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Common Ownership, Domestic Competition, and Export: Evidence from Thailand

by

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Common Ownership, Domestic Competition, and Export: Evidence from Thailand*

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Abstract

We use administrative data of all registered firms in Thailand, both public and private, to study the relationships between common ownership, market power, and firms' export behaviors. Our results suggest that firms in ownership networks tend to have higher market power as measured by markup. In addition, markup is negatively associated with a firm's propensity to export, its likelihood of product upgrade, and the chance of survival in foreign markets. Our findings have policy implications on antitrust regulations and competitiveness policies, especially in export-oriented economies dominated by powerful business conglomerates.

Keywords: Ownership, network, markup, market power, competition, business dynamism, competitiveness

JEL Classification: D4, F1, G3, L2, L4, O25

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1 Introduction

Competition has long been an important issue in economics. Although competition alone does not guarantee an optimal resource allocation, a lack of competition has been widely associated with inefficient resource allocation. There has also been a growing interest in whether, and how, the lack of domestic competition affects the competitiveness of the country in the global economy. In addition, concerns over the rising dominance of large business conglomerates in several economies and its consequences on macroeconomic performance are at the center of academic, public, and policymaking debate over the past decades. Many vocal critiques associate the rising dominance of business conglomerates with rising market power and reduced competition. Insights on these issues are of particular importance and have relevant policy implications as they help prescribe appropriate competition policies that would enhance aggregate productivity and competitiveness of the country.

In this study, we use microdata to analyze the relationship between common ownership across corporations, market power, and exports in an export-oriented developing country. Specifically, we assemble and merge administrative data from several sources: company profile and financial statement, ownership, and export behaviors. The data cover all registered firms in Thailand, both publicly traded and privately held. We then study the impacts of common ownership and market power on various aspects of firm's export behaviors.

Thailand serves as an appropriate setting for the study as it represents many developing countries in several dimensions. First, it exhibits a high degree of ownership concentration in the business sector with many firms connected through ownership networks. These corporate networks, in turn, dominate the economy—60 percent of total corporate revenue and 47 percent of total corporate profit in Thailand in 2017 came from firms that belong to business ownership networks (Banternghansa and Samphantharak, Forthcoming). Second, the Thai economy has experienced increasing market concentration, especially in the wholesale and retail trade industries in which the concentration as measured by the average share of the largest four firms in each industry (CR4) increased from approximately 30 percent to 40 percent during 2006–2016 (Apaitan et al., 2019). Third, the country has experienced declining business dynamism—entry and exit rates of firms have dropped and the average age of firms has increased from 18 to 22 years during 2011–2016—a symptom consistent with declining competition. Fourth, Thailand is facing a serious challenge on persistently low investment. The investment rate has averaged at around 6 percent since 2006, a level far below the rate in the 1990s at around 14 percent.

Fifth, the Thai economy highly depends on exports—exports account for 55.8 percent of GDP during 2006–2016. However, the country is notorious for its lack of innovation and the ability to climb up the value chain (Yoshihara, 1988; Studwell, 2008; Samphantharak, 2020). In 2015, only 15 percent of Thai exporting firms export products in the top complexity quartile (Apaitan, Ananchotikul, and Disyatat, 2017). This paper provides some insights into one of the sources of the lack of innovation and the investment slowdown in the country.

Our study empirically connects common ownership, market power, and export behaviors of firms. First, we find that firms belonging to ownership networks tend to have higher market power as measured by markups. The relationship is stronger for larger networks and networks that are horizontally diversified (i.e., networks with firms operating in the same industry). This finding suggests that common ownership can influence the competitive environment in the corporate sector. This is particularly the case for firms in the retail and service sectors, but it is evident in the wholesale and manufacturing sectors as well.

Second, focusing on manufacturing firms, we find that market power is negatively associated with a firm's propensity to export and the likelihood of product upgrade. In addition, for exporting firms, those who have higher markups are less likely to survive in the foreign markets. Networks, on the other hand, do not seem to have a strong direct relationship with export behaviors, implying that the relationship between networks and exports are indirectly through markup. Overall, this set of findings implies that high domestic market power has adverse impacts on a country's export competitiveness. Possible channels behind this relationship could be either that firms enjoying domestic market power may have less incentive to enter and stay in the more competitive foreign markets, or that they are forced to stay out or exit the foreign markets because of their inefficiency and lack of competitiveness.

Finally, we find consistent empirical evidence that firms with high markup (and hence less likely to export) tend to invest less. This finding could be from either the demand side or the supply side. On the demand side, it is possible that, with market power, firms may limit their investment and reduce their domestic sales so that they can command higher output prices or lower input prices. Alternatively, on the supply side, firms with higher markup tend to export less and therefore have a lower demand for investment in fixed assets. However, our study cannot distinguish whether this finding is from the demand or the supply factors.

This paper connects the growing literature on common ownership and market power with the literature on incentive and competitiveness of exporting firms. It has important policy

implications on antitrust regulations and on export-oriented development strategies, especially for small open economies with weak institutions. In particular, domestic market power could hinder the competitiveness of the country in the global markets. This is a possible explanation for the observed dichotomous corporate sector in many export-oriented developing countries: the exporting activities are dependent on foreign multinational corporations while the domestic business activities are dominated by indigenous powerful business conglomerates.

The remainder of the paper is as follows. Section 2 discusses related literature and the contribution of this paper. Section 3 describes the data and provides some relevant stylized facts about the corporate sector in Thailand. Section 4 focuses on the estimation of markups as a measure of market power and discusses their trend over time and across industries. Section 5 analyzes the relationship between corporate ownership and markups. Section 6 studies markups and firms' export behaviors in various dimensions. Section 7 concludes and discusses policy implications.

2 Related Literature

This study is related to three strands of literature. First, there have been extensive studies on competition and market power. Traditionally, researchers and policymakers often rely on market concentration as a proxy for the competition, or the lack thereof. The benefit of using market concentration is that it is easy to compute and does not require detailed data. However, there are several criticisms. For example, the lack of a well-defined boundary of the market often makes the concentration measures inaccurate. Also, as being pointed out in the industrial organization literature, concentration is a market outcome, not a market primitive. While there are situations in which declining competition leads to increasing concentration, one can think of other situations where increasing competition leads to increasing concentration as well. Finally, this approach ignores heterogeneity across firms within the same industry or market even though they may command different market power. Because of these reasons, the industrial organization researchers often rely on detailed carefully-collected firm-level data and focus on analyzing the market power within a specific industry, such as retail trade, hospital, or ready-mixed concrete.

The topics of competition and market power have recently regained the attention of macroeconomists and policy makers alike. This is partly due to the estimation method proposed by De Loecker and Warzynski (2012), which allows researchers to estimate markups—the most theoretically direct measure of market power—for a wide range of firms in the economy

(Syverson, 2019). One of the first papers that use this method to analyze markups of the whole economy is De Loecker and Eeckhout (2017), which shows that markups of firms in the United States have increased by 40 percentage points between 1980 and 2016. Since then, there are a number of studies investigating markups trends in the U.S. and other advanced economies (e.g., Aquilante et al., 2019; Cavalleri et al., 2019; De Loecker and Eeckhout, 2018; De Loecker, Eeckhout, and Unger, 2020; Díez, Leigh, and Tambunlertchai, 2018; Díez, Fan, and Villegas-Sánchez, 2019). However, most existing literature has focused on advanced countries while studies on developing economies have been limited. Given that developing economies likely have different competitive environment from that of advanced economies, our study contributes to this literature by providing estimates of market power at the firm level over time for an emerging economy.

Second, this study is related to extensive literature on corporate ownership and how it affects a firm's behaviors. In particular, recent studies have linked common ownership and the diminished role of firms as decision units, arguing that industry concentration measured at the firm level might not reflect the level of competition in the industry (Schmalz, 2018). For example, Azar, Schmalz, and Tecu (2018) show that, once adjusted for common ownership, the market concentration of the U.S. airline industry is much higher than the anti-competitive level specified in the guidelines of the antitrust authorities. In this environment, if institutional investors own shares of stock in firms in the same industry, these institutional investors might want to maximize the value of their portfolio rather than the value of individual firms. Again, most existing studies have focused on the U.S. and other advanced economies, while the literature on developing economies is limited. Our paper contributes to this literature by analyzing the relationship between a firm's markup and common ownership within business networks, a typical organizational structure found in developing economies.

Finally, the third related area of research is on the impacts of market power. The high market power of the incumbent firms could lower business dynamism because the potential new firms are discouraged from entering the market while the incumbent firms, enjoying high-profit levels, are less likely to exit. Excessive market power could also lower the aggregate investment level. Since incumbent firms face lower threats from potential entrants and have incentives to restrict output, this situation could lead to a lower investment rate. Both low business dynamism and a low investment rate could, in turn, result in lower productivity growth. Gutiérrez and Philippon (2017a,b) find that declining competition in the U.S. can partially

explain why the U.S. businesses have been under-invested in the past decades. Díez, Leigh, and Tambunlertchai (2018) find an inverted-U shape relationship between market power and investment and innovation rates in developed economies.

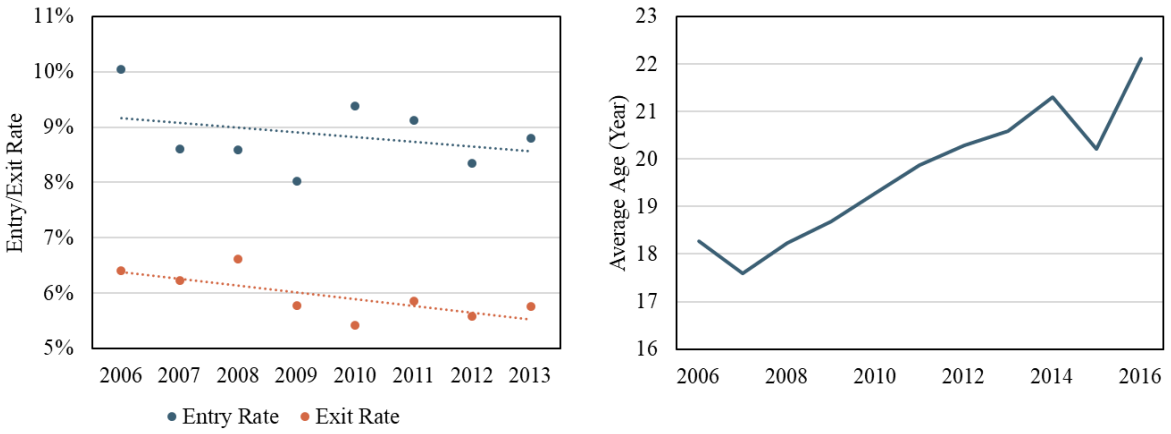
There are also studies that link domestic market power and export competitiveness. In theory, there are two channels through which domestic competition can lead to higher competitiveness of firms in the global economy. First, domestic competition helps enhance firm-level productivity. Second, domestic competition results in resource reallocation, hence improving economy-wide productivity. These two channels lead to firms being more competitive globally, i.e., firms facing more intense domestic competition tend to export more. Empirically, findings from several studies support this prediction (Goodwin and Pierola, 2015). Zhao and Zou (2002) demonstrate that firms in highly concentrated manufacturing and service industries are less likely to export. Ito and Pucik (1993) find that industry's largest companies in Japan have lower export ratios than smaller companies. Sakakibara and Porter (2001) find that domestic rivalry among Japanese firms has a positive relationship with trade performance measured by world export share, particularly when R&D intensity reveals opportunities for dynamic improvement and innovation.

Our study contributes to this third strand of literature by focusing on the consequences of market power in a small, open, developing economy where corporate investment and exports are fundamental driving forces of economic growth. We first demonstrate that firms that enjoy market power domestically are less likely to export. We then show that even when they export, they are also less likely to upgrade their products. In the end, they are less successful in staying in the foreign markets. We supplement our findings on firm's export behaviors with firm's investment, showing a consistent finding that a higher markup is associated with a lower investment rate.

3 Data

This study uses microdata from three sources: (1) corporate profile and financial data, (2) corporate ownership data, and (3) export data. This section describes each data source and descriptive statistics.

Figure 1: Business dynamism in Thailand



Source: Authors' calculation based on data from the Department of Business Development, the Ministry of Commerce.

3.1 Corporate Profile and Financial Statement

All registered firms in Thailand are required to submit their audited annual financial statement to the Department of Business Development (DBD) at the Ministry of Commerce. The database consists of a basic profile and audited annual financial statements of each business. The data include information on registration year, registration type (e.g., partnership, privately-held corporation, or publicly-traded corporation), current status (e.g., in operation, abandoned, or out of business), industry, assets, liabilities, equities, revenues and expenses, net income, and some other subitems in the balance sheet and income statement. Our study includes data from 2006 to 2016.

During 2006–2016, the number of registered firms in Thailand has increased on average by 5.5% per year and their revenue has increased by 7.1% per year.[1] In 2016, there are 486,531 firms in the data. In terms of the number of the firms, trade and service are the two largest sectors, accounting for 34 and 39 percent. However, manufacturing and trade are the two biggest sectors in terms of total revenue, contributing 41 and 37 percent to the total corporate revenue of the country.[2] Panel A of Table 1 presents descriptive statistics of financial variables of firms in our data.[3]

[1]The revenue is reported in nominal value. However, Thailand has had low inflation during the period of our study. Specifically, the average inflation rate was only 2 percent per year during 2006-2016.

[2]For more information about the corporate profile and financial data as well as the financial analysis of Thai firms, see Banternghansa, Samphantharak, and Paweenawat (2019).

[3]In this paper, we first focus on firms in manufacturing, wholesale, retail, and service sectors. We also exclude firms in finance, insurance, and real estate (FIRE), leasing, and education industries. However, when we analyze the export behaviors, we only focus on manufacturing firms, as outputs of trading and service are mostly non-tradables.

Table 1: Descriptive statistics of Thai firms

Variables	N	Mean	S.D.	P25	Median	P75
Panel A:						
Fixed asset	1,778,400	29,734	788,236	24	355	2,569
Total asset	1,821,381	90,462	2,475,349	1,772	4,813	16,286
Total liability	1,821,221	50,208	1,397,787	145	1,476	9,011
Total revenue	1,821,381	139,529	5,294,993	2,091	7,661	30,126
EBIT	1,814,980	8,215	283,050	33	333	1,155
Net profit	1,821,381	5,681	224,446	10	260	822
Cost of goods sold	1,821,381	117,781	4,943,110	1,249	5,344	23,497
ROA	1,814,980	0.040	8.503	0.011	0.069	0.149
Leverage	1,821,221	0.691	7.073	0.063	0.339	0.711
Age (year)	1,821,381	10.330	9.581	3	8	15
Bangkok (0/1)	1,821,381	0.961	0.194	1	1	1
Joint venture (0/1)	1,821,381	0.003	0.056	0	0	0
Panel B:						
Network (0/1)	1,821,381	0.054	0.225	0	0	0
Panel C:						
Export (0/1)	436,087	0.149	0.357	0	0	0
Number of products	65,171	9.003	19.514	1	3	8
Number of destinations	65,171	6.388	9.935	1	3	7
Product upgrade (0/1)	65,171	0.391	0.488	0	0	1
Survival in foreign market						
1st year (0/1)	4,490	0.538	0.499	0	1	1
2nd year (0/1)	3,822	0.394	0.489	0	0	1
Panel D:						
Markup	1,787,393	1.231	0.381	1.011	1.125	1.329

Note: Unit of observation is firm-year. Unless stated otherwise, financial variables in Panel A are in thousand baht. ROA is defined as the ratio of EBIT to total asset. Leverage is defined as the ratio of total liability to total asset. Number of products is the total number of product at the 4-digit ISIC level. For Panel C on export, we only include manufacturing firms and omit those in the trading and service sectors.
Source: Authors' calculation based on data from the Department of Business Development, Ministry of Commerce and the Thai Customs Department, Ministry of Finance.

The left panel of Figure 1 presents the entry and exit rates of Thai registered firms during 2006–2013. It shows that business dynamism of Thai firms has been declining in the past ten years.[4] Consistently, the right panel of Figure 1 shows that the revenue-weighted average age of firms in Thailand has increased over this period, from 16 years in 2006 to 22 years in 2016.[5]

3.2 Ownership

Ownership information is also from the Department of Business Development at the Ministry of Commerce. Our data cover a snapshot of ownership as of 2017.[6] It consists of names, nationality, and the number of shares owned by each owner. An owner could be either an ordinary or a juristic person. Juristic persons include other domestic firms registered with DBD, foreign firms (multinational enterprises), other forms of organizations, and investment funds.[7]

We construct ownership networks of firms based on the information of corporate shareholding. Ownership between firms could be pyramidal, where one firm hold shares of the other, or cross-shareholding, where two (or more) firms hold share of each other. In this study, if firm A owns shares of firm B, we define that firms A and B belong to the same ownership network or the same business group.[8] Figure 2 shows examples of ownership networks of Thai firms, illustrating that networks are diverse in size, structure complexity, and industry diversification.

Panel B of Table 1 shows that about 5.4 percent of firms in our data belong to some ownership networks. There are 6,218 ownership networks and there are 13,829 firms that belonged to these networks. In addition, 815 of firms in the data are a joint venture, defined as a firm jointly owned by more than one business conglomerates.

Table 2 presents descriptive statistics of ownership networks. On average, there are about four firms and less than two industries in each network (either classified by 4-digit or 2-digit ISIC). The distribution of network size is highly skewed, with a few networks accounting for the majority of network firms and revenue. The median network revenue is 19 times lower than the mean network revenue.

[4]The declining business dynamism in Thailand is similar to what observed in the U.S. (Decker et al., 2016) and Belgium (Bijnens and Konings, 2020).

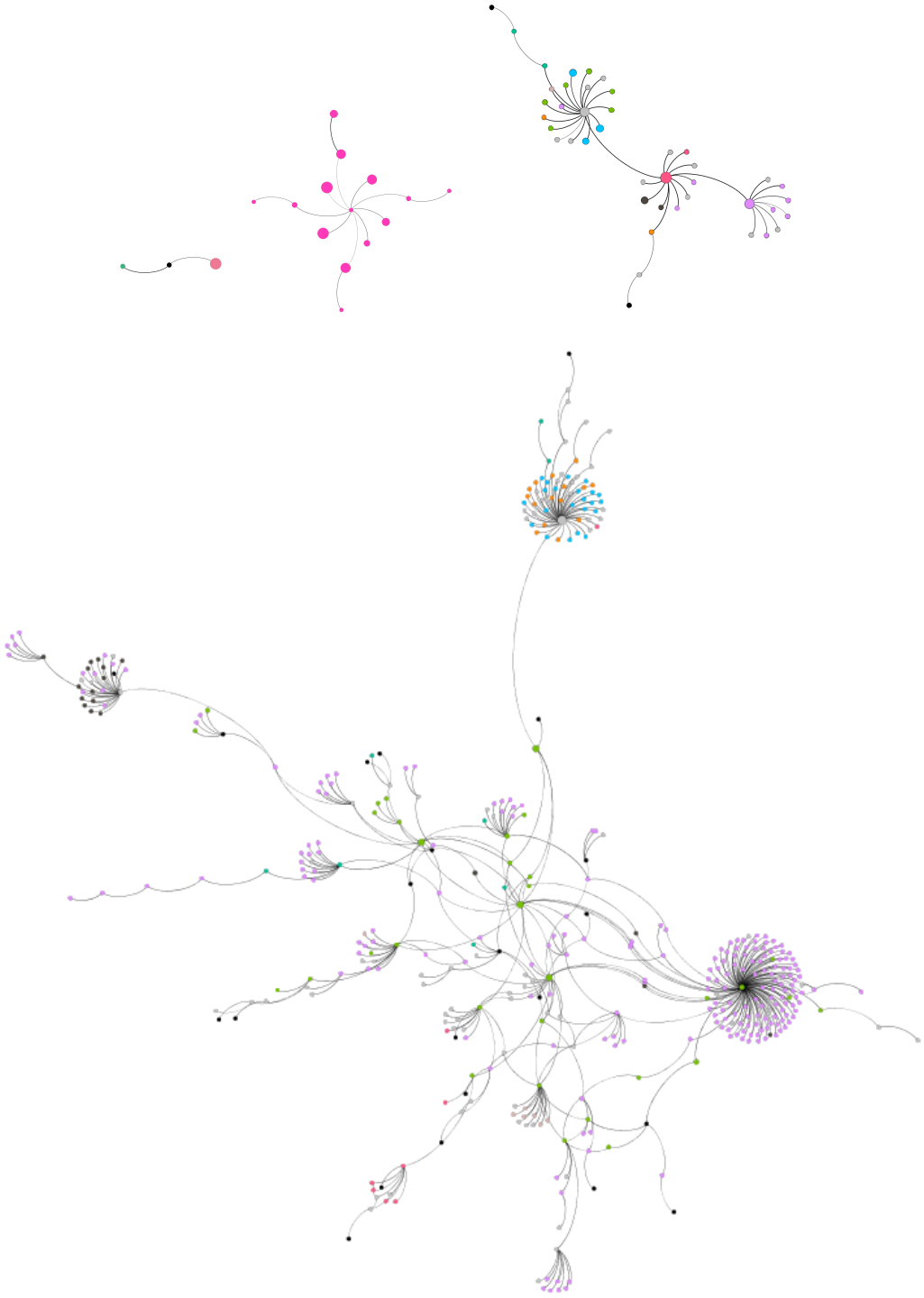
[5]The declining trend in business dynamism also happens across all sectors. See (Apaitan et al., 2019)

[6]We also exclude firms established after 2015 due to the high exit rate of firms during their first two years of operation: only 75 percent of firms survive into their third year of operation (Banternghansa, Samphantharak, and Paweenawat, Forthcoming). In addition, firms registered after 2015 also do not have two consecutive years of financial statements necessary for the analysis in this study.

[7]Other forms of organizations include public and state agencies (such as Ministry of Finance, state-owned enterprises, and the Crown Property Bureau), universities, cooperatives, and foundations. Investment funds also include mutual funds, provident funds, and pension funds, among others.

[8]See Banternghansa and Samphantharak (Forthcoming) for the details on network construction and description.

Figure 2: Examples of ownership networks of Thai firms



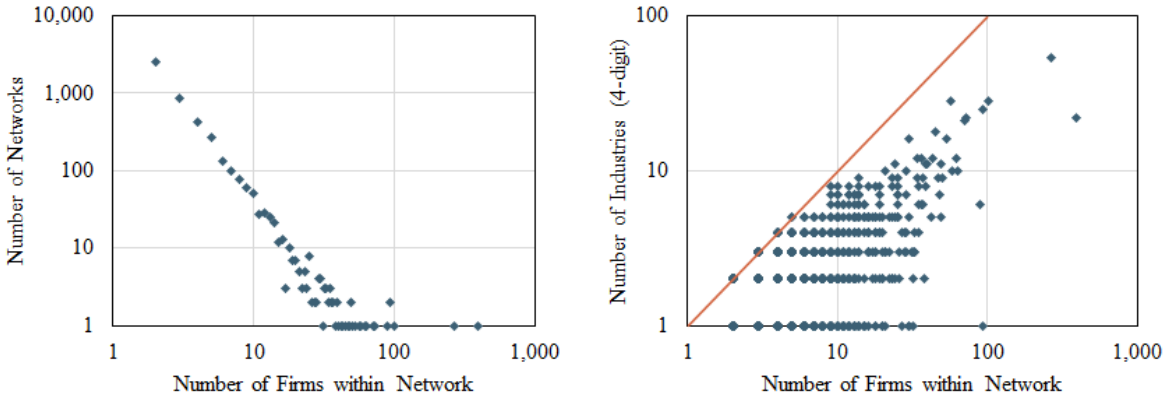
Source: Banternghansa and Samphantharak (Forthcoming). Node size represents total asset. Different colors represent different industries. Firm A owning shares in Firm B represents by a clockwise edge from A to B.

Table 2: Descriptive statistics of Thai ownership networks

Variables	N	Mean	S.D.	P25	Median	P75
# of Firms	50,964	4.155	8.826	2	2	4
# of Industry (4-digit)	50,964	1.568	1.468	1	1	2
# of Industry (2-digit)	50,964	1.456	1.033	1	1	2
Network Revenue	50,964	2,481	32,858	27	129	609

Note: Unit of observations is network. Network revenue is in million baht.
Source: Authors' calculation based on data from the Department of Business Development, Ministry of Commerce.

Figure 3: Numbers of firms and industries within networks



Source: Banternghansa and Samphantharak (Forthcoming); Authors' calculation based on data from year 2016.

The left panel of Figure 3 presents the distribution of the network size, as measured by the number of firms in the network. First, we find that most networks are small: more than 50 percent of the networks consist of only two firms, and almost 90 percent of the networks consist of six firms or less. However, there are some massive networks. The biggest network in our data consists of almost 400 firms, and over 1,000 firms belong to the six largest networks.

Regarding industry diversification within a network, the right panel of Figure 3 shows the number of industries at the 4-digit ISIC level by network size. The figure reveals that although a large number of networks tend to diversify their business activities across various industries (those located close to the 45-degree line), several business groups are not diversified (those having the number of firms much higher than the number of industries). Looking at the data in more detail, we find that while more than 1,700 networks consist of firms operating in more than one industry, most networks consist of firms in only one industry. For example, more than 70 percent of two-firm networks, and almost 65 percent of three-firm networks, consist of firms

in the same industry.

3.3 Export and Product Complexity

The main outcomes in this study are export activities. We use the data of all export transactions collected by the Customs Department at the Ministry of Finance. These data cover all shipments of goods that crossed the border out of Thailand between 2006 and 2016. The key information available include firm identification, destination, commodity, value, currency, shipping method, and point of exit. We aggregate the monthly information into annual data.[9]

Panel C of Table 1 presents descriptive statistics of firm's export. There are 12,902 exporting manufacturing firms in our data. Among these firms, the average number of exporting products is nine and the average number of destinations is six, with the medians being three for both.

We follow an idea proposed by Hidalgo and Hausmann (2009) and Hausmann and Hidalgo (2011) that allow us to gauge an economy's intrinsic capability by looking at the composition of its exported goods. To be able to export a certain product with revealed comparative advantage (RCA), a country needs to possess the necessary capabilities.[10] The more-capable countries export more-diversified baskets of goods; the less-ubiquitous products (i.e., exported by fewer countries) require more exclusive capabilities. Thus, by looking at trade data, one can construct the complexity measures for products based on diversity and ubiquity. For more details, see Hausman and Hidalgo (2011).

We construct the Product Complexity Index (PCI) for each exporting firm, computed as average PCI of all exports by the firm, weighted by export values. Specifically, we incorporate additional data on international trade flow from BACI database, provided by CEPII, to our transaction-level trade data of all Thai exporters from the Thai Customs Department. The international trade flow data provide bilateral values and quantities of exports at the HS 6-digit product disaggregation of more than 200 countries since 1995. Our analysis is based on HS2007 classification. The custom data beyond 2012, which are reported in HS2012 classification, are converted to HS2007 classification.[11]

[9] See Apaitan, Disyatat, and Samphantharak (2016, 2019) for further details on exports of Thai firms.

[10] The RCA of country c in product p is defined as $RAC_{c,p} = \left(\frac{X_{c,p}}{\sum_p X_{c,p}}\right) / \left(\frac{\sum_c X_{c,p}}{\sum_c \sum_p X_{c,p}}\right)$ where $X_{c,p}$ is the export value of product p from country c.

[11] On average, PCI of Thai exporting firms is low and its distribution is skewed—most exporting firms in Thailand tend to focus on low complexity products. This stylized fact is confirmed when analyzing PCI from the product approach: only 15% of all exporting firms export products in the top complexity quartile. In addition, the export share of the least complex products has been steadily declining over the last 20 years. See Apaitan,

Finally, we define that a firm has a product upgrade during a particular year if its PCI increases during that year. Panel C of Table 1 shows that 39 percent of the observations had product upgrade during 2006–2016, as shown in Table 1.

4 Estimating Markup

Our measure of a firm's market power is its markup, which we estimate using the method developed in De Loecker and Warzynski (2012) and De Loecker, Eeckhout, and Unger (2020).

4.1 Markup Estimation

Consider the decision of a firm i with the following production technology

$$Y_{it} = F\left(X_{it}, K_{it}, \Omega_{it}\right) \tag{1}$$

where Y_{it} is the output of firm i at time t, X_{it} is the variable input, K_{it} is capital, Ω_{it} is the total factor productivity, and $F\left(\cdot\right)$ is the production function. We assume that $F\left(\cdot\right)$ is continuous and twice-differentiable.

We can write the Lagrangian for the firm's cost-minimizing problem as

$$\mathcal{L}\left(X_{it}, K_{it}, \Omega_{it}\right) = P_{it}^{X} X_{it} + r_{it} K_{it} + \lambda_{it}\left[\overline{Y} - F\left(X_{it}, K_{it}, \Omega_{it}\right)\right] \tag{2}$$

where P_{it}^{X} is the price of variable input and r_{it} is the cost of capital. The first-order condition for variable input is

$$\frac{\partial \mathcal{L}}{\partial X_{it}} = P_{it}^{X} - \lambda_{it} \frac{\partial F_{it}}{\partial X_{it}} = 0. \tag{3}$$

By rearranging the above equation and multiplying X_{it}/Y_{it} on both sides, we get

$$\frac{X_{it}}{Y_{it}} \frac{\partial F_{it}}{\partial X_{it}} = \frac{1}{\lambda_{it}} \frac{P_{it}^{X} X_{it}}{Y_{it}}. \tag{4}$$

The left-hand side of the above equation is the output elasticity of the variable input. The Lagrange multiplier λ_{it} reflects the marginal cost of output. Define the markup μ_{it} as the price-marginal cost fraction, i.e.,

$$\mu_{it} \equiv \frac{P_{it}}{\lambda_{it}}. \tag{5}$$

Ananchotikul, and Disyatat (2017) for further detail.

Then, we can rewrite the elasticity equation as

$$\beta_{it}^{X} \equiv \frac{X_{it}}{Y_{it}} \frac{\partial F_{it}}{\partial X_{it}} = \mu_{it} \frac{P_{it}^{X} X_{it}}{P_{it} Y_{it}}. \tag{6}$$

Given the elasticity of the variable input, β_{it}^{X}, we can estimate the markup from

$$\mu_{it} = \beta_{it}^{X} \frac{P_{it} Y_{it}}{P_{it}^{X} X_{it}}. \tag{7}$$

To estimate the elasticity of the variable input, we follow the procedures in De Loecker and Warzynski (2012) and Ackerberg, Caves, and Frazer (2015). First, we assume that the firm's production function is Cobb-Douglas and estimate the following equation:

$$y_{it} = \beta_x x_{it} + \beta_k k_{it} + \omega_{it} + \epsilon_{it} \tag{8}$$

where y_{it} is the revenue of firm i at time t, x_{it} is the value of variable inputs, k_{it} is the value of capital, and ω_{it} is the total factor productivity (TFP). All variables are in the logarithmic form.

Next, we assume that the firm's productivity follows an AR(1) process, i.e.,

$$\omega_{it} = \omega_{i,t-1} + \xi_{it}. \tag{9}$$

We also assume that the demand for variable inputs is a function of productivity and capital, $x_{it} = f(\omega_{it}, k_{it})$. By taking an inverse of the function $f(\cdot)$, we can write the productivity level as a function of variable inputs and capital, $\omega_{it} = f^{-1}(x_{it}, k_{it})$. Then, we replace the productivity term in the production function to get

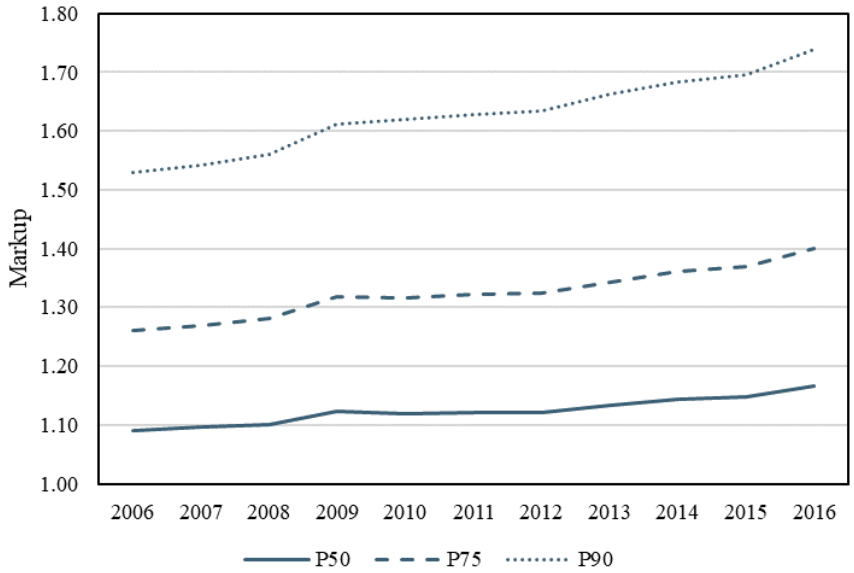
$$y_{it} = \beta_x x_{it} + \beta_k k_{it} + f^{-1}(x_{it}, k_{it}) + \epsilon_{it} = \phi(x_{it}, k_{it}) + \epsilon_{it}. \tag{10}$$

In the first stage, we use a polynomial function to estimate $\phi(x_{it}, k_{it})$ in the following moment condition:

$$\mathbb{E}[\epsilon_{it} | I_{it}] = \mathbb{E}[y_{it} - \phi(x_{it}, k_{it}) | I_{it}] = 0. \tag{11}$$

Let $\hat{\phi}(x_{it}, k_{it})$ denote an estimate of $\phi(x_{it}, k_{it})$ from the first-stage estimation. Then, in the

Figure 4: Markups of registered firms in Thailand over time



Source: Authors' calculation based on data from the Department of Business Development, the Ministry of Commerce.

second stage, we estimate the β_x and β_k from the following conditional moment condition:

$$\begin{aligned} 0 &= \mathbb{E}\left[\xi_{it} + \epsilon_{it} | I_{i,t-1}\right] \\ &= \mathbb{E}\left[y_{it} - \beta_x x_{it} - \beta_k k_{it} - \omega_{i,t-1} | I_{i,t-1}\right] \\ &= \mathbb{E}\left[y_{it} - \beta_x x_{it} - \beta_k k_{it} - \left(\hat{\phi}\left(x_{i,t-1}, k_{i,t-1}\right) - \beta_x x_{i,t-1} - \beta_k k_{i,t-1}\right) | I_{i,t-1}\right] \end{aligned} \tag{12}$$

Next, we estimate the firm's markup as

$$\hat{\mu}_{it} = \hat{\beta}_x \frac{P_{it} Y_{it}}{P_{it}^X X_{it}}. \tag{13}$$

To estimate firms' markups in Thailand, we use financial data from the Department of Business Development. For capital and output, we use the values of total assets and total revenue. For variable inputs, we follow the literature and use cost of goods sold (CGS).[12]

Panel D of Table 1 reports that the average markup of registered firms in Thailand in our study is 23.1 percent. Figure 4 further illustrates that the markup of the median firm in Thailand has been slightly increasing during 2006–2016, from 9 percent to about 17 percent. The firms at the 90$^{\text{th}}$ percentile however have much larger markup, increasing from 53 percent

[12]We drop the firm-year observations with less than 30,000 Baht (approximately 1,000 USD) worth of assets or annual revenue from our analysis.

to almost 74 percent.[13]

Table 3: Change in average markup for selected industries

Industry	Average Markup			Decomposition		
	2006	2016	Diff.	Within	Between	Entry-Exit
Manufacturing						
Petroleum	0.934	1.051	0.117	0.050	-0.035	0.103
Automotive	0.977	0.975	-0.003	0.003	-0.011	0.005
Chemical	0.979	0.964	-0.015	0.023	0.004	-0.042
Computer & Electronics	0.890	0.919	0.029	0.022	0.003	0.004
Food	1.031	1.038	0.007	0.030	-0.022	-0.002
Rubber & Plastic	0.920	0.978	0.058	0.030	-0.001	0.029
Machinery	1.006	1.110	0.104	0.064	-0.007	0.047
Electrical Equipment	0.965	1.000	0.035	0.024	-0.007	0.018
Non-metallic Mineral	1.160	1.172	0.012	0.016	-0.006	0.003
Beverage	0.978	1.018	0.040	0.070	-0.021	-0.009
All Manufacturing	**0.964**	**1.002**	**0.039**	**0.026**	**-0.009**	**0.022**
Trade and Service						
Wholesale Trade	0.971	0.997	0.026	0.039	-0.014	0.001
Retail Trade	0.997	1.049	0.052	0.042	-0.005	0.015
Head Office	1.308	1.082	-0.226	0.327	-0.505	-0.048
Warehousing	0.961	1.168	0.207	0.050	-0.020	0.176
Telecommunication	1.408	1.185	-0.223	0.051	-0.135	-0.138
Healthcare	1.020	1.097	0.077	0.013	0.001	0.062
Land Transport	0.980	1.030	0.050	0.049	-0.019	0.020
Advertising	1.166	1.135	-0.031	0.071	-0.045	-0.057
Legal and Accounting	1.005	1.220	0.215	0.127	-0.055	0.143
Publishing	0.902	1.174	0.272	0.396	-0.119	-0.006
All Trade and Service	**0.998**	**1.035**	**0.037**	**0.048**	**-0.023**	**0.012**

Note: Average markup is computed as the revenue-weighted average from firm-year observations for each industry at the 2-digit ISIC. The decomposition is computed at the 2-digit ISIC level. The "within" column shows the within-firm effect. The "between" column shows the combination of the between-firms effect and the covariance effect. The "entry-exit" column shows the combination of the entry and the exit effects.
Source: Authors' calculation based on data from the Department of Business Development, Ministry of Commerce.

Table 3 presents the changes in markups for selected industries in the manufacturing sector (top panel) and the trading and service sectors (bottom panel). It shows that most industries experienced rising markups during 2006–2016, with a notable exception of the head

[13]If we consider the mean rather than the median markup, the magnitude of the change is smaller than the findings in other studies that consider only listed firms, but it is comparable to the findings in Díez, Fan, and Villegas-Sánchez (2019) which uses the data of both private and public firms.

office and telecommunication industries where markup dropped markedly. The table also shows that markups in the service sector tends to be higher than those in the manufacturing sector, reflecting the fact that services are non-tradable and thus more likely to entertain local market power.

4.2 Decomposition of the Change in Markup

To explore the sources of rising markups, we use the decomposition method in Haltiwanger (1997) to decompose the change in industry-level markups. Define the average markup of industry j in year t as

$$\overline{Markup}_{jt} = \sum_i \theta_{it} Markup_{it} \tag{14}$$

where θ_{it} denotes the expenditure share of firm i in year t. Following Haltiwanger (1997), we decompose the change in industry-level markup between year t and year $t-k$ as

$$\begin{aligned}
\Delta\overline{Markup}_{jt} \;=\; & \textstyle\sum_{i\in S} \theta_{i,t-k}\Delta Markup_{it} && \text{“Within effect”} \\
& + \textstyle\sum_{i\in S} \Delta\theta_{it}\left(Markup_{i,t-k} - \overline{Markup}_{j,t-k}\right) && \text{“Between effect”} \\
& + \textstyle\sum_{i\in S} \Delta\theta_{it}\Delta Markup_{it} && \text{“Covariance effect”} \\
& + \textstyle\sum_{i\in N} \theta_{it}\left(Markup_{it} - \overline{Markup}_{j,t-k}\right) && \text{“Entry effect”} \\
& + \textstyle\sum_{i\in X} \theta_{i,t-k}\left(\overline{Markup}_{j,t-k} - Markup_{i,t-k}\right) && \text{“Exit effect”}
\end{aligned} \tag{15}$$

where S is the set of firms in industry j that stay in business from year $t-k$ to year t, N is the set of entering firms in industry j, and X is the set of exiting firms in industry j.

Table 3 also reports the decomposition of markup changes for selected industries. The “within” column shows the within effect, i.e., the change of the industry’s average markup that comes from the increase in each firm’s markup. The “between” column shows the combination of the between effect and the covariance effect. The “entry-exit” column shows the combination of the entry effect and the exit effect. The results suggest that the increase in industry-level markups comes mainly from the within-firm increase. In addition, the between-firm reallocation tends to lower the industry-level markups: firms with low markups became relatively bigger, while firms with high markups became relatively smaller. Our findings are in contrast to those of De Loecker, Eeckhout, and Unger (2020) and Baqaee and Farhi (2019), who find that the increase in aggregate markup come mainly from the reallocation toward high-markup firms.

Table 4: Ownership networks, location, and firm's markup

Dependent Variable:	(1)	(2)	(3)	(4)	(5)
$Markup_{it}$	All	Manufacturing	Wholesale	Retail	Service
$Network_i$	0.141^{***}	0.115^{***}	0.130^{***}	0.173^{***}	0.191^{***}
	(0.00107)	(0.00110)	(0.00154)	(0.00265)	(0.00245)
JV_i	0.00400	0.00339	-0.0402^{***}	0.0313^{***}	0.0237^{**}
	(0.00431)	(0.00400)	(0.00562)	(0.0113)	(0.00977)
$Bangkok_i$	−0.00158	−0.000680	−0.000986	−0.000962	−0.00163
	(0.00109)	(0.00139)	(0.00152)	(0.00176)	(0.00288)
$Revenue_{it}$	-0.0977^{***}	-0.0763^{***}	-0.0785^{***}	-0.0863^{***}	-0.154^{***}
	(0.000139)	(0.000199)	(0.000181)	(0.000240)	(0.000411)
Age_{it}	0.00295^{***}	0.00170^{***}	0.00253^{***}	0.00194^{***}	0.00562^{***}
	$(2.15e{-}05)$	$(3.01e{-}05)$	$(2.85e{-}05)$	$(3.11e{-}05)$	$(7.59e{-}05)$
Number of obs.	1,787,393	428,663	477,281	357,162	524,287
R^2	0.422	0.481	0.405	0.429	0.373
Industry-year F.E.	Yes	Yes	Yes	Yes	Yes

Note: Unit of observations is firm-year. $Markup_{it}$ denotes the markup of firm i in year t, $Network_i$ is a time-invariant dummy variable equal one if firm i belongs to an ownership network, $Bangkok_i$ is a dummy variable equal to one if firm i is located in Bangkok and vicinity (i.e., located in a metropolitan area), JV_i is a dummy variable equal to one if firm i is a joint-venture firm, $Revenue_{it}$ is the log of firm i's total revenue, and Age_i is the age of firm i. Robust standard errors in parentheses. Drop firms with markup in the top or the bottom 1 percentiles. *** and ** denote significance at 1% and 5% levels, respectively.

5 Markup Heterogeneity

To examine the heterogeneity of markups across firms in our data, we estimate the following equation:

$$Markup_{it} = \beta_1 Network_i + \beta_2 JV_i + \beta_3 Bangkok_i + \beta_4 Revenue_{it} + \beta_5 Age_{it} + \delta_{jt} + \epsilon_{it} \quad (16)$$

where $Markup_{it}$ denotes the markup of firm i in year t, $Network_i$ is a time-invariant dummy variable equal one if firm i belongs to an ownership network, $Bangkok_i$ is a dummy variable equal to one if firm i is located in Bangkok and vicinity (i.e., located in a metropolitan area), JV_i is a dummy variable equal to one if firm i is a joint-venture firm, $Revenue_{it}$ is the log of firm i's total revenue, and Age_i is the age of firm i. We include the industry-year fixed effect, δ_{jt} for firm i in industry j at time t, in the regression to control for the effects from macroeconomic shocks at the industry level in each year.

Table 4 reports the estimation results. We find that firms in an ownership network tend to

have higher markups—being in a network increases the firm's markup by 14 percentage points. This result suggests that business networks seem to have an ability to enjoy profit above the level that would otherwise be in competitive markets.

We also find that firm size, as measured by its total revenue, has a negative relationship with markup.[14] Firm age has a positive relationship with markup. There are at least two possible explanations for the reason why older firms tend to have more market power. First, the finding could reflect the survival bias of firms with higher markup. Second, older firms may have an advantage over younger firms in certain aspects such as reputation, customer loyalty, and market information.

When we perform the regression analysis by broad sector, we find that the effect of business networks on markup is highest for trading and service sectors and smallest for manufacturing. Specifically, being in a network increases markup by 19, 17, and 13 percentage points for service, retail, and wholesale firms, compared to 11 percentage points for firms in the manufacturing sector. This result is intuitive: retail trading and services are likely nontradables, hence allowing firms to enjoy local market power. In contrast, manufacturing, and wholesale trading to a lesser extent, are tradables and face broader markets and more competitors.

To explore whether the results are heterogeneity across different networks, we further consider the effect of the network characteristics on the firm's market power.

$$\begin{aligned} Markup_{it} &= \beta_1 NetworkFirms_I + \beta_2 NetworkIndustries_I + \beta_3 NetworkRevenue_{It} \\ &\quad + \beta_4 JV_i + \beta_5 Bangkok_i + \beta_6 Revenue_{it} + \beta_7 Age_{it} + \delta_{jt} + \epsilon_{it} \end{aligned} \tag{17}$$

where $NetworkFirms_I$ is the log of the number of firms within network I to which firm i belongs, $NetworkIndustries_I$ is the log of the number of industries within network I, and $NetworkRevenue_{It}$ is the log of network I's total revenue.[15]

Table 5 reports the estimation results. Firms in a larger network, as measured by the number of firms and the total revenue of all firms in the network, are more likely to have a higher markup. This result suggests that larger business networks seem to have more ability to influence the prices of their inputs or products. In addition, we find that firms in the more concentrated networks, as represented by the fewer number of ISIC-4 industries in the network, are more likely to have a higher markup. This finding implies that the source of higher market

[14] It is possible that higher markup of smaller firms reflects fixed costs needed to be covered more than proportionately by smaller firms.

[15] We exclude the firm's own revenue to avoid double counting in the regression.

Table 5: Network characteristics and firm's markup

Dependent Variable:	(1)	(2)	(3)	(4)	(5)
$Markup_{it}$	All	Manufacturing	Wholesale	Retail	Service
$NetworkFirms_I$	0.0149^{***}	-0.00128	0.000640	0.0131^{***}	0.0361^{***}
	(0.00209)	(0.00194)	(0.00310)	(0.00483)	(0.00419)
$NetworkIndustries_I$	-0.0255^{***}	-0.00566^{**}	-0.00858^{**}	-0.00918	-0.0446^{***}
	(0.00265)	(0.00231)	(0.00380)	(0.00635)	(0.00574)
$NetworkRevenue_{It}$	0.00806^{***}	0.00454^{***}	0.00458^{***}	0.000335	0.0138^{***}
	(0.000622)	(0.000619)	(0.000965)	(0.00145)	(0.00139)
JV_i	-0.00261	0.00125	-0.0430^{***}	0.0225^{**}	0.0144
	(0.00493)	(0.00451)	(0.00570)	(0.0111)	(0.0120)
$Bangkok_i$	-0.00495	-0.00476	-0.0243^{**}	0.0460^{***}	-0.00791
	(0.00565)	(0.00528)	(0.0104)	(0.0153)	(0.0126)
$Revenue_{it}$	-0.0620^{***}	-0.0387^{***}	-0.0544^{***}	-0.0492^{***}	-0.0923^{***}
	(0.000824)	(0.000859)	(0.00115)	(0.00161)	(0.00198)
Age_{it}	0.00264^{***}	0.000960^{***}	0.00251^{***}	0.00369^{***}	0.00386^{***}
	(0.000107)	$(9.51e{-}05)$	(0.000149)	(0.000286)	(0.000289)
Number of obs.	66,900	21,605	13,799	6,632	24,864
R^2	0.496	0.468	0.323	0.315	0.464
Industry-year F.E.	Yes	Yes	Yes	Yes	Yes

Note: Unit of observations is firm-year. $Markup_{it}$ denotes the markup of firm i in year t, $NetworkFirms_I$ is the log of the number of firms within network I to which firm i belongs, $NetworkIndustries_I$ is the log of the number of industries within network I, and $NetworkRevenue_{It}$ is the log of network I's total revenue, $Bangkok_i$ is a dummy variable equal to one if firm i is located in Bangkok and vicinity, JV_i is a dummy variable equal to one if firm i is a joint-venture firm, $Revenue_{it}$ is the log of firm i's total revenue, and Age_i is the age of firm i. Robust standard errors in parentheses. Drop firms with markup in the top or the bottom 1 percentiles. *** and ** denote significance at 1% and 5% levels, respectively.

power enjoyed by business networks seems to come from horizontal integration (i.e., operating multiple firms in the same business) more than from vertical integration (i.e., operating multiple firms in the same vertical supply chain).

When we perform this analysis by sector, we find that the effects of network size and diversification are (economically and statistically) largest for firms in the service sector. In particular, if we compare two service firms from two different business groups where one group consists of ten percent more firms than the other, the firm in the larger business group has a 0.36-percentage-point higher markup. In contrast, if we compare two service firms from two different business groups where one group consists of ten percent more ISIC-4 industries than the other, the firm in the less-diversified group has a markup higher than the other firm by 0.45 percentage points.

6 Markup and Firm's Export Behaviors

Finally, we examine the relationship between a firm's domestic market power, as measured by markup at the firm level, and the firm's export behaviors and investment.

6.1 Export, Diversification, and Product Upgrade

As suggested in the literature, market power could have a negative effect on firms' export activities through two channels. First, by reaping high rent in the domestic market, firms with excessive market power might have less incentive to expand into foreign markets. Second, since firms with high market power invest less and are less productive, these firms might not be able to compete in the more-competitive foreign markets.

To investigate the effect of market power on the firm's export decisions, we start by estimating a logistic regression of a firm's export dummy on lagged markup and firm's characteristics:

$$\begin{aligned} X_{it} &= \beta_1 Markup_{i,t-1} + \beta_2 Network_i + \beta_3 ROA_{i,t-1} + \beta_4 Size_{i,t-1} + \beta_5 Leverage_{i,t-1} \\ &\quad + \beta_6 Age_{i,t-1} + \epsilon_{it} \end{aligned} \tag{18}$$

where X_{it} is a time-varying indicator variable that is equal to one if firm i exports any product in year t and zero otherwise, $Network_i$ is a time-invariant indicator variable that is equal to one if firm i belongs to any business network and zero otherwise, $ROA_{i,t-1}$ is the ratio of EBIT to total asset, $Size_{i,t-1}$ is the log value of firm i's total asset[16], and $Leverage_{i,t-1}$ is the ratio of total liability to total asset. We use lagged markup in this analysis to capture the firm's willingness and ability to compete in the foreign market that is determined by how much domestic market power it had in the previous year. Note that we only perform the regression analysis on manufacturing firms as outputs of most trading and service firms are nontradables.

Column (1) in Table 6 reports the marginal effect from the estimation. The result suggests that higher-markup firms are less likely to export. More specifically, firms with 50 percentage points higher in markup are 3.9-percentage-point less likely to export.[17] This impact is substantial, given that only 15 percent of firms in our data export.

Note that the negative relationship between markup and the likelihood to export is sta-

[16]The results are robust to using fixed asset instead of total asset in the calculation of ROA and $Size$.

[17]We choose to use 50 percentage points when interpreting the magnitude of the estimation results because, as shown earlier in Figure 4, the difference in the markups between the median firm and the 90^{th} percentile firm (i.e., a high markup firm) is approximately 50 percentage points.

Table 6: Markup and firm's export

	(1)	(2)	(3)	(4)
Dependent Variable:	$Export_{it}$	$Upgrade_{it}$	Survive to year t	Survive to year $t+1$
$Markup_{i,t-1}$	-0.0583^{***}	-0.0912^{***}	-0.0953^{**}	-0.152^{***}
	(0.00312)	(0.0143)	(0.0428)	(0.0474)
$Network_i$	0.00331^{*}	-0.0131^{**}	-0.00451	0.0242
	(0.00192)	(0.00638)	(0.0261)	(0.0265)
$ROA_{i,t-1}$	-0.0262^{***}	-0.00989	-0.000176	-0.0368
	(0.00226)	(0.00891)	(0.0244)	(0.0263)
$Size_{i,t-1}$	0.0468^{***}	0.0108^{***}	0.0385^{***}	0.0350^{***}
	(0.000307)	(0.00120)	(0.00526)	(0.00570)
$Leverage_{i,t-1}$	0.000325^{***}	0.00489^{**}	0.00474	-0.00432
	$(4.13e{-}05)$	(0.00244)	(0.00610)	(0.00575)
$Age_{i,t-1}$	-0.00135^{***}	0.00103^{***}	-0.00645^{***}	-0.00671^{***}
	$(6.09e{-}05)$	(0.000228)	(0.000926)	(0.00108)
Number of obs.	336,406	52,511	4,414	3,758
Industry-year F.E.	No	No	No	No

Note: Unit of observations is firm-year. $Export_{it}$ is a time-varying indicator variable that is equal to one if firm i exports any product in year t and zero otherwise, $Upgrade_{it}$ equals one if the firm's PCI increases from year $t-1$ to year t and equals zero otherwise, Survive to year t is an indicator variable equal to one if a newly-exporting firm in year $t-1$ survives to year t, Survive to year $t+1$ is an indicator variable equal to one if a newly-exporting firm in year $t-1$ survives to year t, $Markup_{i,t-1}$ denotes the markup of firm i in year $t-1$, $Network_i$ is a time-invariant indicator variable that is equal to one if firm i belongs to any business network and zero otherwise, $ROA_{i,t-1}$ is the ratio of EBIT to total asset, $Size_{i,t-1}$ is the log value of firm i's total asset. Logistic estimation with marginal effects reported. Standard errors in parentheses. Drop firms with markup in the top or the bottom 1 percentiles. ***, **, and * denote significance at 1%, 5% and 10% levels, respectively.

tistically significant even when we control for the network variable. Meanwhile, the network variable is weakly significant, statistically and economically. In other words, the mechanism through which business networks mainly impact the firm's export is through domestic market power.[18]

Next, we focus only on the exporting firms to investigate the relationships between market power and export diversification by estimating the following equation:

$$\begin{aligned} N_{it} &= \beta_1 Markup_{i,t-1} + \beta_2 Network_i + \beta_3 ROA_{i,t-1} + \beta_4 Size_{i,t-1} + \beta_5 Leverage_{i,t-1} \\ &\quad + \beta_6 Age_{i,t-1} + \delta_{jt} + \epsilon_{it} \end{aligned} \tag{19}$$

where N_{it} is the number of exported products (or destinations) of firm i in year t.

[18]Everything else equal, we expect that firms in business networks are more likely to export since they are usually larger and have more access to finance, managerial skills, and information that are necessary for exporting.

Table 7: Markup and firm's export diversification

	(1)	(2)
Dependent Variable:	Number of products	Number of destinations
$Markup_{i,t-1}$	0.0575	−0.0771
	(0.508)	(0.217)
$Network_i$	−1.161***	−0.164
	(0.287)	(0.136)
$ROA_{i,t-1}$	−0.968***	−0.849***
	(0.198)	(0.138)
$Size_{i,t-1}$	4.077***	2.552***
	(0.0754)	(0.0320)
$Leverage_{i,t-1}$	0.403***	0.227***
	(0.0660)	(0.0358)
$Age_{i,t-1}$	0.00777	0.0452***
	(0.0116)	(0.00479)
Number of obs.	52,509	52,509
R^2	0.285	0.353
Industry-year F.E.	Yes	Yes

Note: Unit of observations is firm-year. Number of products is the total number of product at the 4-digit ISIC level that firm i exports in year t, Number of destinations is the total number of economies to which firm i exports in year t, $Markup_{i,t-1}$ denotes the markup of firm i in year $t-1$, $Network_i$ is a time-invariant indicator variable that is equal to one if firm i belongs to any business network and zero otherwise, $ROA_{i,t-1}$ is the ratio of EBIT to total asset, $Size_{i,t-1}$ is the log value of firm i's total asset. Robust standard errors in parentheses. Drop firms with markup in the top or the bottom 1 percentiles. *** denotes significance at 1% level.

Table 7 reports the estimation results. It shows that the relationships between markup and export diversification as measured by the number of products and the number of destinations are not statistically significant. These results are intuitive—if an exporting firm does not have either incentive or ability to compete in the global markets, it is irrelevant how many products and destinations the firm exports.

Finally, to investigate whether markup might help explain the lack of product upgrade among Thai firms, we estimate a logistic regression of a firm's product upgrade on its markup and characteristics:

$$\begin{aligned} Upgrade_{it} &= \beta_1 Markup_{i,t-1} + \beta_2 Network_i + \beta_3 ROA_{i,t-1} + \beta_4 Size_{i,t-1} \\ &\quad + \beta_5 Leverage_{i,t-1} + \beta_6 Age_{i,t-1} + \delta_{jt} + \epsilon_{it} \end{aligned} \tag{20}$$

The indicator variable $Upgrade_{it}$ equals one if the firm's PCI increases from year *t–1* to year t and equals zero otherwise. The estimation result reported in column (2) in Table 6 suggests that firms with higher market power are less likely to upgrade their products. Specifically, firms with a 50-percentage-point higher markup have 4.5-percentage-point lower likelihood of a product upgrade.[19]

6.2 Survival in Foreign Markets

We further examine the competitiveness of exporting firms in the foreign markets. Columns (3) and (4) in Table 6 show that firms that have high domestic market power are less likely to survive in the foreign markets. Particularly, newly-exporting firms with a 50-percentage-point higher markup are 4.7 and 7.5 percentage points less likely to continue to export in the second and third years when compared to another newly-exporting firm. For comparison, on average, around 54 percent of newly-exporting firms survive and continue to export to foreign markets in the second year and around 40 percent continue to the third year.

Again, the channels through which this relationship operates could be either firms having less incentive to stay in a more-competitive global market, or firms being lack of ability to compete with others and being forced to withdraw from the foreign markets.

6.3 Firm's Investment

Finally, we study the relationship between a firm's markup and its investment in fixed assets by estimating the following equation:

$$\begin{aligned} Investment_{it} &= \beta_1 Markup_{i,t-1} + \beta_2 ROA_{i,t-1} + \beta_3 Size_{i,t-1} + \beta_5 Leverage_{i,t-1} \\ &\quad + \beta_6 Age_{i,t-1} + \delta_{jt} + \epsilon_{it} \end{aligned} \tag{21}$$

where $Investment_{it}$ is the change in logarithm of firm i's fixed asset between year $t-1$ and year t.[20]

Table 8 reports the estimation results. We find that a firm's investment and markup are negatively correlated. This is the case for firms in all sectors, as reported in Columns (1)-(4), as well as exporting firms, as reported in Columns (5)-(6). Specifically, the result in Column (5) shows that, among the exporting firms, a 50-percentage-point higher markup is associated with

[19] Note that this result may also help explain a stylized fact from Apaitan, Ananchotikul, and Disyatat (2017) that the increasing trend of the share of most complex products in Thailand has tapered off since 2007, though there might be other factors confounding this relationship.

[20] The results are robust to using the change in firm i's total asset instead.

Table 8: Markup and firm's Investment

Dependent Variable: $Investment_{it}$	(1) Manu-facturing	(2) Wholesale	(3) Retail	(4) Service	(5) Export	(6) Ever Export
$Markup_{i,t-1}$	-0.235^{***}	-0.182^{***}	-0.165^{***}	-0.110^{***}	-0.169^{***}	-0.244^{***}
	(0.0143)	(0.0139)	(0.0151)	(0.00625)	(0.0363)	(0.0289)
$Network_i$	0.0135^{***}	0.00990	0.0343^{***}	0.0361^{***}	0.00929	0.00269
	(0.00489)	(0.00916)	(0.0132)	(0.00768)	(0.00745)	(0.00728)
$ROA_{i,t-1}$	0.0282	0.0976^{***}	0.0817^{***}	0.0501^{***}	0.0591	0.00190
	(0.0214)	(0.0177)	(0.0116)	(0.00917)	(0.0392)	(0.00670)
$Size_{i,t-1}$	0.0162^{***}	0.0343^{***}	0.0394^{***}	0.00880^{***}	0.000382	0.00550^{***}
	(0.00130)	(0.00172)	(0.00213)	(0.00170)	(0.00242)	(0.00213)
$Leverage_{i,t-1}$	-0.00683^{***}	-0.00176	-0.00355^{*}	-0.00319^{***}	-0.0214^{**}	-0.0125^{*}
	(0.00257)	(0.00213)	(0.00215)	(0.000936)	(0.00959)	(0.00723)
$Age_{i,t-1}$	-0.00597^{***}	-0.00696^{***}	-0.00588^{***}	-0.00845^{***}	-0.00362^{***}	-0.00469^{***}
	(0.000205)	(0.000252)	(0.000287)	(0.000281)	(0.000316)	(0.000291)
No of obs.	317,112	330,614	238,480	338,501	51,840	77,408
R^2	0.013	0.008	0.007	0.009	0.028	0.024
Indust-yr FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Unit of observations is firm-year. $Investment_{it}$ is change in total fixed asset from year $t-1$ to year t, $Markup_{i,t-1}$ denotes the markup of firm i in year $t-1$, $Upgrade_{it}$ equals one if the firm's PCI increases from year $t-1$ to year t and equals zero otherwise, Survive to year t is an indicator variable equal to one if a newly-exporting firm in year $t-1$ survives to year t, Survive to year $t+1$ is an indicator variable equal to one if a newly-exporting firm in year $t-1$ survives to year t, $Network_i$ is a time-invariant indicator variable that is equal to one if firm i belongs to any business network and zero otherwise, $ROA_{i,t-1}$ is the ratio of EBIT to total asset, $Size_{i,t-1}$ is the log value of firm i's total asset. Robust standard errors in parentheses. Drop firms with markup in the top or the bottom 1 percentiles. Column (5) include only firms that export in year t. Column (6) include all firms that ever export in any year between 2006–2016. ***, **, and * denote significance at 1%, 5% and 10% levels, respectively.

a 8.5-percentage-point lower investment rate. The result is slightly larger when we consider all firms in our data that have ever exported at some point during 2006–2016.

There are two possible channels behind this finding. First, with market power, firms may limit their investment to control their production for domestic sales so that they can command higher output prices or lower input prices. Second, consistent with the findings presented earlier, firms with higher markup tend to export less and therefore may have a lower demand for investment in fixed assets.

6.4 Discussion

The key variable in our analysis is markup that we estimate under certain assumptions and data limitations. There are also some concerns over this approach. For example, scholars have criticized the use of CGS as a variable input in the production-based estimation of markup à la De Loecker, Eeckhout, and Unger (2020). In particular, Covarrubias, Gutiérrez, and Philippon (2019) argue that, in comparison to manufacturing or trading firms, defining CGS for service firms is more complicated. With no goods to be sold, many pure service firms do not even report CGS in their income statement. Alternative line items, such as "Cost of Revenue", might include fixed costs, which violate the assumption of a variable input. Traina (2018) shows that some components in "Selling, General, and Administrative" (SG&A) are variable costs and that the share of SG&A in "Operating Expenses" (OPEX) has been increasing over time. When using OPEX instead of CGS in estimating markup, the increasing trend in markup disappears. De Ridder (2019) argues that intangible inputs (e.g., IT and software) become more important in firms' production, and thus the firms' cost structure shifts toward higher fixed costs and lower marginal costs. As a result, the estimated markups appear to be higher.

However, our overall conclusions should not be affected by these criticisms. First, in our regression analyses, we include industry-year fixed effects, which should control for increasing trends in SG&A or intangible inputs in each sector.[21] Second, as discussed in Covarrubias, Gutiérrez, and Philippon (2019), profit is among the best measures of firm's market power. We run a regression of profit rate on markup, controlling for industry-year fixed effects, and find a positive relationship at the 1% significant level.

7 Conclusion

We use data on company profile and financial statement, ownership, and export behaviors, covering all registered firms in Thailand, both publicly traded and privately held, to study the impacts of common ownership and market power on various aspects of firm's export behaviors.

First, we find that firms belonging to ownership networks tend to have higher market power as measured by markups. Besides, the relationship is stronger for larger networks and networks with firms operating in the same industry. These findings suggest that common ownership can influence the competitive environment in the corporate sector. It also has an important

[21] While we do not include industry-year fixed effects in logistics regressions, we estimate linear probability models with industry-year fixed effects and get similar results.

policy implication: common ownership matters and needs to be taken into consideration in antitrust regulations, especially in the industries where many firms belong to the same group of shareholders.

Second, we find that market power is negatively associated with a firm's propensity to export and the likelihood of product upgrade. In addition, for exporting firms, those who have higher markups are less likely to survive in the foreign markets. Possible channels behind this relationship could be either firms that enjoy domestic market power may have less incentive to enter and stay in the more competitive foreign markets, or they are forced to stay out or exit the foreign markets because of their inefficiency and lack of competitiveness. These findings have an important policy implication for an economy that pursues export-oriented development strategy: domestic market power could hinder the country's competitiveness. This finding is also an explanation as to why many developing countries, especially those with domestic economy dominated by powerful business networks, have to rely on foreign multinational corporations to drive their export activities.

Finally, we find that firms with high markup and hence less likely to export tend to invest less. On the demand side, it is possible that, with market power, firms may limit their investment and reduce their domestic sales so that they can command higher output prices or lower input prices. Alternatively, on the supply side, firms with higher markup tend to export less and therefore have lower demand for investment in fixed assets. This finding may help explain the decline in investment that coincides with the slowdown in export growth in several emerging economies, including Thailand.

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