'s two-step peers include firm *i* if it is linked with any other firm. To see this, let us consider a network in Figure 1. In this case, $\mathbf{G}$ and $\mathbf{G^2}$ are given by:

$$\mathbf{G} = \begin{pmatrix} 0 & 0.5 & 0.5 & 0 & 0 \\ 0.333 & 0 & 0.333 & 0.333 & 0 \\ 0.5 & 0.5 & 0 & 0 & 0 \\ 0 & 0.5 & 0 & 0 & 0.5 \\ 0 & 0 & 0 & 1 & 0 \end{pmatrix},$$

and

$$\mathbf{G}^2 = \begin{pmatrix} 0.417 & 0.25 & 0.167 & 0.167 & 0 \\ 0.167 & 0.5 & 0.167 & 0 & 0.167 \\ 0.167 & 0.25 & 0.417 & 0.167 & 0 \\ 0.167 & 0 & 0.167 & 0.667 & 0 \\ 0 & 0.5 & 0 & 0 & 0.5 \end{pmatrix}.$$

Although $\mathbf{G}(1,1)$ is apparently zero, $\mathbf{G}^2(1,1)$ is not. This is because firm 1 is a peer of firm 2 that is a peer of firm 1. Similarly, when firms form a loop, like firms 1, 2, and 3 in Figure 1, firm 1's three-step peers include firm 1 itself, or $\mathbf{G}^3(1,1)$ is non-zero. The possible inclusion of the focal firm in the set of its two- and three-step peers may contrast with standard definition of peers. However, our definition of peers is appropriate for the purpose of identification, as long as the crucial condition, $E[\boldsymbol{\varepsilon}_l|\boldsymbol{\alpha}_l, \boldsymbol{x}_l, \boldsymbol{G}_l] = 0$, holds.

Second, in this estimation framework, three types of peer effects can be identified only when $\mathbf{I}$, $\mathbf{G}$, $\mathbf{G^2}$, and $\mathbf{G^3}$ are linearly independent. If, for example, a network of firms forms a loop, this condition is not satisfied so that peer effects cannot be identified. In our estimations, we confirm that this condition is satisfied because there are intransitive triads in the networks.

Finally, this method exclude isolates, firms that are not linked with any peer, from the sample, because α_l cannot be identified for isolates. This is similar to the argument that singleton groups, i.e., groups with only one observation, are suggested to be dropped from estimations using group fixed effects (Correia, 2015).

3. Data

This study employs data for 296 micro, small, and medium-sized enterprises (MSMEs) in 16 village-based apparel and textile industrial clusters surrounding Hanoi, the capital city of Vietnam, which were collected by the authors. Our data is suitable to the analysis of peer effects on exporting activities in two ways. First, in Vietnam, industrial clusters of specific products, such as apparel and textile, metal products, and bamboo and wood products, have been historically developed at the village level. Within each cluster, MSMEs often share information with others to enjoy one of the benefits of agglomeration claimed by Marshall (1890). Therefore, social interactions are most likely to influence MSMEs' behaviors. In addition, because the number of MSMEs in each cluster, particularly those with formal entity that are our target, is relatively small, we could survey to most of MSMEs in the 16 clusters and identify the information-sharing network within each cluster. Second, although the MSMEs are still at the early stage of development, 19 percent are already exporting and the share of exporters is increasing over time. Therefore, we would expect any effect of peers on exporting activities.

3.1 Survey

To select our target firms, we first used the Vietnam Enterprise Survey (VES) conducted by the General Statistical Office of Vietnam (GSO) in 2010. We identified village clusters of apparel and textiles in the 10 provinces in the Red River Delta as villages or communes with more than five formally registered firms in the apparel and textile industry. Because VES randomly selected MSMEs, villages with more than five registered firms in the VES data are expected to be industrial clusters of a specific industry. Our survey team initially identified 19 villages in six provinces and visited all of them for a preliminary survey. Then, we found that in two of the 19, no registered firm was actually producing apparel or textiles and thus dropped the two from our sample. In addition, we found that one village had already received a social experiment to provide business management training and been surveyed several times by another research team (Higuchi et al., 2015). Because we suspect that firms in this village behave systematically different from others due to their experiences, we also dropped this village from our target.

We contacted all of 354 registered firms[‡] in the remaining 16 apparel and textile village clusters in the list provided by the municipal government of each village. We successfully conducted face-to-face interviews to owners or top-level managers of 296 firms in December 2014 and January 2015 with a response rate of 84 percent. The questionnaire consisted of questions on standard firm characteristics (e.g. sales, the number of workers, main products, and ownership) and on firms' information-sharing networks described in detail in the next sub section.

3.2 Information-sharing network

In the survey, we asked the representative of each firm "With which firm in this village does your firm regularly exchange business information in the village?," showing the full list of registered firms in the village. Each firm can name any number of information-sharing partners. We assume that information-sharing ties are reciprocal and unidirectional and hence that two firms are linked with an information-sharing tie if at least one of the two names the other as a partner. Hereafter, we refer a firm's information-sharing partners as its peers.

Figure 2 displays the histogram of the number of peers. On average, firms have 4.58 peers within the villages. Figure 3 shows a visualization of the peer network of firms within each village, indicating that the structure of peer networks differs substantially across villages. In addition, intransitive triads are observed in the peer networks, implying that we can apply the method developed by Bramoullé et al. (2009) to identify the effects of social interactions on exports.

[‡] Although there are informal firms in the target clusters, we focus on registered firms for two reasons. First, it is often found that informal firms tend to be less productive than registered firms in less developed countries (La Porta and Shleifer, 2014). Therefore, informal firms are less likely to engage in exporting activities than registered firms due to their lower productivity (Melitz, 2003). Second, as explained later, we asked information-sharing partners to each firm by showing the list of all registered firms in the same village. Because the municipal governments had no list of informal firms, we could not ask about informal firms with which the focal firm exchanged information.

3.3 Construction of variables

Our key dependent variable is the share of exports in total sales in 2014 that are directly reported by each firm. In some alternative specification, we utilize the dummy variable that takes a value of one if the export share of the firm is greater than zero and zero otherwise. The firm attributes include the number of workers and its square divided by 10,000, firm age, the manager's age and years of schooling, and a dummy variable that indicates whether manage is a female. Although one of the key determinants for exports is shown to be productivity of firms (Bernard and Jensen, 2004; Melitz, 2003), our data do not include standard measures of productivity, such as total factor productivity or value added per worker, because respondents usually hesitated to disclose sales and did not record the value of intermediate products and capital goods. Instead, we use the number of workers as a proxy for productivity, as it is often found that productivity and firm size are positively correlated.

3.4 Descriptive statistics

Table 1 displays the descriptive statistics of firms that used for analysis. In this study, we limited our sample to 223 firms with at least one peer because our estimation method explained in Section 2.2 cannot apply to observations with no peer. On average, the share of exports in total sales is 16.0 percent, whereas 19.3 percent of firms in our sample engage in any exporting activity. The average and standard deviation of the number of workers is 35.7 and 84.81, respectively, implying there is a substantial variation in firm size. The average firms age is 7.8 years, and the average number of peers within a village is 4.6. On average, the age and years of schooling of managers are 44.1 and 11.6, respectively, and 20 percent of managers are female.

4. Results and Discussion

4.1 Results

Before we apply the method of Bramoullé et al. (2009) described in Section 2.2, we employ methods used in previous studies on export spillovers that do not necessarily correct for biases due to the reflection problem and endogeneity. Specifically, we start with simple ordinary least squares (OLS) estimations in which measures of exporting activities of each firm are regressed on the average measures among other firms in the same village or peers of the firm. In these estimations, none of the three channels of biases mentioned in Section 2, i.e., correlated, endogenous, or exogenous effect, is incorporated. The results shown in columns (1) and (2) of Table 2 indicate that the share of exports of a firm is likely to be higher when other firms in the same village or its peer firms have a higher export share. In columns (3) and (4) of Table 2, we experiment with the dummy variable for a positive export share and find similar positive correlation.

We further experiment with simple 2SLS estimations, in which we estimate equation (1) assuming no sub-network fixed effects (i.e., $\alpha_l = \alpha$ for any l) and using attributes of two-step peers to instrument

direct peers' exporting activities. In this framework, we can correct for biases due to endogenous effects. In addition, as we also incorporate average of peers' attributes as independent variables or exogenous effects of peers. However, because we assume a constant term in equation (1), rather than fixed effects, results from the 2SLS estimations should still be biased because of correlated effects, i.e., correlation in exporting activities among peers due to unobserved attributes shared by the peers.

Column (1) of Table 3 indicates the results from the first-stage regression of the 2SLS estimation using the share of exports in total sales as the dependent variable, whereas column (2) shows its second-stage results. Columns (3) and (4) of Table 3 are corresponding results in which the dependent variable is the export dummy. In the bottom rows, we show the Wald rk *F* statistic of Kelibergen and Paap (2006) to test whether the instruments are weak and the *p* value of Hansen *J* statistic to test whether the instruments are orthogonal to the error term. In both sets of results in Table 3, we find that the instruments are not weak and orthogonal to the error term. The non-weak instruments are also confirmed in the results in columns (1) and (3) that the effect of the number of workers of two-step peers on direct peers' exporting activities is positive and significant at the one-percent level. More importantly, the results in columns (2) and (4) suggest that peers' exporting activities are still positively correlated with the firm's own exporting activities, after correcting for biases due to endogenous and exogenous effects. The values of the coefficients from the 2SLS estimations are slightly smaller than but not very different from those from the OLS estimations shown in columns (1) and (2) of Table 2, suggesting that biases due to endogenous and exogenous effects are not very large.

This positive correlation of exporting activities among neighbors and peers obtained from our OLS and simple 2SLS estimations are consistent with results from some of the existing studies such as Fernandes and Tang (2014), Koenig (2009), Koenig et al. (2010), and Kamal and Sundaram (2016). However, the positive peer effects we found may still be contaminated by correlated effects. In other words, a firm's exporting activities are correlated with its peers' exporting activities, simply because the firm and its peers share similar but unobservable characteristics that affect firms' decision to export.

Therefore, we now apply the method of Bramoullé et al. (2009) to incorporate correlated effects into our analysis and fully identify causality. Specifically, we transform equation (1) to (2) to eliminate sub-network fixed effects, α_l, and apply 2SLS estimations. It should be noted that sub-network fixed effects enable us to control heterogeneity across villages, because each sub-network is defined as a sub-sample of firms within a village. Columns (1) and (2) of Table 4 show the results from the first and the second stage, respectively, of the 2SLS estimation. The first-stage result indicates that some of the instruments in the bottom rows, or $(\mathbf{I}-\mathbf{G})\mathbf{G}^2\mathbf{X}$, are significantly correlated with the endogenous variable, $(\mathbf{I}-\mathbf{G})\mathbf{GY}$. The Wald rk *F* statistic of Kleibergen and Paap (2006) is shown in the second row from the bottom, suggesting that the instruments are not weak because the *F* statistic is greater than its critical value at the 20-percent maximal size, or 6.73 (Stock and Yogo, 2005).

The result from the second-stage regressions presented in column (2) of Table 4 demonstrates that the estimated coefficient of the average share of exports in total sales among the focal firm's peers on its own export share is negative and statistically significant at the 1-percent level. This result is completely

opposite to the results from the OLS and 2SLS without fixed effects (Table 2 and 3, respectively). That is, after incorporating correlated effects, the endogenous effect of peers, or the effect of peers' exporting activities on the focal firm's exporting activities, is found to be negative, although it was positive without controlling for correlated effects. The effect is large in size, as the estimated coefficient, -0.951, implies that an increase in the average share of exports among the firm's peers by a certain percentage point reduces the firm's export share by approximately the same percentage point. The negative peer effect on exporting activities is also shown in Bernard et al. (2012) and Bao et al. (2016), although majority of the literature finds a positive peer effect.

Further, looking at the effect of average attribute of peers, (**I-G**)**GX**, on the focal firm's export share, or the exogenous effects, shown in the middle rows in column (2) of Table 4, we find that the coefficient of the average number of workers among peers is positive and statistically significant, whereas the coefficient of its square is negative. According to the coefficients, the threshold average number of workers with which the marginal effect is zero is 328, while its mean is 36 (Table 1). Thus, this result indicates a positive but diminishing marginal effect of peer firms' size for the most possible range of firm size, rather than an inverted U-shaped effect.

The effect of a firm's own attribute on its export share is shown from the second to the eighth row of column (2) of Table 4. The coefficients of the number of workers and its square indicate a positive but diminishing marginal effect of firm size, implying that larger firms are more likely to export. This result is consistent with most existing studies on determinants of exporting activities, such as Bernard et al. (2012). The effect of the female dummy is negative and significant, indicating that a firm's export share is 10 percentage points higher when its manager is a female than when the manager is a male.

As a robustness check, we experiment with the export dummy as our dependent variable, rather than the share of exports. The results shown in columns (3) and (4) of Table 4 are quite similar to those in columns (1) and (2). A slight difference is that the Kleibergen-Paap Wald rk *F* statistics, 5.021, is lower than its critical value at the 30-percent maximal size, or 5.07 (Stock and Yogo, 2005). Thus, the estimated coefficients from this alternative specification may be more biased than those in the benchmark specification using the export share due to weak instruments. Accordingly, we rely more on the benchmark results.

4.2 Discussion

Our analysis provides three important implications. First, we find that although there are positive correlation between exporting activities of a firm and its peers, the causal effect of peers' exporting activities on the firm's is negative after controlling for correlated effects, i.e., correlation of unobserved attributes between the firm and its peers that affect exporting activities. That is, firms are less likely to engage in exporting activities when their peers are exporting more. Therefore, the positive peer effects on exporting activities often found in the existing studies may be because they did not explicitly correct for biases due to correlated effects.

Second, as we explained in Section 2.1, exporting activities of a firm's peers affect the firm's own exporting activities in two ways: a positive effect due to learning of information and a negative effect due to competition. Our result suggests that the negative competition effect exceeds the positive information effect, leading to a net negative effect. We conjecture that the competition effect prevails in our case of MSMEs in rural Vietnam, because our sample firms are relatively underdeveloped and mostly rely on limited buyers from several particular countries, such as China, Japan, and the United States, to access foreign markets. Therefore, when a firm's peers are exporting, the firm may be able to obtain information about the foreign buyers from the peers but at the same time observe great competition among exporters because they also realize that demand from the foreign buyers is limited. Moreover, the information about the foreign buyers in the region does not necessarily help the firm directly access foreign markets without the buyer's help. As a result, the firm is discouraged, rather than encouraged, by peer exporters and less likely to engage in exporting activities.

Third, the positive exogenous effect of peer firms' size on the focal firm's export share may reflect spillovers of information from larger peer firms. Because spillovers of information related to exporting activities are accounted for by the endogenous effect, i.e., the effect of peers' exporting activities, the positive effect of peers' size can be interpreted as spillovers of information indirectly related to exporting activities, such as production and management skills. Learning such skills from large peer firms may enable the firm to raise its productivity and start exporting. Thus, our results suggest productivity spillovers from exporters to non-exporters.

5. Conclusion

This study examines the effect of social interactions on exporting activities of MSMEs in traditional apparel and textile clusters in Vietnam. To deal with econometric issues due to the reflection problem of Manski (1993) and endogeneity of network formation, we apply the estimation method developed by Bramoullé et al. (2009) where sub-network fixed effects are eliminated by within transformation and the average share of exports among peers of the focal firm is instrumented by the average attributes of its peers' peers. This method enables us to identify the effects of exporting activities of the focal firm's peers on its own exporting activities (the endogenous effect according to Manski [1993]) and the effect of its peers' attributes (exogenous effects). We find that peers' export share has a negative and significant effect on own export share, while correlation between the export share of the firm and its peers is positive. A plausible interpretation is that firms' participation into the export market promotes competition in the export market accessible form the region and thus discourages their peers' exporting activities. We also find that firms are encouraged to export by their large peers, possibly because firms can obtain technology spillovers from large peers and thus can be productive enough to start exporting.

References

Acemoglu D, Ozdaglar A, Tahbaz-Salehi A. 2015. Systemic Risk and Stability in Financial Networks. The American Economic Review. 105; 564-608.

Aitken B, Hanson GH, Harrison AE. 1997. Spillovers, Foreign Investment, and Export Behavior. Journal of International economics. 43; 103-132.

Albornoz F, Pardo HFC, Corcos G, Ornelas E. 2012. Sequential Exporting. Journal of International Economics. 88; 17-31.

Aral S, Walker D. 2011. Creating Social Contagion through Viral Product Design: A Randomized Trial of Peer Influence in Networks. Management Science. 57; 1623-1639.

Araujo LF, Ornelas E. 2007. Trust-Based Trade. SSRN. 642803.

Atkin D, Khandelwal AK, Osman A. 2017. Exporting and Firm Performance: Evidence from a Randomized Experiment. The Quarterly Journal of Economics. 132; 551-615.

Bandiera O, Rasul I. 2006. Social Networks and Technology Adoption in Northern Mozambique. The Economic Journal. 116; 869-902.

Banerjee A, Chandrasekhar AG, Duflo E, Jackson MO. 2013. The Diffusion of Microfinance. Science. 341; 1236498-1236491-1236497.

Banerjee AV. 1992. A Simple Model of Herd Behavior. The Quarterly Journal of Economics. 107; 797-817.

Bao Q, Ye N, Song L. 2016. Congested Export Spillover in China. Review of Development Economics. 20; 272-282.

Barrot J-N, Sauvagnat J. 2016. Input Specificity and the Propagation of Idiosyncratic Shocks in Production Networks. The Quarterly Journal of Economics. 131; 1543-1592.

Bazzi S, Chari AV, Nataraj S, Rothenberg AD. 2017. Identifying Productivity Spillovers Using the Structure of Production Networks.

Bernard AB, Jensen JB. 2004. Why Some Firms Export. Review of economics and Statistics. 86; 561-569.

Bernard AB, Jensen JB, Redding S, Schott PK. 2007. Firms in International Trade. Journal of Economic Perspectives. 21; 105-130.

Bernard AB, Jensen JB, Redding SJ, Schott PK. 2012. The Empirics of Firm Heterogeneity and International Trade. Annu. Rev. Econ. 4; 283-313.

Bernard AB, Moxnes A, Saito YU. 2018. Production Networks, Geography and Firm Performance. Journal of Political Economy. forthcoming.

Bernard AB, Wagner J. 2001. Export Entry and Exit by German Firms. Weltwirtschaftliches Archiv. 137; 105-123.

Bikhchandani S, Hirshleifer D, Welch I. 1992. A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades. Journal of political Economy. 100; 992-1026.

Bikhchandani S, Hirshleifer D, Welch I. 1998. Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades. Journal of Economic Perspectives. 12; 151-170.

Bobonis GJ, Finan F. 2009. Neighborhood Peer Effects in Secondary School Enrollment Decisions. The Review of Economics and Statistics. 91; 695-716.

Bramoullé Y, Djebbari H, Fortin B. 2009. Identification of Peer Effects through Social Networks. Journal of Econometrics. 150; 41-55.

Brunello G, De Paola M, Scoppa V. 2010. Peer Effects in Higher Education: Does the Field of Study Matter? Economic Inquiry. 48; 621-634.

Cai J, Szeidl A. 2016. Interfirm Relationships and Business Performance. National Bureau of Economic Research.

Cai J, Szeidl A. 2017. Interfirm Relationships and Business Performance. The Quarterly Journal of Economics. 133; 1229-1282.

Clerides SK, Lach S, Tybout JR. 1998. Is Learning by Exporting Important? Micro-Dynamic Evidence from Colombia, Mexico, and Morocco. Quarterly Journal of Economics. 113; 903-947.

Conley TG, Udry CR. 2010. Learning About a New Technology: Pineapple in Ghana. American Economic Review. 100; 35-69.

Correia S. 2015. Singletons, Cluster-Robust Standard Errors and Fixed Effects: A Bad Mix. Technical Note, Duke University, http://scorreia.com/research/singletons.pdf.

Dahl GB, Løken KV, Mogstad M. 2014. Peer Effects in Program Participation. The American Economic Review. 104; 2049-2074.

De Giorgi G, Pellizzari M, Redaelli S. 2010. Identification of Social Interactions through Partially Overlapping Peer Groups. American Economic Journal: Applied Economics. 241-275.

Duflo E, Saez E. 2003. The Role of Information and Social Interactions in Retirement Plan Decisions: Evidence from a Randomized Experiment. The Quarterly Journal of Economics. 118; 815-842.

Eaton J, Eslava M, Kugler M, Tybout J. 2007. Export Dynamics in Colombia: Firm-Level Evidence. National Bureau of Economic Research.

Elliott M, Golub B, Jackson MO. 2014. Financial Networks and Contagion. American Economic Review. 104; 3115-3153.

Fafchamps M, Gubert F. 2007. The Formation of Risk Sharing Networks. Journal of Development Economics. 83; 326-350.

Fafchamps M, Lund S. 2003. Risk-Sharing Networks in Rural Philippines. Journal of Development Economics. 71; 261-288.

Fafchamps M, Quinn S. 2015. Networks and Manufacturing Firms in Africa: Results from a Randomized Field Experiment. The World Bank Economic Review.

Falk A, Ichino A. 2006. Clean Evidence on Peer Effects. Journal of Labor Economics. 24; 39-57.

Fernandes AP, Tang H. 2014. Learning to Export from Neighbors. Journal of International Economics. 94; 67-84.

Foster AD, Rosenzweig MR. 1995. Learning by Doing and Learning from Others: Human Capital and Technical Change in Agriculture. Journal of political Economy. 103; 1176-1209.

Freund C, Pierola MD. 2010. Export Entrepreneurs: Evidence from Peru. Policy Research Working Paper. WPS5407.

Higuchi Y, Nam VH, Sonobe T. 2015. Sustained Impacts of Kaizen Training. Journal of Economic Behavior & Organization. 120; 189-206.

Iacovone L, Javorcik BS. 2010. Multi - Product Exporters: Product Churning, Uncertainty and Export Discoveries. The Economic Journal. 120; 481-499.

Jovanovic B. 1982. Selection and the Evolution of Industry. Econometrica: journal of the Econometric Society. 649-670.

Kamal F, Sundaram A. 2016. Buyer–Seller Relationships in International Trade: Do Your Neighbors Matter? Journal of International Economics. 102; 128-140.

Kleibergen F, Paap R. 2006. Generalized Reduced Rank Tests Using the Singular Value Decomposition. Journal of Econometrics. 133; 97-126.

Kneller R, Pisu M. 2007. Industrial Linkages and Export Spillovers from FDI. World Economy. 30; 105-134.

Koenig P. 2009. Agglomeration and the Export Decisions of French Firms. Journal of urban economics. 66; 186-195.

Koenig P, Mayneris F, Poncet S. 2010. Local Export Spillovers in France. European Economic Review. 54; 622-641.

Krautheim S. 2012. Heterogeneous Firms, Exporter Networks and the Effect of Distance on International Trade. Journal of International Economics. 87; 27-35.

La Porta R, Shleifer A. 2014. Informality and Development. Journal of Economic Perspectives. 28; 109-126.

Lu Y, Tao Z, Yu L. 2012. Agglomeration and Markup. SSRN. 2065303.

Manski CF. 1993. Identification of Endogenous Social Effects: The Reflection Problem. The Review of Economic Studies. 60; 531-542.

Marshall A. 1890. The Principles of Economics. Macmillan: London.

Mayer T, Ottaviano GIP. 2007. The Happy Few: The Internationalisation of European Firms. Bruegel: Brussels.

Melitz MJ. 2003. The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. Econometrica. 71; 1695-1725.

Melitz MJ, Ottaviano GI. 2008. Market Size, Trade, and Productivity. The Review of Economic Studies. 75; 295-316.

Nguyen DX. 2012. Demand Uncertainty: Exporting Delays and Exporting Failures. Journal of International Economics. 86; 336-344.

Ottaviano G, Tabuchi T, Thisse JF. 2002. Agglomeration and Trade Revisited. International Economic Review. 43; 409-435.

Rauch JE, Watson J. 2003. Starting Small in an Unfamiliar Environment. International Journal of Industrial Organization. 21; 1021-1042.

Sacerdote B. 2014. Experimental and Quasi-Experimental Analysis of Peer Effects: Two Steps Forward? Annual Review of Econmics. 6; 253-272.

Stock JH, Yogo M. 2005. Testing for Weak Instruments in Linear Iv Regression. Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg. 80.

Wagner J. 2007. Exports and Productivity: A Survey of the Evidence from Firm-Level Data. The World Economy. 30; 60-82.

Wagner J. 2012. International Trade and Firm Performance: A Survey of Empirical Studies since 2006. Review of World Economics. 148; 235-267.

Zimmerman DJ. 2003. Peer Effects in Academic Outcomes: Evidence from a Natural Experiment. Review of Economics and Statistics. 85; 9-23.

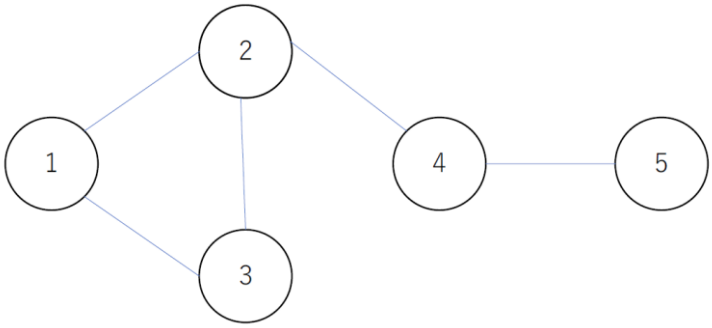


Figure 1. An example of networks

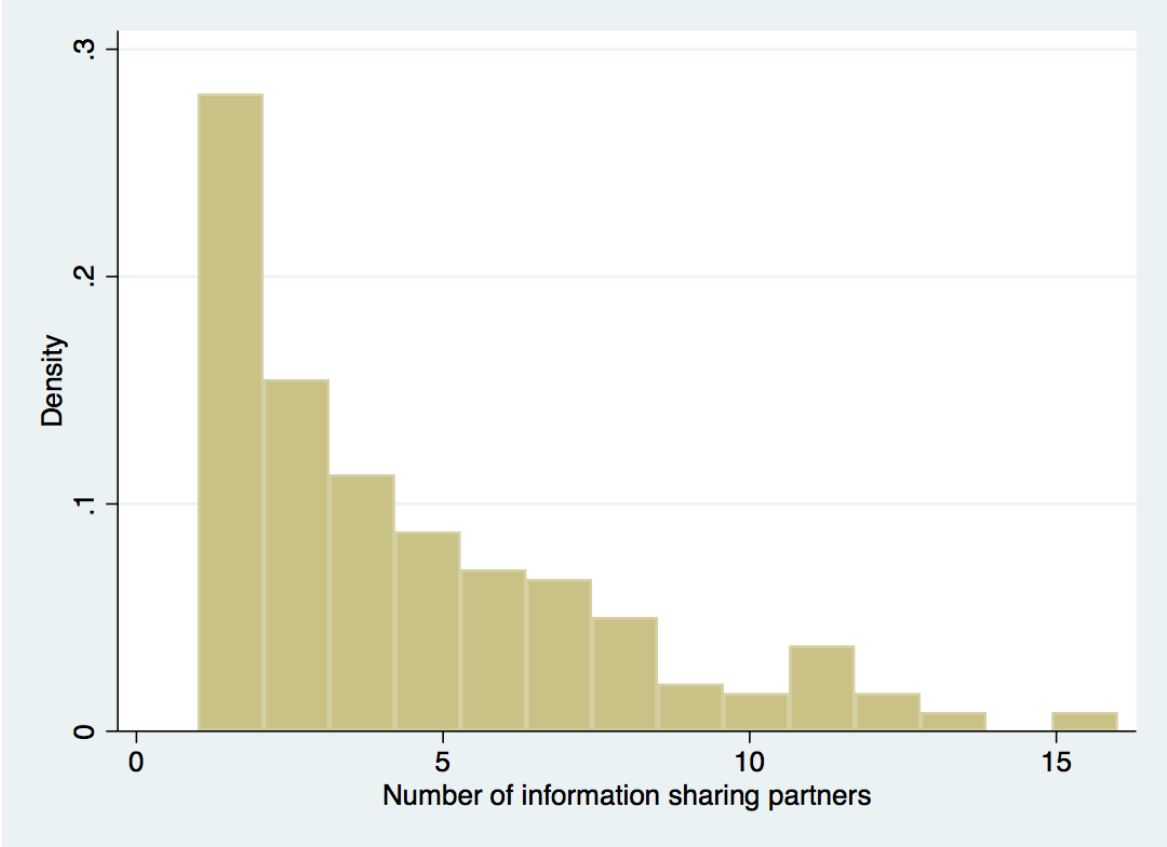
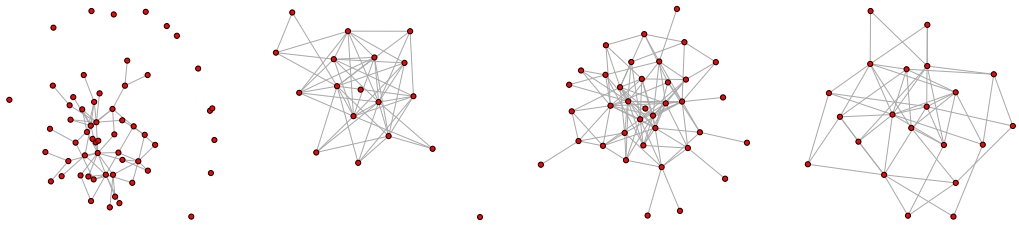
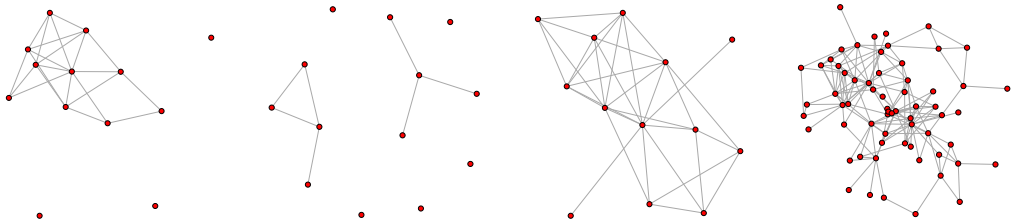


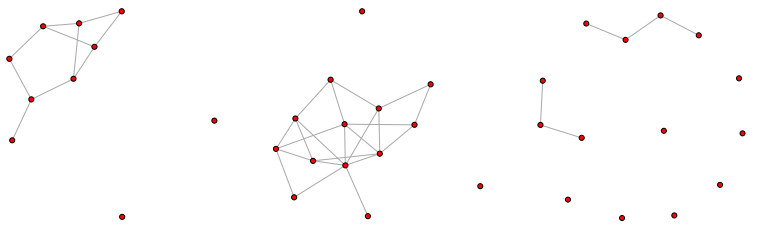
Figure 2. Number of information-sharing partners



(1) Village 1 (2) Village 2 (3) Village 3 (4) Village 4



(5) Village 5 (6) Village 6 (7) Village 7 (8) Village 8



(9) Village 9 (10) Village 10 (11) Village 11

Figure 3. Network structure

Table 1. Descriptive statistics

Variable	Mean	Standard deviation	Min.	Max.
Share of export in total sales	0.1603139	0.3421716	0	1
Export dummy	0.1928251	0.3954045	0	1
Number of workers	35.73543	84.81499	0	1000
Squared of number of workers /10000	0.8438345	6.936284	0	100
Firm age	7.798206	5.82319	0	25
Number of peers	4.58296	3.163855	1	16
Manager's age	44.07175	9.990728	25	69
Manager's female dummy	0.2017937	0.4022419	0	1
Manager's years of schooling	11.58296	2.656129	6	16

The number of observations is 223.

Table 2. Estimation results from simple OLS

	(1)	(2)	(3)	(4)
Dependent variable	Share of exports in total sales		Export dummy	
Average share of exports in total sales among other firms in a village	0.732***			
	(0.120)			
Average share of exports in total sales among peers		0.660***		
		(0.0988)		
Share of exporters among other firms in a village			0.733***	
			(0.120)	
Share of exporters among peers				0.649***
				(0.0923)
Firm's attribute				
Number of workers	0.00271***	0.00298***	0.00262***	0.00288***
	(0.000661)	(0.000739)	(0.000622)	(0.000698)
Squared of number of workers /10000	-0.0224***	-0.0253***	-0.0204***	-0.0232***
	(0.00613)	(0.00698)	(0.00592)	(0.00674)
Years of founding	-0.00404	-0.00509*	-0.00406	-0.00503
	(0.00250)	(0.00301)	(0.00264)	(0.00319)
Manager's age	0.00207	0.00266	0.00168	0.00255
	(0.00208)	(0.00267)	(0.00199)	(0.00262)
Manager's female dummy	0.0755**	0.0649	0.0674*	0.0781*
	(0.0380)	(0.0468)	(0.0383)	(0.0470)
Manager's years of schooling	-0.00349	-0.00367	-0.00427	-0.00409
	(0.00630)	(0.00881)	(0.00589)	(0.00841)
Observation	223	223	223	223
R-squared	0.574	0.528	0.578	0.543

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3. Estimation results from simple 2SLS

	(1)	(2)	(3)	(4)
Y:	Share of exports in total sales		Export dummy	
Dependent variables	First stage (I-G)GY	Second stage (I-G) Y	First stage (I-G)GY	Second stage (I-G) Y
GY: Peers' exporting activities				
Share of exports in total sales		0.507**		
		(0.243)		
Export dummy				0.527**
				(0.237)
X: Firm's own attributes				
Number of workers	0.000298	0.00272***	0.000383	0.00301***
	(0.000716)	(0.000671)	(0.000856)	(0.000765)
Squared of number of workers /10000	-0.0197	-0.0223***	-0.0258	-0.0255***
	(0.0259)	(0.00626)	(0.0320)	(0.00730)
Years of founding	0.000580	-0.00292	0.000941	-0.00405
	(0.00220)	(0.00257)	(0.00281)	(0.00323)
Manager's age	0.000431	0.00156	-0.000124	0.00220
	(0.00157)	(0.00188)	(0.00187)	(0.00244)
Manager's female dummy	-0.00856	0.0705*	-0.0230	0.0779
	(0.0405)	(0.0407)	(0.0460)	(0.0490)
Manager's years of schooling	0.00483	-0.00223	0.00477	-0.00205
	(0.00627)	(0.00625)	(0.00677)	(0.00840)
GX: Peers' attributes				
Number of workers	0.00176**	0.00181	0.00249***	0.00166
	(0.000700)	(0.00127)	(0.000849)	(0.00147)
Squared of number of workers /10000	-0.0125*	-0.0207*	-0.0201**	-0.0200
	(0.00677)	(0.0111)	(0.00800)	(0.0130)
Years of founding	-0.00173	3.96e-05	-0.00289	0.000909
	(0.00481)	(0.00523)	(0.00505)	(0.00666)
Manager's age	0.00428	0.000663	0.00490	0.00159
	(0.00343)	(0.00385)	(0.00371)	(0.00470)
Manager's female dummy	0.0115	0.000226	0.0560	-0.0113
	(0.0629)	(0.0527)	(0.0765)	(0.0670)
Manager's years of schooling	0.00618	-0.00159	0.00314	-0.00208
	(0.00645)	(0.00844)	(0.00727)	(0.0115)
GGX: 2-step peers' attributes (Instrument variables)				
Number of workers	0.00441***		0.00472***	
	(0.00141)		(0.00172)	
Squared of number of workers /10000	-0.0242		-0.0231	
	(0.0307)		(0.0381)	
Years of founding	-0.0115		-0.0162	
	(0.0107)		(0.0116)	
Manager's age	0.00629		0.00990	
	(0.00825)		(0.00904)	
Manager's female dummy	0.234*		0.231*	
	(0.127)		(0.138)	
Manager's years of schooling	-0.0155		-0.0120	
	(0.0142)		(0.0162)	
Observation	223		223	
Kleibergen-Paap rk Wald F statistics	18.20		16.65	
Hansen J statistic (p value)	0.126		0.230	
R-squared	0.705	0.602	0.709	0.563

Table 4. Estimation results from 2SLS incorporating network fixed effects

	(1)	(2)	(3)	(4)
Y:	Share of exports in total sales		Export dummy	
Dependent variables	First stage (I-G)GY	Second stage (I-G) Y	First stage (I-G)GY	Second stage (I-G) Y
(I-G)GY: Peers' exporting activities				
Share of exports in total sales		-0.863***		
		(0.229)		
Export dummy				-0.830***
				(0.270)
(I-G)X: Firm's own attributes				
Number of workers	0.000116	0.00466***	0.000214	0.00528***
	(0.000454)	(0.000847)	(0.000573)	(0.000988)
Squared of number of workers /10000	-0.00690	-0.0800***	-0.0105	-0.0896***
	(0.0128)	(0.0179)	(0.0170)	(0.0190)
Years of founding	-0.000642	-0.00218	-0.00127	-0.00353
	(0.00207)	(0.00265)	(0.00268)	(0.00346)
Manager's age	0.000907	0.000700	0.000801	0.00140
	(0.00167)	(0.00210)	(0.00196)	(0.00272)
Manager's female dummy	-0.0415	0.107***	-0.0633	0.107**
	(0.0350)	(0.0373)	(0.0415)	(0.0486)
Manager's years of schooling	0.00578	-0.00740	0.00507	-0.00820
	(0.00431)	(0.00621)	(0.00550)	(0.00861)
(I-G)GX: Peers' attributes				
Number of workers	0.00455***	0.00618***	0.00422**	0.00698***
	(0.00148)	(0.00128)	(0.00174)	(0.00147)
Squared of number of workers /10000	-0.105***	-0.0942***	-0.0897***	-0.106***
	(0.0213)	(0.0200)	(0.0278)	(0.0214)
Years of founding	0.000445	-0.00308	-0.00157	-0.00466
	(0.00675)	(0.00535)	(0.00863)	(0.00700)
Manager's age	-0.00107	0.000705	0.000658	0.00270
	(0.00449)	(0.00384)	(0.00527)	(0.00512)
Manager's female dummy	0.193*	0.104*	0.230*	0.109
	(0.111)	(0.0610)	(0.127)	(0.0756)
Manager's years of schooling	-0.0347***	-0.00938	-0.0333**	-0.0124
	(0.0127)	(0.0115)	(0.0155)	(0.0152)
(I-G)GGX: 2-step peers' attributes (Instrument variables)				
Number of workers	0.00524**		0.00375	
	(0.00216)		(0.00258)	
Squared of number of workers /10000	-0.110***		-0.0821***	
	(0.0192)		(0.0262)	
Years of founding	0.00109		0.00170	
	(0.0111)		(0.0129)	
Manager's age	-0.00565		-0.00375	
	(0.00731)		(0.00838)	
Manager's female dummy	0.527***		0.571***	
	(0.170)		(0.190)	
Manager's years of schooling	-0.0866***		-0.0779***	
	(0.0213)		(0.0247)	
Observation	223		223	
Kleibergen-Paap rk Wald F statistics	10.43		10.43	
Hansen J statistic	2.690		2.690	
R-squared	0.374	0.479	0.374	0.479

Notes: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1