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# Understanding Corporate Thailand I: Finance

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## Abstract

This study analyzes the entire universe of registered firms in Thailand. There are five main findings. First, firm size distribution is smooth, with a majority of firms in the middle of the distribution; the apparent “missing middle” phenomenon is entirely driven by arbitrary categorization of small and medium enterprises (SMEs). Second, the Thai corporate sector is very concentrated; the concentration has also risen over the past decade. Third, larger firms seem to have advantages over smaller firms regarding financing. Fourth, smaller firms tend to disproportionately invest less in fixed assets than larger firms. Finally, firms in the middle of the size distribution exhibit the highest return on asset (ROA) but have low leverage, consistent with the symptom of credit constraints. Large firms, in contrast, seem to have lower ROA but higher debt. Meanwhile, smaller firms seem to have both lower leverage and ROA. Overall, our results suggest that the Thai corporate sector exhibits both inefficient capital allocation and financial vulnerability. The paper has important policy implications on resource allocation in the economy, particularly, regarding appropriate assistance provided to small and medium enterprises.

**JEL Classification:** G31, G32, M41, O16, O53

**Key Word:** Private firm, firm size, SME, concentration, financial analysis, capital structure, return on asset, working capital, financial constraint

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# 1 Introduction

**The corporate sector is a crucial part of the Thai economy.** It accounts for a large share of the country's production; it contributes to a majority of the country's exports; it provides employment to the country's workforce; it helps stimulate the country's aggregate demand through investment; and it serves as an essential source of the government revenue. A productive and efficient corporate sector is therefore important for the economy, making the understanding this sector relevant not only for business practitioners and academic researchers but also for policymakers.

**Nonetheless, our knowledge about corporate firms in Thailand remains limited.** Due to data availability, most studies on the corporate sector, in Thailand and elsewhere, have been almost exclusively on public companies. However, public companies, especially those listed in the stock exchanges, are not representative of the Thai corporate sector: they account for only a tiny fraction of the total number of firms in the economy; they are much larger and much older than other firms; and they are financially different from others. Conclusions drawn from the studies using only listed firms therefore have limited generalizability for Thailand's corporate sector at large. In contrast, private companies dominate the Thai economy in terms of the number of firms, employment, asset holding, and total production. Their importance has also been increasing over time. Knowledge about these firms, however, remains scarce.

**Understanding the corporate sector is important for policies related to economic development.** The majority of firms are private and considered small and medium enterprises (SMEs).<sup>1</sup> These firms have been at the center of government's economic policies as they are considered to be a driving force of the economy due to their prevalence and potential roles in entrepreneur incubation, employment generation, and poverty reduction. However, policies promoting SMEs are controversial at best as SMEs are highly heterogeneous—some have potential, but face constraints and need government supports; some are unproductive but artificially survive through assistance from the state; some are already highly productive and need no further assistance. Not only do universal, one-size-fit-all policies promoting SMEs consume unnecessary resources of the government, they also create perverse impacts and lead to misallocation in the aggregate economy. To identify which SMEs should be supported and what assistance they need, we must understand the heterogeneity behind the corporate landscape of the Thai economy. This study analyzes firm-level panel data of registered firms in Thailand with the objective to better understand the Thai corporate sector. Our main findings can be summarized as follows.

**First, firm size distribution in Thailand is smooth, with a majority of firms in the middle of the distribution.** This is in contrast with the notion of "the missing middle" phenomenon in the literature: based on firm size classification commonly used in policy making, small firms dominate the Thai economy in terms of number while large firms prevail in terms of contribution to the aggregate production, suggesting that the role of

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<sup>1</sup>Note that based on the Office of Small and Medium Enterprises Promotion (OSMEP), there are 3,013,722 Thai business enterprises in 2016; of which, only 9,025 are classified as large enterprises while the rest are SMEs. Among SMEs, 25% are corporate SMEs registered with the Ministry of Commerce while others operate as ordinary persons rather than a juristic persons. See N. Wasi, P. Bumrungruan, C. Monchaitrakul, M. Rudtanasudjatun, and K. Samphantharak. "SME Debt in Thailand: A Perspective from Logan-Level Data," aBRIDGE Issue 12/2018, Puey Ungphakorn Institute for Economic Research (PIER), 11 July 2018.

medium firms in the economy is limited. Instead, analyzing the entire distribution of firms and going beyond the arbitrary cutoffs of firm size classification, we find that there is no missing middle in corporate Thailand. Firm size distribution is smooth, with a majority of firms in the middle of the distribution, and the conclusion on the missing middle seems to be entirely driven by arbitrary categorization.

**Second, the Thai corporate sector is very concentrated.** For example, the combined revenue of the 50 largest firms is approximately one-fourth of the revenue of all registered firms in the country. The concentration has also risen over the past decades. We document three factors that contribute to this increased concentration: (1) large industries have become more dominant; (2) there are more industries with rising within-industry concentration and fewer industries with declining concentration; and (3) industries with rising concentration are those with large size, resulting in a larger impact on the overall concentration of the economy.

**Third, larger firms seem to have advantages over smaller firms in terms of financing:** This conclusion is supported by a series of our findings: (1) small firms tend to be less leveraged than large firms—the debt-to-asset ratio of firms in the top size decile is over five times larger than that of firms in the third decile; (2) most firms do not have long-term liabilities, and those that do are likely to be the very large firms—the median firms in the first eight size deciles have no long-term liabilities at all; and (3) large firms tend to have advantage in managing working capital, especially inventory—cash conversion cycle, i.e., the number of days that a firm need to finance its short-term capital, is 100 day shorter for the firms in the top size decile when compared to firms in the fourth decile. These findings suggest that small firms may either have less need for credit or have difficulty in getting loans, especially the long-term ones.

**Fourth, we find that smaller firms invest disproportionately less in fixed assets than larger firms.** This finding is consistent with the limited debt held by small firms discussed earlier. Although small firms may have fewer business opportunities so they have less need to invest in fixed assets, it is likely that they also have difficulty in access to credit, especially long-term ones, preventing them from investing in fixed capital. Conversely, a lack of collateralizable fixed assets may also prevent small firms from getting loans in the first place.

**Finally, firm in the middle of size distribution have the highest return on asset.** Regarding firm performance, the relationship between return on asset (ROA) and firm size exhibits a hump shape. Firms in the middle of the size distribution seem to have average ROA at around 20% per year, higher than small and large firms. Decomposing the contribution to ROA, we find that small firms tend to have lowest asset turnover but highest profit margin while large firms have highest turnover but lowest margin. Thought firms in the middle seem do not have either highest turnover or highest margin, their turnover and margin are both moderately high, resulting in highest ROA when compared to smaller and larger firms.

**Overall, our findings suggest that the Thai corporate sector exhibits both inefficient capital allocation and financial vulnerability.** Large firms have high leverage but low ROA while small firms have both low leverage and low ROA. Meanwhile, firms in the middle of the size distribution, i.e., those with the highest ROA, tend to have low leverage, consistent to a symptom of credit constraints.

**This paper contributes to the understanding of the corporate sector in Thailand in many ways.** First, by analyzing the entire universe of registered firms in the country, we illustrate how special, i.e., unrepresentative, public companies are. We therefore caution the generalization of findings from the studies based exclusively on those companies. Second, by using firm revenue as a continuous measure of firm size and classify firm size relative to the entire distribution of firms in the economy, we show that there is more heterogeneity among small firms than between those around the absolute cutoffs. Making policy recommendations based on arbitrary cutoffs may not be appropriate as they ignore the diversity across small firms and they treat very-large small enterprises, medium enterprises, and large enterprises differently even though they may not be very different.

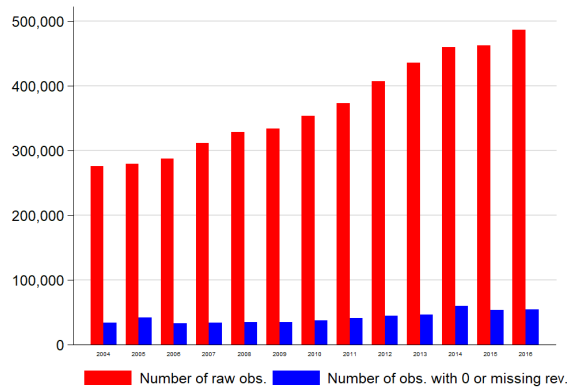
**Our study has important policy implications regarding resource allocation in general and entrepreneurship and SME promotion in particular.** First, if the increasing concentration found in this study linked to the increasing market power, this could be a hindrance to an efficient resource allocation. Thus, a more-detailed study on market power is warranted and the policies promoting competition might be necessary. Second, we find that firms in the middle of size distribution seem to have financial constraints and face limit to expansion. Policies targeting this group of firms should focus on providing them with easier and cheaper access to finance, including both long-term credit and short-term loan to fund working capital. Note that these firms are categorized as small and not as medium enterprises by the official SME definition. Third, we find that the very small firms may not have access to finance, but they are also not very productive. Although financial support that would allow them to overcome large fixed costs generally faced by small enterprises are necessary, it is neither sufficient nor sustainable. In particular, simply providing subsidized loans to these enterprises will likely create delinquency problems unless there are other measures that simultaneously help the firms improve their productivity. If the government would like to support these entrepreneurs, other non-financial policies that help them improve their productivity are also needed. These policies may involve skill training, innovation and product design, and access to broader markets.

**This paper is a part of our series of studies on Thailand's corporate sector.** This paper mainly focuses on a snapshot of the sector in 2016, the latest data when we conduct the analysis. We leave other aspects of Thai firms such as firm dynamics, ownership and corporate structure, and competitive environment to sequel papers in the series. The remainder of this paper is organized as follows. Section 2 provides an overview of data source and coverage as well as discussing the landscape of the Thai corporate sector in regard to firm's registration type. Section 3 is devoted to firm size distribution while Section 4 provides a deeper analysis into allocations across and within industries. Section 5 covers a series of financial ratio analysis of Thai firms, with particular attention to the relationship between corporate finance and firm size and industry. Section 6 concludes and discuss policy implications.

## 2 The Landscape

**This study analyzes firm-level panel data of registered firms in Thailand from 2004 to 2016.** By law, all registered firms in Thailand are required to submit annual financial state-

Figure 1: Number of Firms in the Data (2004-2016)



ments to the Department of Business Development (DBD) at the Ministry of Commerce. This Corporate Profiles and Financial Statements (CPFS) database consists of a basic profile and annual financial statements of each business. The data include information on registration year, registration type, current status, main industry, assets, liabilities, equities, revenues and expenses, and net income. In 2016, there are 644,759 registered firms in operation in the DBD database.<sup>2</sup> We exclude firms that did not submit their financial statement to DBD from our data. We also exclude holding companies from our analysis as they do not directly engage in production activities. In the end, there are a total of 486,556 firms in 2016 in our study, which account for about 75% of all registered firms in operation.<sup>3</sup>

**The number of firms in Thailand has increased over time.** Figure 1 shows the number of observations in our data over time. The left (red) bars represent the number of firms that submit their financial information. Among these firms, the right (blue) bars represent the number of firms that do not have any information on revenue, which account for less than 15% of the entire data. Most of these firms are young: 39% of them are two years old or younger and may not start generating revenue yet; firms in their first year of operation are also unlikely to have annual financial statements.

**Firms in Thailand are registered in three main categories.** These categories are partnership, private limited company, and public limited company. Most public limited companies, though not all, are also listed either in the Stock Exchange of Thailand (SET) or in the Market for Alternative Investment (MAI).

**Private limited companies dominate the Thai economy in terms of the number of firms, total production, and asset holding.** As Table 1 shows, in 2016 private limited companies comprise about 75% of firms in our data, followed by partnerships which account for 25%; in contrast, public limited companies represent only 0.21%. Additionally, private limited companies generate over three-quarter of the country's total revenue and hold over a half of Thailand's total corporate asset. The table also shows that although public limited companies represent only a tiny fraction of firms in our data, they more-

<sup>2</sup>Department of Business Development, as of December 2016.

<sup>3</sup>If any firm does not submit its financial statement to DBD for three consecutive years, the firm's status in the database will be converted to inactive. These firms are likely the ones on the process of ceasing operation.

than-proportionately contribute to over one-fifth of the economy's total revenue and about a half of the economy's total assets. Meanwhile, partnership firms represent only 4% of the total revenue and less than 2% of the total asset.

Table 1: Share of Firm by Registration Type (2016)

	Total Revenue		Total Asset		Number of Firms	
	Bil. Baht	Percent	Bil. Baht	Percent	No.	Percent
Partnership	1,722.42	4.18	1,099.65	1.86	122,096	25.09
Private Co. Ltd.	30,982.27	75.17	30,106.80	50.81	363,423	74.70
Public Co. Ltd., Non-listed	1,526.48	3.70	4,807.88	8.11	424	0.09
Public Co. Ltd., Listed	6,982.61	16.94	23,241.83	39.22	588	0.12
Total	41,213.77	100.00	59,256.16	(100.00)	486,531	100.00

**There is a growing importance of private limited firms over time.** Table 2 compares firm type composition in the economy in 2004 and 2016. The fraction of private limited firms has increased, while that of partnership has decreased relative to other firm types and that of public firms remains roughly the same. In addition, private limited firms also represent a growing share of revenue and asset holding.

Table 2: Share of Firm by Registration Type (2004 and 2016)

	2004		2016	
	No. of Firms	Share	No. of Firms	Share
Partnership	75,201	32.69	122,102	25.10
Private	154,331	67.08	363,448	74.70
Public (Non-listed)	185	0.08	424	0.09
Public (Listed)	354	0.15	588	0.12

**Public limited companies, especially those listed in stock exchanges, are not representative of the corporate sector in Thailand.** As shown in Table 3 shows that listed firms are very different from others in virtually every consideration. Not only are they significantly larger and older, they are also distinct in various financial aspects. A corollary to this finding is that conclusions drawn from studies using only listed firms have limited generalizability.

**Meanwhile, despite their growing importance, knowledge about private firms remains scarce.** Existing literature on the corporate sector in Thailand (and other countries) has been dominated almost exclusively by publicly traded firms, especially those listed in stock exchanges. Given that the contribution of private firms on the production is significant and growing, the understanding of their incentives, constraints, and behaviors has important policy implications for resource allocation, aggregate productivity, poverty, and income distribution of the country. More attention needs to devote to private firms, which range from start-ups and high-growth firms to firms with no need to grow and firms with

growth constraints.

Table 3: Median of Selected Financial Information by Registration Type (2016)

	Partnership	Private	Public (Non-listed)	Public (Listed)
Total Revenue (Million Baht)	1.76	1.90	714.88	1,881.03
Total Asset (Million Baht)	2.57	3.81	1,307.15	3,192.30
Age (Years)	7.00	7.00	19.00	23.00
Return on Asset, ROA	0.07	0.03	0.06	0.08
EBIT Profit Margin	0.09	0.05	0.08	0.10
Asset Turnover Ratio	0.82	0.74	0.51	0.61
Tax Rate	0.00	0.00	0.19	0.17
Return on Equity, ROE	0.07	0.03	0.06	0.08
Total Liability to Total Asset Ratio	0.03	0.20	0.49	0.41
Inventory Turnover Ratio	8.47	6.79	5.69	5.57
Days Inventory Outstanding	43.10	53.77	64.17	65.48
Accounts Receivable Turnover Ratio	16.52	7.61	6.18	6.28
Days Sales Outstanding	22.10	47.95	59.05	58.09
Accounts Payable Turnover Ratio	19.61	7.40	4.75	5.74
Days Payable Outstanding	18.14	48.26	76.73	61.62
Cash Conversion Cycle (Days)	54.41	55.42	54.57	74.40

Remark: Median ROE is calculated from firms with positive equity only.

### 3 Firm Size

Size is an important concept for the understanding of firms and the corporate sector. It provides information on the scale and the boundary of the firm. Size distribution, together with measures of firm performance, also imply constraints faced by firms with different sizes. This in turn has important policy implications regarding concentration, inequality, competitive environment, entrepreneurship, and business expansion.<sup>4</sup>

#### 3.1 Size by SME Definition

**Firms are often broadly classified based on their size into small, medium, and large enterprises.** This classification is widely used for research and policies that target small and medium enterprises (SMEs). However, different arbitrary criteria are used to classify SMEs by different agencies in different countries. In this study we begin by using a definition similar to what adopted by Thailand's Ministry of Industry in 2002. Our choice of the criteria, which are based exclusively on fixed assets, is dictated by a constraint that

<sup>4</sup>For a discussion on the implications of firm size distribution on development economic theories and policies, see Chang-Tai Hsieh and Benjamin A. Olken. 2014. "The Missing "Missing Middle"." *Journal of Economic Perspectives*, 28 (3): 89-108.



our data only contain financial information but not employment.<sup>5</sup> Table 4 summarizes our definitions of small, medium, and large firms.

Table 4: Definition of SMEs (Based on Fixed Asset, Million Baht)

Sector	Small	Medium
Manufacturing	< 50 mil baht	50 - 200 mil baht
Wholesale	< 50 mil baht	50 - 100 mil baht
Retail	< 30 mil baht	30 - 60 mil baht
Services	< 50 mil baht	50 - 200 mil baht

**Small firms dominate the Thai economy in terms of number while large firms dominate in terms of contribution to aggregate production; the role of medium firms seems limited.** Table 5 presents the composition of firm size in 2016 based on our SME definition. It shows that almost all firms in our data are categorized as small. Large firms, despite being a minority, contribute to a very large share in the country's total revenue and total asset, at 59% and 70%, respectively. The role of medium-sized firms seems limited, representing only about 2% of the number of firms, 9% of total revenue, and 7% of total asset.

Table 5: Share of SMEs in the Thai Economy (2016)

	Total Revenue	Total Asset	Number of firms
1. Small	32.55	22.24	95.98
2. Medium	8.78	7.61	2.38
3. Large	58.67	70.15	1.63
Total	100.00	100.00	100.00

**Firm size classification, though convenient, has drawbacks.** First, the cutoffs for size bins are arbitrary. In addition, it focuses only on one type of input, namely, fixed assets. A closer inspection reveals that three 'small' enterprises by this definition appear on the top five firms with largest revenue in 2016, as shown in Table 6. Of these three 'small' firms, all are trading firms that generate large revenue but hold small fixed assets. This finding suggests that an alternative definition of firm size classification is therefore needed.<sup>6</sup>

<sup>5</sup>See [http://www.sme.go.th/SiteCollectionDocuments/White%20Paper/2545/whitepaper\\_2545\\_Eng.pdf](http://www.sme.go.th/SiteCollectionDocuments/White%20Paper/2545/whitepaper_2545_Eng.pdf). Note that the definition by the Ministry of Industry considers fixed assets excluding land. However, land value is not consistently reported for all firms in our data so we are forced to rely only on total fixed assets, which include plant, property, and equipment (PPE) as well as land. Note that this definition implies that our classification will result in having fewer firms classified as small and medium than in the case where the official definition were applied.

<sup>6</sup>Note that this finding is partly due to the lack of employment information in our data. The three *small* firms in our top five list may have large employment.

Table 6: Top Ten Firms with Largest Revenue (2016)

Rank	Name	Industry	Type	Size	Revenue (Mil. Baht)	Fixed Assets (Mil. Baht)
1	PTT	19. Manu of refined petro products	Public (SET)	Large	1,483,160	285,002
2	Hua Seng Heng Commoditas	46. Wholesale (except motor vehicles)	Private	Small	579,002	7
3	MTS Gold	46. Wholesale (except motor vehicles)	Private	Small	440,765	39
4	YLG Bullion International	46. Wholesale (except motor vehicles)	Private	Small	435,189	17
5	Toyota Motor Thailand	29. Manu of motor vehicles	Private	Large	419,094	60,306
6	Toyota Motor Asia Pacific - Engineering & Manufacturing	45. Wholesale and retail of motor vehicles	Private	Large	384,125	6,984
7	PTT Global Chemical	19. Manu of refined petro products	Public (SET)	Large	312,770	170,167
8	Thai Oil	19. Manu of refined petro products	Public (SET)	Large	301,067	36,072
9	CP All	47. Retail (except motor vehicles)	Public (SET)	Large	278,246	25,639
10	Ek-Chai Distribution System	47. Retail (except motor vehicles)	Private	Large	208,119	67,434

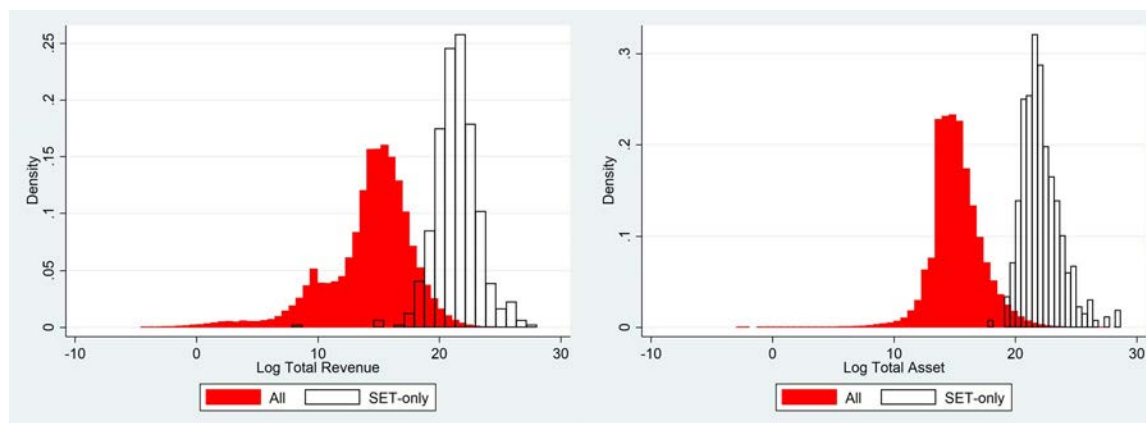
Source: Department of Business Development

### 3.2 Size by Revenue and by Asset

We categorize firm size based on their relative size in the distribution rather than absolute cutoffs. An advantage of this approach is that we avoid any arbitrary definition of SMEs. We first consider two continuous measures of firm size: total revenue and total asset.<sup>7</sup>

**The “missing middle” does not seem to be the case for corporate Thailand.** The left panel of Figure 2 plots the distribution of firm size in terms of revenue. There are two distributions in this chart, one for all registered firms in the economy (dark bars) and the other for firms listed in the Stock Exchange of Thailand (SET; hollow bars). Although the distribution of firm size for all firms is apparently bimodal, there is a significant number of medium firms (i.e., those in the middle of the distribution) in the Thai economy. The right panel presents the distribution of firm size based on total asset and shows no evidence of the missing middle as well. Unlike the distribution of firm revenue, the asset distribution is not bimodal. It is also highly skewed, with disproportionately more small firms than large firms. Finally, the distribution of listed firms is clearly on the right side of both charts in Figure 2, confirming that listed firms are relatively very large by either total revenue or total asset.

Figure 2: Distribution of Firm Size (2016)



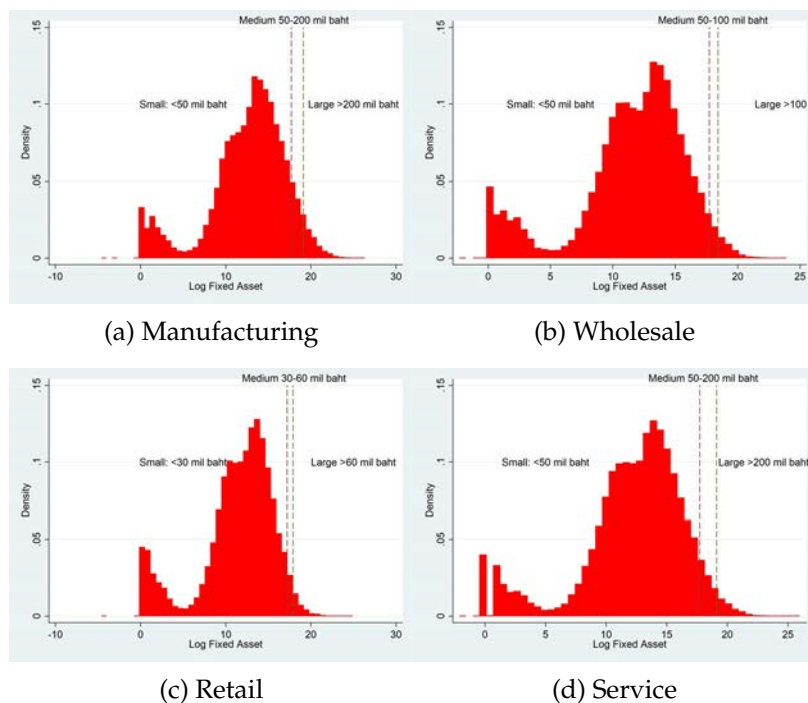
Remark: The unit of observation is firm. “SET-only” represents public limited companies listed in the Stock Exchange of Thailand (SET).

**There is more heterogeneity among small firms than between those around the cutoffs of arbitrary SME categorization.** Figure 3 shows the size distribution by fixed assets for each sector, with two vertical dash lines indicating the cutoffs based on the SME definition in Table 4. By this definition, a vast majority of registered firms in Thailand are small and diverse. These findings substantiate the arbitrariness of the SME definition.

**We will use revenue as a measure of firm size in this paper.** Although the distribution of total revenue and the distribution of total asset are similar, we prefer using revenue over total asset for two main reasons. First, revenue is a composite measure of outputs

<sup>7</sup>To get a consistent definition across all firms in the data, total revenue is computed as the sum of revenue from sales, revenue from services, and other income. Total asset is as explicitly reported in the data.

Figure 3: Distribution of Firm's Fixed Assets by Sector (2016)



that includes contribution from multiple types of inputs, not only capital. Second, a large share of the total asset, especially PPE and intangibles, is reported as a book value (i.e., acquisition cost minus depreciation and amortization), hence not well representing the current value. This is particularly the case for older firms. In contrast, revenue is measured at the current price annually. However, there is a caveat. Revenue is gross of expense and not value added; aggregating total revenue across firms in the economy is therefore double-counting when sales of one firm is considered as expenses on intermediate inputs of another. When discussing the macroeconomic perspective, it is more appropriate to view revenue as a measure of economic activities rather than output. Table 7 shows the range of revenue for each decade bin.

### 3.3 Overall Concentration

**The Thai corporate sector is very concentrated.** Firm size distribution reveals how much concentrated the Thai corporate sector is. We analyze concentration of the corporate sector in Thailand by looking at revenue share by each size bin. The left panel of Figure 4 shows the Lorenz curve of revenue distribution of Thai firms, i.e., the cumulative share of total revenue for each ventile bin. For both 2004 and 2016, i.e., the first and last years of our data, the bottom 75 percentile account for less than 10 percent of total revenue while the top five percentile account for at over 80 percent of the total revenue share.

**Concentration has increased over the past decades.** As the left panel of Figure 4 also reveal, larger firms in 2016 have more revenue share in the economy than their counter-

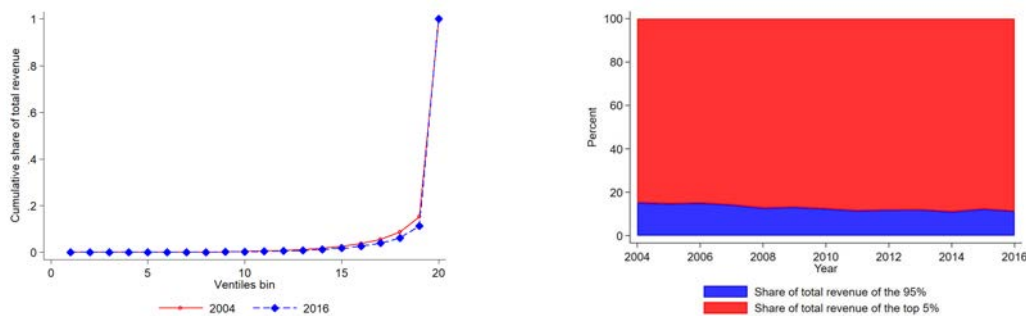
Table 7: Revenue by Decile Bin, Baht (2016)

Decile Bin	Range
1	0
2	0 - 13,750
3	13,750 - 192,415
4	192,465 - 863,308
5	863,394 - 1,860,614
6	1,860,634 - 3,903,572
7	3,903,612 - 7,913,086
8	7,913,195 - 17,379,578
9	17,379,936 - 52,869,688
10	52,871,080 and above

parts in 2004. This finding implies that inequality based on revenue has increased over time. The right panel of Figure 4 confirms this conclusion, demonstrating that the revenue share that the top 5% contributes has steadily increased over time, from around 85% in 2004 to approximately 90% in 2016.

**Increasing concentration has important implications on efficiency of resource allocation in the economy.** On the one hand, it can be viewed as inefficient if the larger concentration is a symptom of less competition. On the other hand, it could reflect efficiency if productive firms are those who get larger. Thus, it is crucial to understand what firms are in the top 5%, how they became so large, and whether they remain large over time.<sup>8</sup>

Figure 4: Concentration of the Thai Economy (2004-2016)



(a) Lorenz Curve: 2004 vs 2016

(b) Share of Revenue over Time, 2004-2016

Remark: Concentration is computed based on total revenue of each registered firm.

<sup>8</sup>We return to this issue in a sequel of this paper; see Tosapol Apaitan, Chanont Banterngansa, Archawa Paweenawat, and Krislert Samphantharak. "Ownership, Market Power, and Productivity: Evidence from Thailand", Discussion Paper, Puey Ungphakorn Institute for Economic Research, forthcoming, 2019.

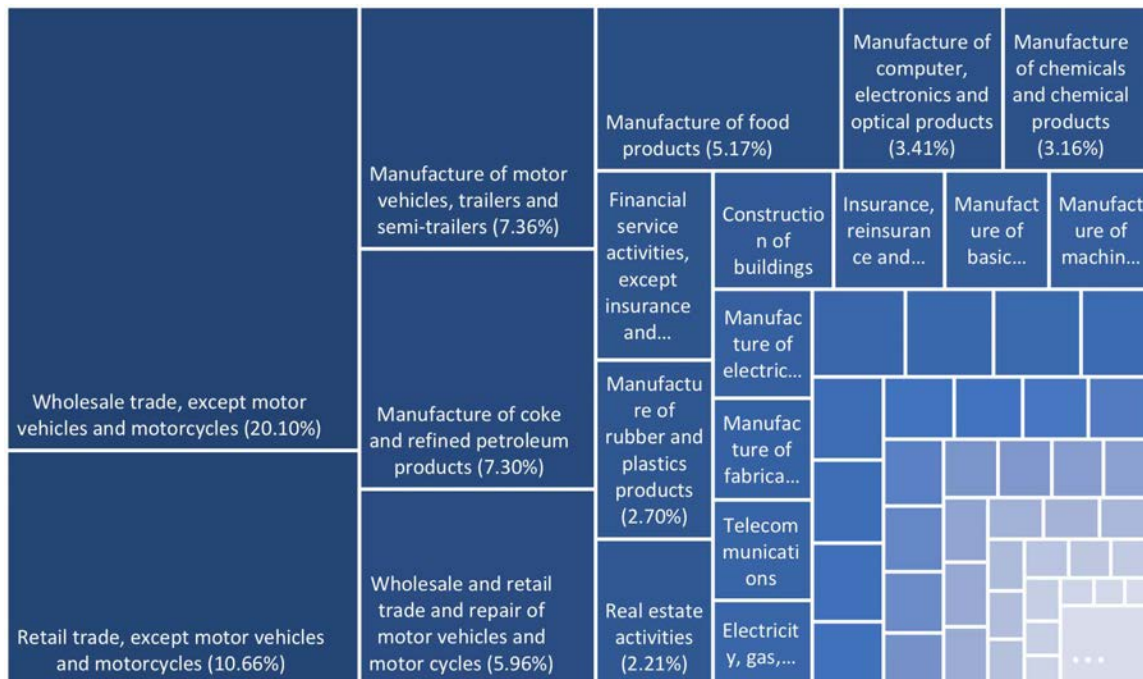
## 4 Industry

The data used in this study also have information on the main industry in which each firm operates, allowing us to analyze the production structure of the Thai economy. Industry classification follows the International Standard Industrial Classification of All Economic Activities (ISIC Revision 4). Table ?? in the Appendix lists the 2-digit classification, the number of registered firms in each industry, and selected financial information in 2016.

### 4.1 Industry Allocation

**The Thai economy is dominated by wholesale and retail.** Figure 5 shows the industry composition based on the 2-digit ISIC. Wholesale excluding motor vehicles, retail excluding motor vehicles, and wholesale and retail of motor vehicles together represents about one-third of the economy. Among these three industries, wholesale trade excluding motor vehicles is the largest, representing 18% of the economy's total revenue. The other two industries in the top five are manufacturing of refined petroleum and manufacturing of motor vehicles. Service industries tend to be smaller, with financial services, real estate, and insurance are the three biggest industries in this sector.

Figure 5: Industry Allocation (2016)



Remark: Industry classification is based on 2-digit ISIC.

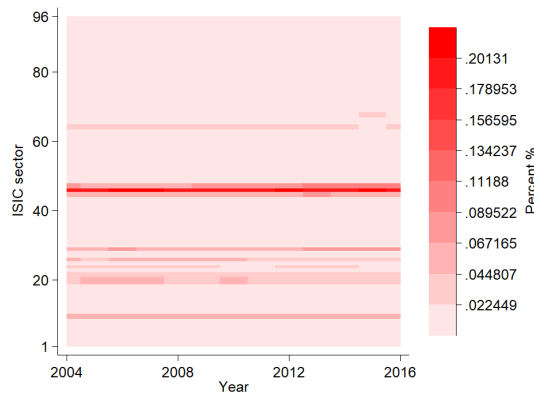
**The Thai economy has always been dominated by very few large industries.** Table 8 reports the revenue shares of the five largest industries in the economy in 2004 and 2016. The table further reveals that the combined revenue of the top-five industries has grown

Table 8: Share of Top Five Industries (2004 and 2016)

2004			2016		
	ISIC	Share		ISIC	Share
1. Wholesale (no motor)	46	0.194	1. Wholesale (no motor)	46	0.201
2. Manu of petro product	19	0.080	2. Retail (no motor)	47	0.107
3. Retail (no motor)	47	0.077	3. Manu of motor	29	0.074
4. Manu of computer/electronic	26	0.060	4. Manu of petro product	19	0.073
5. Wholesale & retail (motor)	45	0.058	5. Wholesale & retail (motor)	45	0.060

from 46.9% in 2004 to 51.4% in 2016. In other words, the top-five sectors as a whole have represented approximately half of the Thai economy, and their dominance has been increasing. This finding is consistent with the increasing concentration of the Thai economy as a whole discussed earlier.

Figure 6: Revenue Share by Industry (2004-2016)

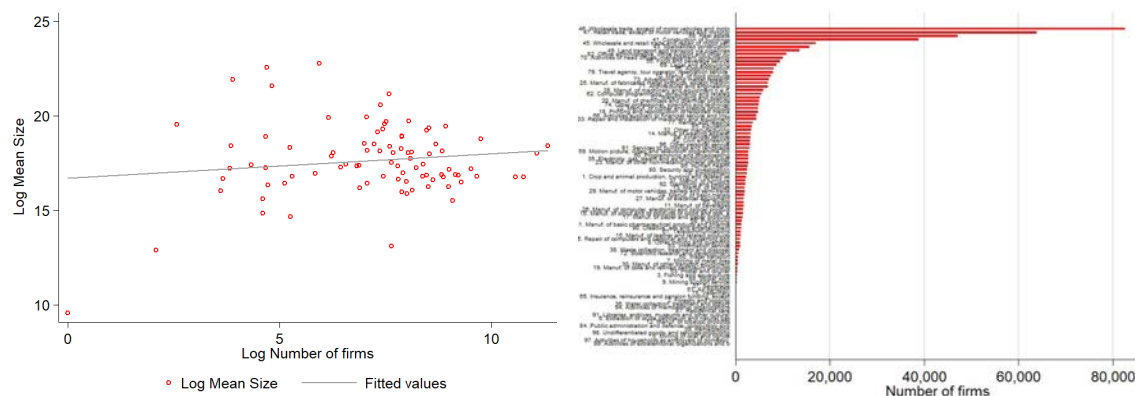


**Revenue shares by industry are persistent.** Figure 6 plots the revenue share of each industry over time over the 13 years covered in our data. An industry with high revenue share in one year tend to also have high revenue share in other years. In fact, wholesale and retail trade have been the largest industries in the economy during this period.

**There is no trade-off between the number of firms and the average firm size within industry—industries with more firms do not necessarily have smaller firms.** Given that the total revenue of each industry is the product of the number of firms and the average firm size, industries with high revenue share may have many firms, larger firms on average, or both. Figure 7a shows that the correlation between the number of firms and the average firm size in each industry is weak, if any. In addition, among the 10 largest industries in terms of revenue, only four industries are in the top 10 in terms of the number of firms and only three are in the top 10 in terms of the average firm size. There is also no overlap between the top-10 industries by number and the top-10 by average size. Figure 7b shows the number of firms by industry. Wholesale and retail trade are the industries with highest number of firms. On average, service industries have more firms, while manufacturing industries have fewer firms. Figures 7c and 7d reports the mean and median

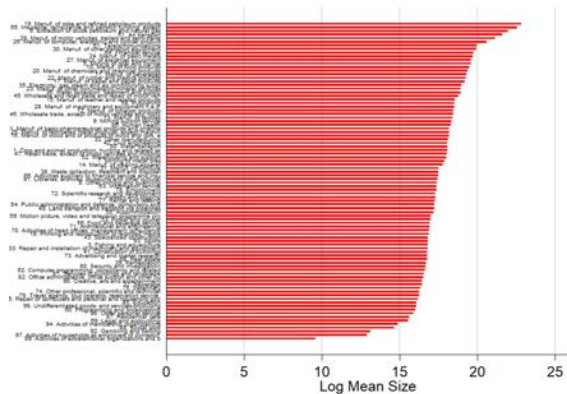
firm sizes by industry, respectively. The industries with highest mean firm size are manufacturing of refined petroleum.

Figure 7: Number of Firms and Average Firm Size by Industry (2016)

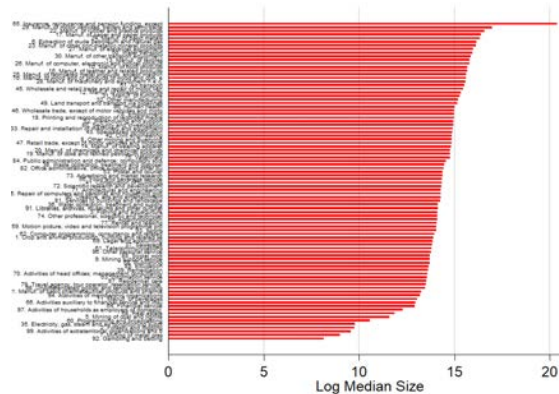


(a) Number of Firms versus Firm Size

(b) Number of Firms



(c) Mean Firm Size



(d) Median Firm Size

Remark: Firm size is computed based on total revenue in 2016. In Panel (a), the unit of observation is industry, classified by 2-digit ISIC; firm size is measured by mean; in Panels (b)-(d), the unit of observation is firm in each industry. The top five industries based on the number of firms are wholesale trade excluding motor vehicle (46), retail trade excluding motor vehicles (47), real estate (68), construction (41), and wholesale and retail trade of motor vehicles (45). The top five industries with highest mean firm size are manufacturing of refined petroleum (19), insurance (65), extraction of crude petroleum and natural gas (6), air transportation (51), and manufacturing of motor vehicle (29).

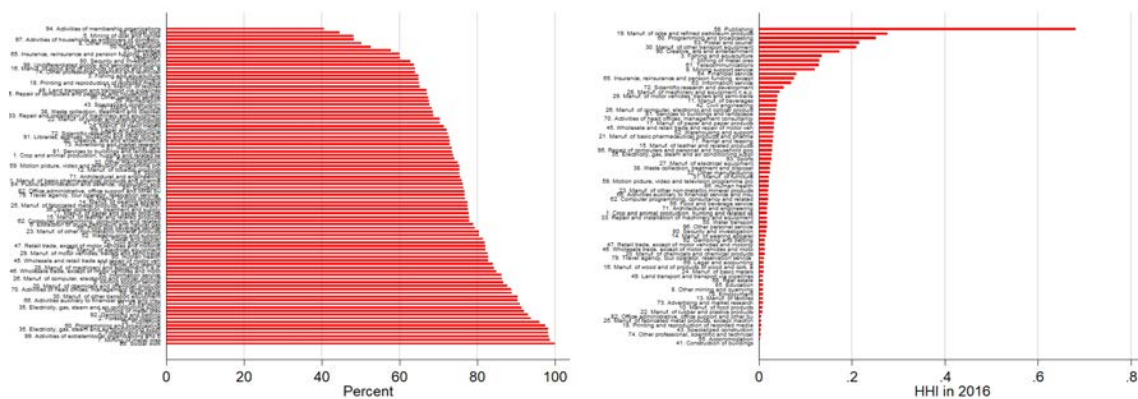
## 4.2 Concentration by Industry

The increase in concentration *across* industries may not be the only factor that contributes to the growing overall concentration in the Thai economy. Higher concentration *within* each industry could also account for this finding. Thus, we next turn to the analysis of within-industry concentration.



**There is heterogeneity in concentration across industries, both in manufacturing and service sectors.** Figure 8 presents within-industry concentration based on total revenue in 2016. The left panel plots the revenue share of firms in the top five percentile for each 2-digit industry. For example, the top 5% firms in the manufacturing of beverages industry represent almost 100% of revenue share in the industry. On the other hand, the top 5% firms in the activities of membership organizations industry represent only 41% of the revenue share. Similarly, the right panel presents the Herfindahl-Herschman Index (HHI) of each industry. There's a strong correlation between these two measures. For instance, the publishing industry has an HHI around 0.6 while the top 5% largest firms represents about 96% of the industry's revenue.

Figure 8: Concentration by Industry (2016)



(a) Revenue Share of the Top Five Percentile

(b) Herfindahl-Herschman Index

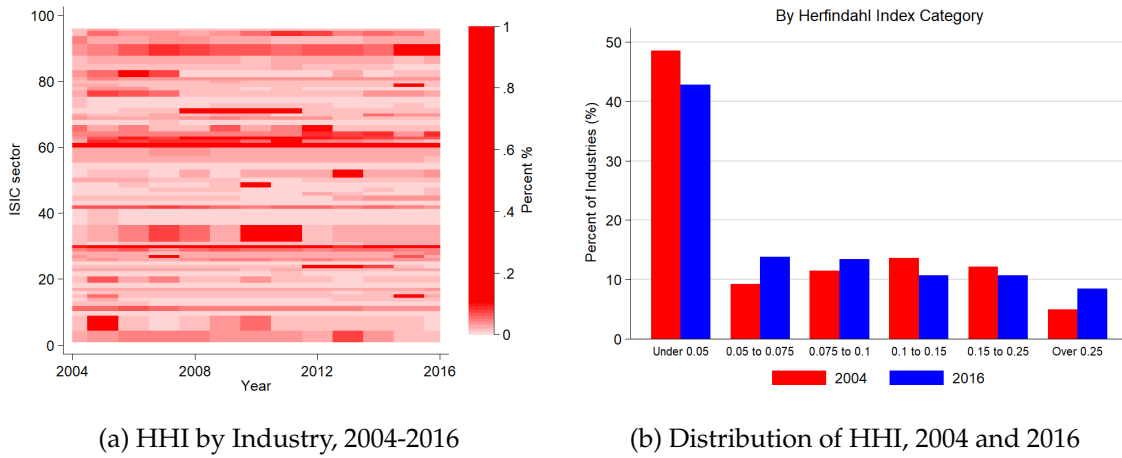
Remark: Concentration is computed based on total revenue in 2016. Industries with the highest concentration based on HHI in 2016 are publishing (58), manufacturing of refined petroleum (19), programming and broadcasting (60), postal and courier (53), and manufacturing of other transport equipment (30). Industries with the lowest HHI are construction (41), accommodation (55), other professional (74), specialized construction (43), and printing and reproduction of recorded media (18).

**During 2004-2016 there are more industries with higher concentration while there are fewer industries with lower concentration.** This finding is shown in the left panel of Figure 9, which plots HHI of each industry over time. We observe that on average, HHIs of most industries have gone up. The right panel plots the distribution of industry by HHI bins. Industries with HHI under 0.05 are considered to be unconcentrated while industries with HHI over 0.25 are considered to be highly concentrated. Specifically, the fraction of industries with HHI below 0.05 dropped from almost 60% to just slightly above 40% while the fraction of industries with HHI above 0.15 more than doubled. This finding suggests that there is an increase in average within-industry concentration during this period. This is in fact another contribution to the growing concentration of the corporate sector in Thailand in the past 15 years.<sup>9</sup>

**There are more industries that become more concentrated over time than those with**

<sup>9</sup>Note also that the distribution of industry concentration in Thailand is strikingly similar to what has been found in the US., as shown in the right panel of Figure A1 in the Appendix.

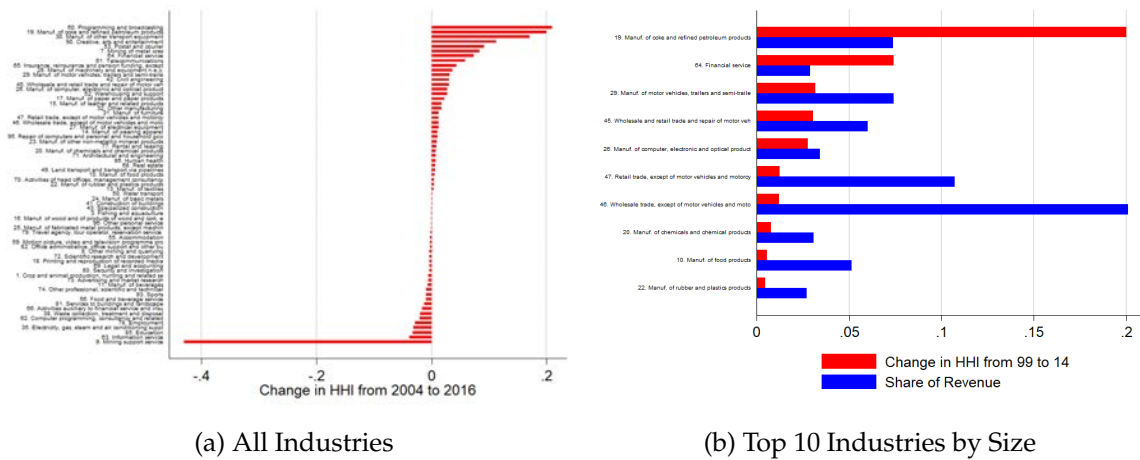
Figure 9: Concentration by Industry (2004-2016)



**declining concentration.** Figure 10 shows the change in concentration by industry on the left panel. It confirms that although there are industries that are less concentrated during the 12-year period from 2004 to 2016, there are more industries that experience rising HHI. Most notably, programming and broadcasting records the largest increase while mining support service industry see the largest decrease. The average increase of concentration is also higher than the average decrease. In addition, we also show in the right panel that the top 10 largest industries all experience an increase in concentration. In other words, industries that experienced the large increase in concentration are also those with large size, further indicating that the increase in each industry's concentration contributes to the increase in inequality in the economy.

**In summary, there are three factors that contribute to an increase in concentration in the Thai corporate sector: (1) large industries have become more dominant; (2) there are more industries with rising concentration and fewer industries with declining concentration; and (3) industries with rising concentration are those with large size, resulting in more impact on the overall concentration of the economy.**

Figure 10: Change in Concentration by Industry (2004-2016)



Remark: Industry size in the right panel is based on the total revenue in 2016. The top five industries with the largest increase in concentration are programming and broadcasting (60), manufacturing of refined petroleum product (19), manufacturing of other transport equipment (30), creative arts and entertainment (90), and postal and courier (53). The industries with the largest decrease in concentration are mining support service industry (9), information service (63), education (85), electricity, gas, steam, and air cond. supply (35), and employment (78).

## 5 Financial Ratios

Information in the balance sheet and income statement of each firm can be summarized by financial ratios. In this section, we look at selected financial ratios that shed light on the following financial aspects of the firm: (1) asset allocation and capital structure, (2) performance, and (3) working capital management.

We pay special attention to the distributions of financial ratios by firm size and by industry. For each ratio, we present two charts for a snapshot of 2016. The chart on the right shows the median ratio for each industry, ranked from the smallest at the top to the largest at the bottom. The chart on the left plots the average ratios for each revenue decile.<sup>10</sup> The solid (blue) line presents the simple median, with the scale shown on the left axis. Since financial ratios are likely industry-specific and size bins could be driven by industry factors, we further analyze each financial ratio; the dashed (red) line plots the ratio after controlling for these industry-specific factors. Specifically, we first run a regression of the ratio on size decile bin indicators and industry fixed effects, and then plot a regression coefficient for each size bin, with the scale on the right axis and the confidence interval included.<sup>11</sup> In the Appendix, we present descriptive statistics of selected financial

<sup>10</sup>In this section, when we compute median of each ratio in each size bin, we first drop firms in the overall top and bottom 2.5 percentiles of each ratio to eliminate outliers. We also ignore all firms that have annual revenue less than 30,000 baht (approximately less than 1,000 US dollars). We also assume that tax expense equals to zero if it is not reported. The first few size bins are sometimes dropped if the number of observation in the bin is less than 500. For financial ratios by industry, we only report the industries with at least 50 firms in our data.

<sup>11</sup>Since we plot the regression coefficients, the dashed line represents the mean within each bin rather than

ratios by industry.

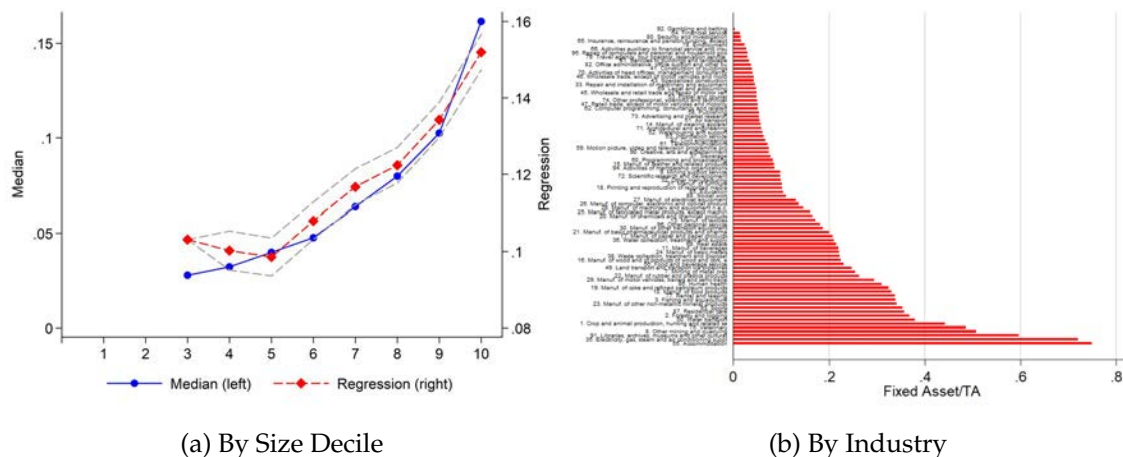
## 5.1 Measures of Asset Allocation and Capital Structure

We first look at how firms invest and finance their assets. This information is obtained from items in the balance sheet, which is the statement of the firm's financial positions.

### 5.1.1 Fixed Asset to Total Asset Ratio

Since a key function of firms is to use their assets to produce outputs and generate income, we first look at the asset side of the balance sheet and study how firms allocate their resources across different types of assets. Assets could be classified broadly into short-term and long-term assets. Short-term or current assets mostly include financial assets and inventories while long-term or non-current assets are mainly fixed assets, which consist of plant, property, and equipment (PPE), and land. Fixed asset to total asset ratio presents how much the firm allocates its assets to investment in fixed, long-term capital.

Figure 11: Fixed Asset to Total Asset Ratio (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Fixed asset to total asset ratio is calculated as total fixed asset (property, plant, and equipment, and land) divided by total asset. Industries with highest fixed asset to total asset ratios are accommodation (55), electricity, gas, steam and air conditioning supply (35), libraries, archives, museums and other cultural activities (91), other mining and quarrying (8) and veterinary (75). Industries with lowest fixed asset to total asset ratios are gambling and betting (92), financial service (64), security and investigation (80), insurance, reinsurance, and pension (65), and employment (78).

**Large firms tend to invest disproportionately more in fixed assets than small firms.** The solid line of the left panel of Figure 11 plots median fixed asset to total asset ratio by size decile, and reveals a clear positive relationship. Of course, this ratio could be well determined by the type of industry in which firms operate, which is illustrated in the right panel of Figure 11. Wholesale and retail trade industries have the lowest ratios, while

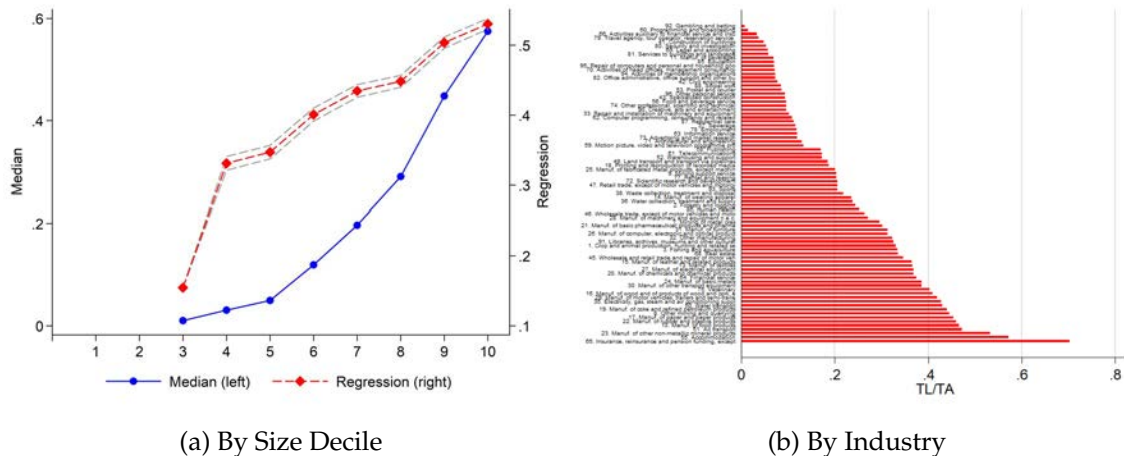
manufacturing industries tend to have high ratio. The ratios across service industries vary substantially. After we control for industry fixed effects, the positive relationship remains, as shown by the dashed line in the left panel of the figure.

**Fixed asset to total asset ratios contain information that has important implications on firm’s financing.** On the one hand, fixed assets are illiquid; financing fixed assets with short-term liabilities may make the firm vulnerable to liquidity shortage and default. On the other hand, fixed assets are generally collateralizable, as opposed to current assets; having fixed assets could allow the firm to have more access to credit. Our finding that small firms tend to have disproportionately less fixed asset could therefore suggest that they have more difficulty in getting loans than large firms.

### 5.1.2 Total Liability to Total Asset Ratio

Next we study how Thai firms finance their assets by looking at the liability and equity side of the balance sheet and analyzing capital structure of firms in Thailand. Generally speaking, there are two broad ways that firms fund their investment, namely, by debt and by equity. Our first financial ratio that provides this information is therefore the total liability to total asset ratio, which tells us how much firm’s asset is financed by liability (debt), as opposed to equity (ownership). In other words, this ratio implies the *leverage* of each firm. Figure 12 summarizes total liability to total asset ratios of firms in Thailand in 2016.

Figure 12: Total Liability to Total Asset Ratio (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Total liability to total asset ratio is calculated as total liability divided by total asset. Industries with highest total liability to total asset ratios are insurance, reinsurance, and pension funding (65), accommodation (55), manufacture of other non-metallic mineral products (23), air transport (51), and manufacturing of food product (10). Industries with lowest total liability to total asset ratios are gambling and betting (92), programming and broadcasting (60), activities auxiliary to financial service and insurance activities (66), travel agency (79), and construction of building (41).

**Large firms tend to finance their asset by debt more than small firms.** The solid line of the left panel of Figure 12 shows that the median total liability to total asset ratio is

increasing with firm size. Specifically, the median ratio for the 3rd bin is almost zero. In contrast, about 60% of the total assets held by the median firm in the top decile bin is financed by debt. The right panel illustrates that not only leverage varies across firm size but it is also heterogeneous across industries. However, even when we control for industry fixed effects, the positive relationship between firm size and firm leverage as measured by total liability to total asset ratio remains. This result is shown by the dashed line in the left panel of the figure.

**There are several explanations why small firms are less leveraged than large firms.** First, small firms tend to have more difficulty to borrow. This is consistent to the finding we discuss earlier that they tend to have less fixed asset. In addition, small firms could be younger and have less reputation or credit history, preventing them from access to credit, either from loan rejection or from being discouraged to even apply for credit in the first place. These small firms are then forced to finance most, if not all, of their assets by owners' equity. Second, small firms that may have access to credit otherwise may still face other constraints such as limited access to technology, skilled management, and markets. These non-financial constraints in turn prevent them from business expansion and the need for borrowing.

### 5.1.3 Long-Term Liability to Total Liability Ratio

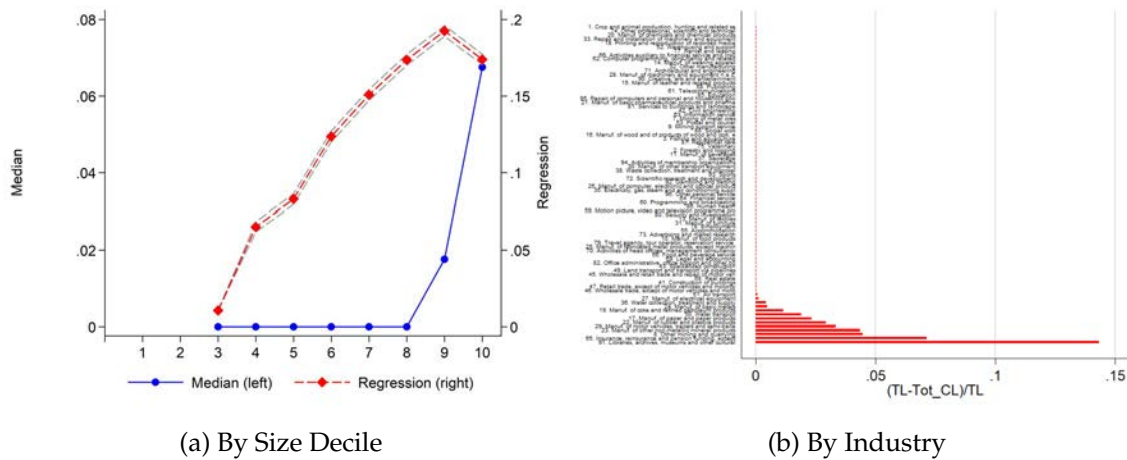
Debt financing could be short-term or long-term. The advantage of long-term debt over short-term debt is that it reduces uncertainty that debt will not be rolled over when maturity has reached, hence lowering short-term liquidity risk. It also lowers transaction costs that incur every time borrowing contracts are executed. The long-term liability to total liability ratio measures how much the proportion of debt is long-term. Figure 13 summarizes this financial ratio by firm size and industry.

**The majority of firms do not have long-term liabilities, which tend to be concentrated only among the very large firms.** The solid line in the left panel of the figure shows that the most firms in the first eight decile bins have no long-term obligations. Together with the finding on total liability discussed earlier, not only do the small firms seem to have difficulty in access to debt financing, but when they do they are also less likely to borrow long-term. Even for large firms, long-term liability accounts for less than 2% of total liability of the median firm in the ninth decile bin and less than 7% for the top decile bin. When we look at long-term liability to total liability ratio by industry, we find striking results. The majority of firms in most industries barely have long-term liability at all. After controlling for industry fixed effects, we still find the positive relationship between long-term liability to total liability ratio and firm size, as shown by the dashed line in the left panel.

### 5.1.4 Current Ratio

Financing with short-term debt can create liquidity risk if firms do not have enough liquid assets to fulfill their current debt obligations. One measure that captures short-term liquidity of firms is the current ratio, which is calculated as total current asset divided by total current liability. If this ratio is above one, then the firm has more current asset than current

Figure 13: Long-Term Liability to Total Liability Ratio (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Long-term liability to total liability ratio is calculated as total non-current liability divided by total liability. Industries with highest long-term liability to total liability ratios are libraries, archives, and museum (91), insurance, reinsurance, and pension funding (65), other mining and quarrying (8), manufacturing of other non-metallic mineral products (23), manufacturing of motor vehicles (29).

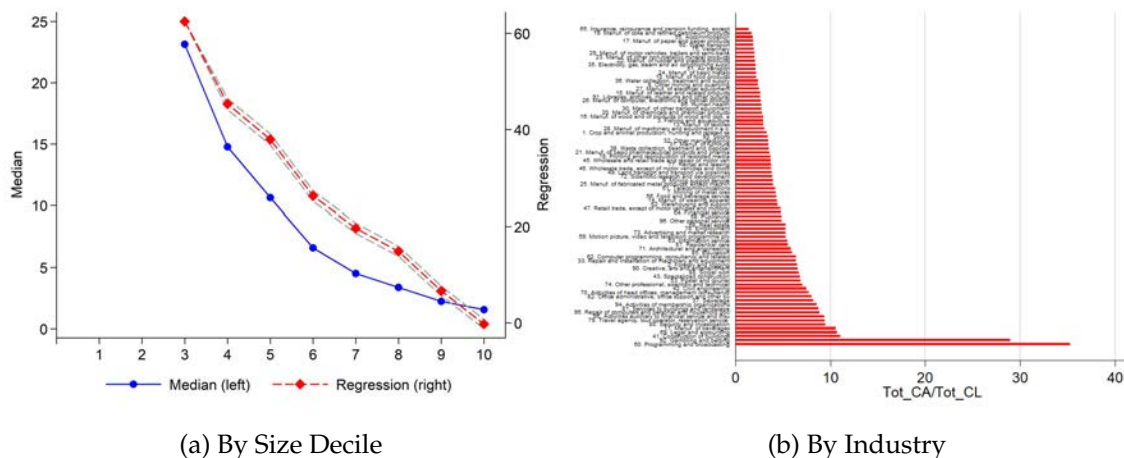
liability, implying that it has enough liquidity to fulfill short-term obligations. Generally, the higher the current ratio, the more liquidity the firm has.

**Current ratios of Thai firms are remarkably high and are decreasing with firm size.** As can be seen from the solid line in the left panel of Figure 14, current ratios of Thai firms are remarkably high. The ratio is also decreasing with firm size. For small firms in the third decile bin, the median current ratio is as high as 25 times. Even for large firms whose ratios are lower, the median ratio for firms in the top decile is still above one. This finding suggests that most Thai firms have sufficient short-term liquidity. Of course, given that most firms in Thailand do not have debt in the first place and many allocate their investment into current assets, this finding is not at all surprising. When we look at current ratios by industry, two industries strike out as having extraordinarily high ratios. Programming and broadcasting (60) has the median ratio of over 30 while gambling and betting industry (92) has the median current ratio almost 30. Overall, even after controlling industry fixed effects, current ratios remain decreasing with firm size.

## 5.2 Measures of Performance

We now turn to a set of financial ratios that provide information on firm performance. First, we compute the *return on asset* (ROA). We then perform a DuPont decomposition that allows us to disentangle the three components of ROA: EBIT margin, asset turnover, and tax retention. Second, we analyze the *return on equity* (ROE) and decompose it into asset return and financial leverage.

Figure 14: Current Ratio (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Current ratio is calculated as total current asset divided by total current liability.

### 5.2.1 Return on Asset

Return on asset (ROA) is a ratio that measures the firm's performance in using its assets to generate income. This is the return regardless of how the assets are financed (debt versus equity). ROA is therefore computed as

$$ROA = \frac{(1 - \text{Tax Rate}) \cdot \text{EBIT}}{\text{Total Asset}},$$

where EBIT is earnings before interest and taxes.<sup>12</sup> Figure 15 presents median ROAs by firm size decile and by industry.

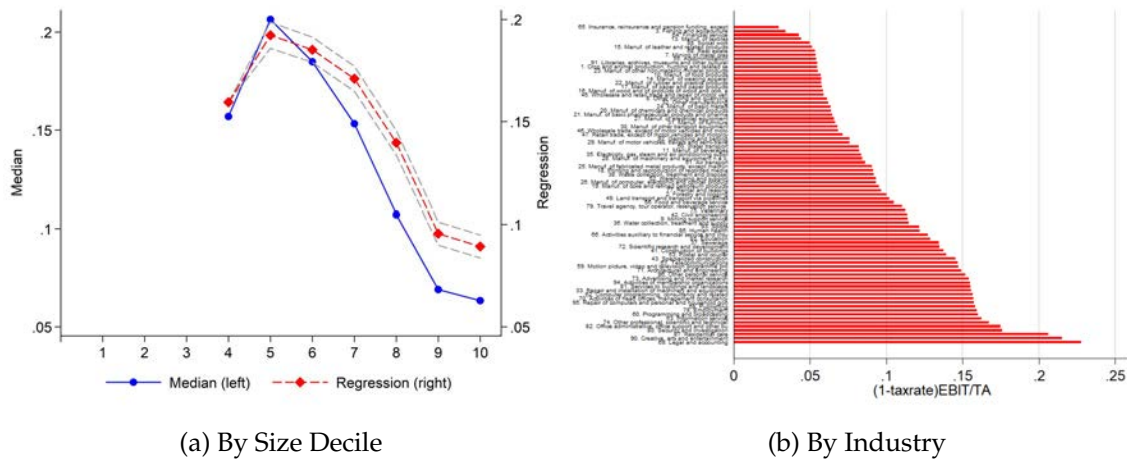
**The relationship between ROA and firm size is non-monotonic and exhibits a hump shape.** The solid line in the left panel of Figure 15 shows that firms in the middle deciles (fifth to eighth deciles) have the highest ROAs, with the medians of over 15%. ROA peaks at around 20% in the sixth decide. As firm size becomes further larger, ROAs begin to decline. For the very large firms, i.e., those in the top decile, the median ROA is around 6%. The right panel shows that ROAs are heterogeneous across industries. Most industries have positive median ROAs. Unsurprisingly, industries with highest ROAs are mainly in the services sector, which are less capital intensive. In contrast, industries with lowest ROAs are mining and financial, which are very intensive in capital (fixed and financial, respectively). After we control for industry fixed effects, a similar hump-shape relationship prevails. This is shown by the dashed line of the left panel of Figure 15.

**ROA can be decomposed into components that give us insights on how firms generate return on asset.** In particular, we perform the following DuPont decomposition of ROA for each firm.

<sup>12</sup>Note that interest expense is tax deductible so the income generated by firm's assets is (1-Tax Rate)·EBIT.



Figure 15: Return on Asset, ROA (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. ROA is calculated as after-tax EBIT divided by total asset. The top five industries with highest median ROAs are legal and accounting (69), creative, arts, and entertainment (90), residential care (87), security and investigation (80), and office administrative, office support, and others (82). Industries with lowest ROAs are insurance, reinsurance and pension funding (65), fishing and aquaculture (3), financial service (64), manufacturing of textiles (13), and social works (88). Remind that in this section, we only include firms with total annual revenue above a certain positive threshold of 30,000 baht. If all firms are included, the five industries with lowest median ROAs are mining of coal and lignite (5), fishing and aquaculture (3), sports activities, amusement, and recreation (93), mining of metal ores (7), and public administration and defence (84)—all of them have negative median ROAs in 2016.

$$ROA = \frac{(1 - \text{Tax Rate}) \cdot \text{EBIT}}{\text{Total Asset}} = \frac{\text{EBIT}}{\text{Total Revenue}} \cdot \frac{\text{Total Revenue}}{\text{Total Asset}} \cdot (1 - \text{Tax Rate}),$$

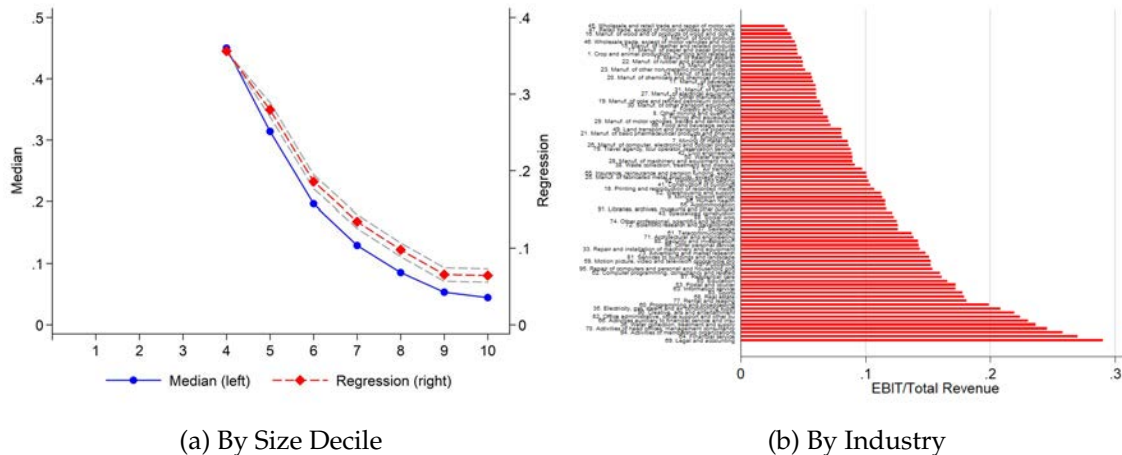
The first component, the *EBIT margin*, measures an overall ratio of firm’s pre-tax profitability, defined as firm’s EBIT (profit) that is generated from its revenue (sales). The second component, the *asset turnover ratio*, measures the utilization of assets, i.e., how much revenue is generated from the firm’s total asset. The last component is the *tax retention rate*, i.e., the fraction of earnings that is retained in the firm after income tax is charged. This decomposition is informative as it helps us unlock how asset return is generated. More specifically, a firm’s return on assets can be increased by three channels. First, it can increase the EBIT margin, getting more profit from each baht of sales by decreasing its expenses. Alternatively, it can increase asset turnover by either generating more sales or services volume from the same amount of assets or reducing the amount of assets required for a given level of sales volume. Finally, the return on asset increases when the average tax rate faced by the firm is lower. We now turn to the analysis of each of these components below.

### 5.2.2 EBIT Margin

EBIT margin is one of the measures of firm’ profitability. Specifically, it measures the pre-tax profit of a business enterprise regardless of how its assets are financed. Figure 16

presents median EBIT margin by firm size decile and by industry.

Figure 16: EBIT Margin (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. EBIT margin is calculated as EBIT divided by total revenue. Industries with highest EBIT margin are legal and accounting (69), financial service (64), activities of membership organizations (94), activities of head offices, management consultancy (70), and water collection, treatment and supply (36). Industries with lowest EBIT margin are wholesale and retail of motor (45), retail trade (47), manufacturing of wood (16), manufacturing of food products (10), and wholesale trade (46).

**Large firms tend to have lower profitability than small firms.** The solid line on the left panel of Fig 16 shows that EBIT margin seems to decrease with firm size. The right panel shows the heterogeneity of profitability as measured by EBIT margin across industries. The industries with high profitability are all in service sector while industries with low profitability are diverse, including both trade and manufacturing. After we control for industry fixed effects, EBIT margin remains decreasing with firm size, which is shown as the dashed line in the left panel of the figure.<sup>13</sup>

### 5.2.3 Asset Turnover Ratio

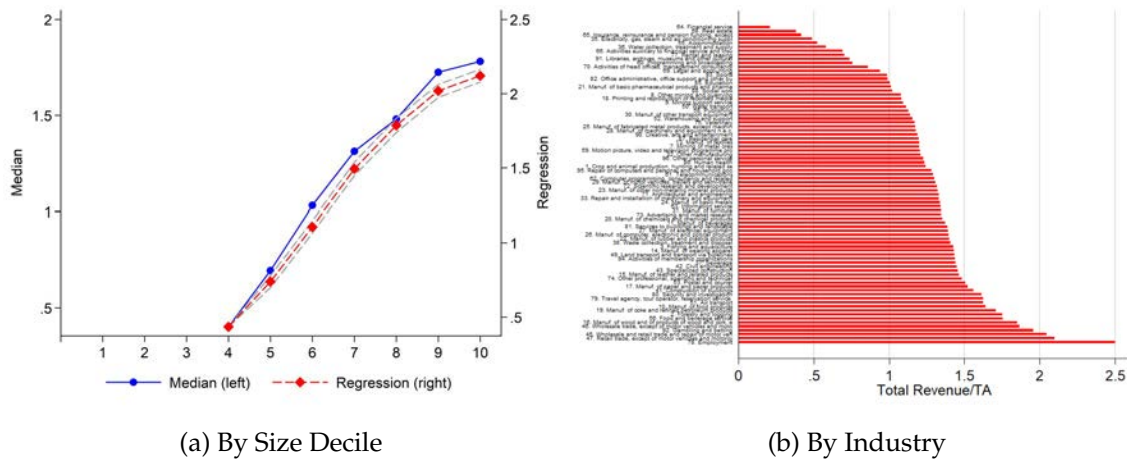
Asset turnover ratio measures the utilization of asset in revenue generation and computed as a ratio between total revenue and total asset. Figure 17 shows asset turnover ratio of firms in the data in 2016.

**Large firms are more efficient in using assets to generate revenue.** The solid line on the left panel of the figure shows that large firms have higher asset turnover than small firms.<sup>14</sup> The right panel shows that asset turnover ratio varies across industries. Although industries with high asset turnover ratio are diverse and include both trade and service sectors, the ones with lowest ratios tend to be (fixed or financial) capital intensive. Once we

<sup>13</sup>Hsieh and Olken (2016) reports that there is no strong pattern of profitability and firm size for firms in India, Indonesia, and Mexico.

<sup>14</sup>Although our working definition of firm size is based on total revenue, there is a positive correlation between total revenue and total asset of firms and it is not necessary that firms with smaller total revenue will have higher asset turnover ratio.

Figure 17: Asset Turnover Ratio (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Asset turnover ratio is calculated as total revenue divided by total asset. Industries with highest asset turnover ratio are employment (78), retail trade (47), wholesale and retail of motor vehicle (45), gambling and betting (92), and wholesale trade (46). Industries with lowest asset turnover ratio are financial service (64), real estate (68), insurance, reinsurance and pension funding (65), electricity, gas, steam and air conditioning supply (35), and accommodation (35).

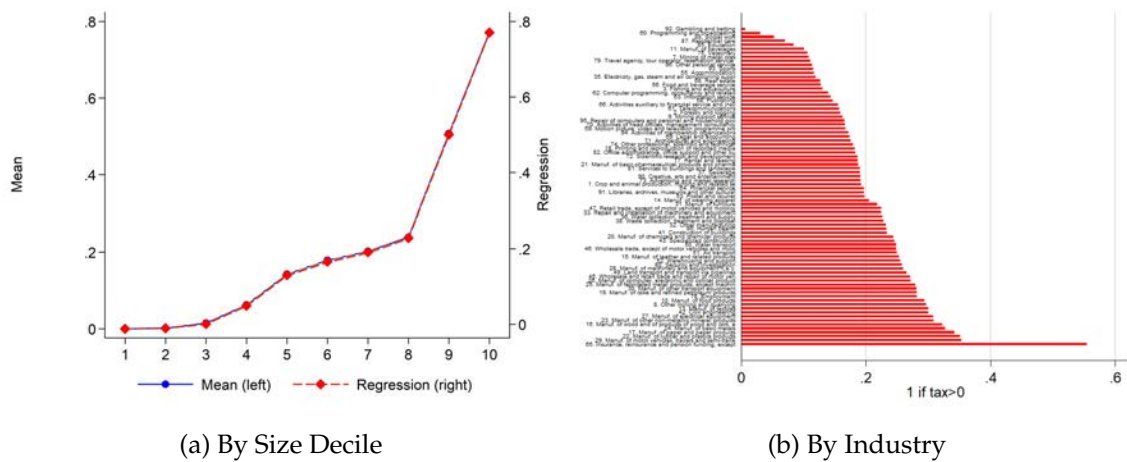
control for industry fixed effect, the positive relationship between size and asset turnover ratio still hold, as shown by the dashed line in the left panel. One possible explanation for this pattern is that many investment projects are lumpy or indivisible. In the presence of such projects, small firms may be forced to purchase assets beyond their need. This over-investment in turn leads to unemployment of capital, i.e., lower efficiency in using the assets in generating revenue. Large firms, in contrast, can cope better with the lumpy investment thanks to economies of scale and scope.

#### 5.2.4 Tax Retention

Tax retention rate measures how much firm's earnings is retained after it pays income taxes. Firms generally do not pay income tax when their earnings before tax (EBT) is negative or below some minimum positive thresholds. Among firms that pay income tax, there are also tax breaks that allow firms to get deductibles or exemption from paying the full amount. The average tax rates are thus different across firms. We present two measures of tax retention here. The first one measures the incidence of positive tax rate, which is a measure at the extensive margin. The second measure is the average tax rate among firms that pay taxes, i.e., a measure at the intensive margin.

**Larger firms are more likely to pay corporate income tax.** Regarding the extensive margin, the solid line in the left panel of Figure 18 shows that the fraction of firms in each revenue decile with positive tax rates. Most firms in the bottom three deciles do not pay tax at all. This finding is not surprising given that these firms barely make any revenue, if any. However, there is a noticeable pattern that larger firms are more likely to pay income tax,

Figure 18: Fraction of Firms with Positive Tax (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. The fraction of firms with positive tax is calculated as the number of firms in each size bin that have positive tax expense divided by the total number of firm in that bin. Industries with more than 50% of firms paying positive income tax are insurance, reinsurance and pension funding (65). Other industries in the top five are manufacturing of motor vehicles (29), manufacturing of rubber and plastics (22), manufacturing of papers (17), and manufacturing of basic metals (24). Note that an industry that there is no firm paying any income tax is activity of extraterritorial organizations and bodies (99); this industry is not presented here due to the small number of firms.

especially those in the 4th and higher deciles.<sup>15</sup> The right panel shows the heterogeneity of this extensive-margin measure across industries. Controlling for industry fixed effect, the positive relationship between firm size and tax incidence remains, as shown by the dashed line on the left panel.

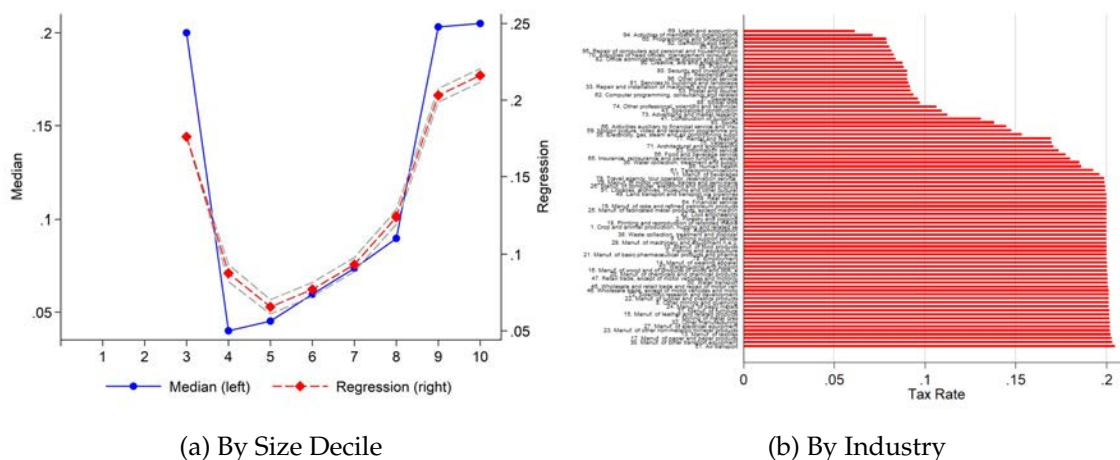
**The average tax rate seems to be higher for large firms than small firms.** Regarding the intensive margin, among firms that pay positive income tax, there is also heterogeneity in their average tax rates. The solid line in the left panel of Figure 19 shows that there is a positive relationship between firm size and average tax rate. This finding could reflect fewer deductibles and tax breaks firms get larger as well as their higher visibility that prevents them from tax evasion. Regarding the heterogeneity by industry, the right panel shows that industries with the highest average tax rates are mostly manufacturing while industries with the lowest average tax rates are mostly professional activities.

### Unbundling Return on Asset: Profitability vs Asset Turnover

Given that returns on asset could be driven by three factors: EBIT margin, asset turnover, and tax retention. We further explore the joint distribution of these factors in order to get more insights on the operation and financial strategies of firms in Thailand. We first combine the EBIT margin and the tax retention ratio, computing the after-tax EBIT margin

<sup>15</sup>On the surface, this may seem straightforward as, by our definition of firm size, these firms generate more revenue. However, higher revenue does not imply higher net income and firms with high revenue could have low or even negative net income if they also have very high expense.

Figure 19: Average Tax Rate (2016)



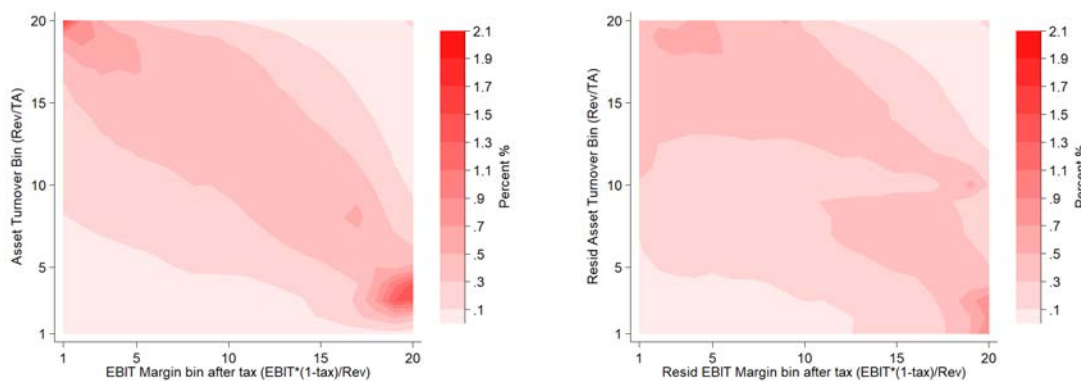
Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. The average tax rate is computed for each firm as tax expense divided by earning before tax (EBT). Only firms with positive EBT and positive tax rates are included when we calculate the median of average tax rate for each bin. Industries in the top five are air transport (51), manufacturing of other transport equipment (30), manufacturing of paper (17), manufacturing of textiles (13), and manufacturing of other non-metallic minerals (23). Industries in the bottom five are legal and accounting (69), activities of membership organizations (94), programming and broadcasting (60), gambling and betting (92), and education (85).

as the product between these two factors. This is a measure of after-tax profitability. We then plot a contour graph that shows the frequency of firms in each of the 20x20 bins jointly determined by the after-tax EBIT margin and the asset turnover ratio ventiles.

**Most firms tend to exhibit either low-turnover, high-profitability; or high-turnover, low-profitability.** The contour graph in the left panel of Figure 20 shows the crude after-tax EBIT margin and the crude asset turnover of each firm, unconditional on its industry affiliation. The graph reveals a striking pattern of bimodal distribution that many firms are either focusing on low-turnover, high-profitability (the bottom-right corner) or high-turnover, low-profitability (the top-left corner). Most of other firms lie between these two polar strategies along the diagonal. Given the heterogeneity across industries, the right panel of the figure plots the contour graph of the residual after-tax EBIT margin and the residual asset turnover ratio after controlling for industry fixed effects. Although the distribution is less concentrated around the top-left and the bottom-right corners, the contour still roughly shows the distribution of firms along the diagonal line connecting these two corners.

**When compared to large firms, small firms tend to have lower asset turnover but higher profit margin.** Finally, we explore whether firm size is related to firm's strategies for achieving high return on asset. Figure 21 shows contour plots of ROA decomposition by firm size bin. What revealed by the figure is striking. The very small firms, i.e., those in the second decile, tend to have low asset turnover but high profit margin. Once the firm size is larger, asset turnover ratio begins to increase while EBIT margin starts to decline. Eventually, the very large firms in the top deciles are those with very high asset turnover ratio but very low profitability. This finding is consistent with, and in fact behind, the

Figure 20: After-Tax EBIT Margin and Asset Turnover Ratio (2016)



(a) Unconditional, Whole Economy

(b) Controlled for Industry, Whole Economy

Remark: The observations are registered firms in Thailand in 2016. The left panel plots the crude after-tax EBIT margin (i.e., after-tax EBIT divided by total revenue) and the crude asset turnover ratio (i.e., total revenue divided by total asset) of each firm in 2016. The right panel plots the residual after-tax EBIT margin and the residual asset turnover ratio for each firm, after controlling for industry fixed effects. The shades of the contour represent the frequency of firms for each of 20x20 bins jointly determined by the after-tax EBIT margin and the asset turnover ratio ventiles.

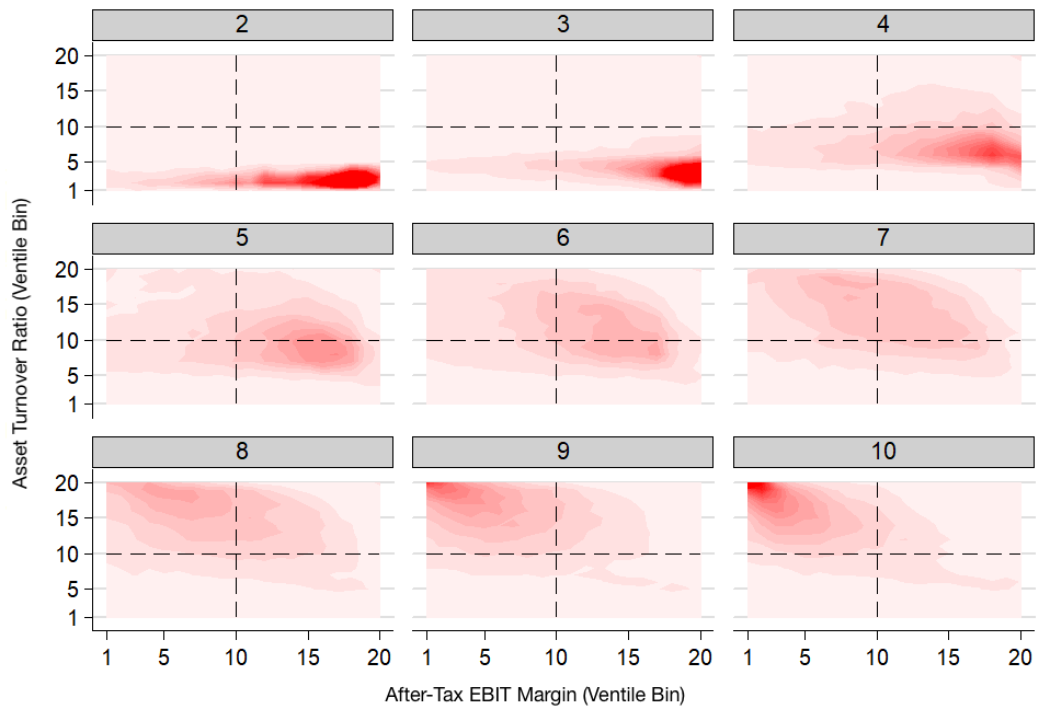
hump-shape relationship between ROA and firm size that we find earlier—ROA is highest for firms in the fifth to seventh deciles as they tend to have both relatively high profit margin *and* relatively high asset turnover.

Of course, this pattern is driven by industries. Figure 22 presents contour plots for each industry. The figure shows that industries with high asset turnover but low profitability are mainly trading and light manufacturing.<sup>16</sup> The industries with high profitability but low asset turnover are relatively (fixed or financial) capital intensive.<sup>17</sup> The interpretation of this finding from our contour plots is that there are not many firms that are mastering in achieving both high profitability and high asset turnover. In our data, there are 45,748 firms located in this top-right quadrant of Figure 20, accounting for 16.5% of all firms in the data. At the same time, for a firm to survive, it needs to achieve at least either high profitability or high asset turnover, or a combination of the two.

<sup>16</sup>These industries include wholesale and retail trade (45-47), manufacturing of food products (10), manufacturing of woods and wood products (16), and manufacturing of paper and paper products (17).

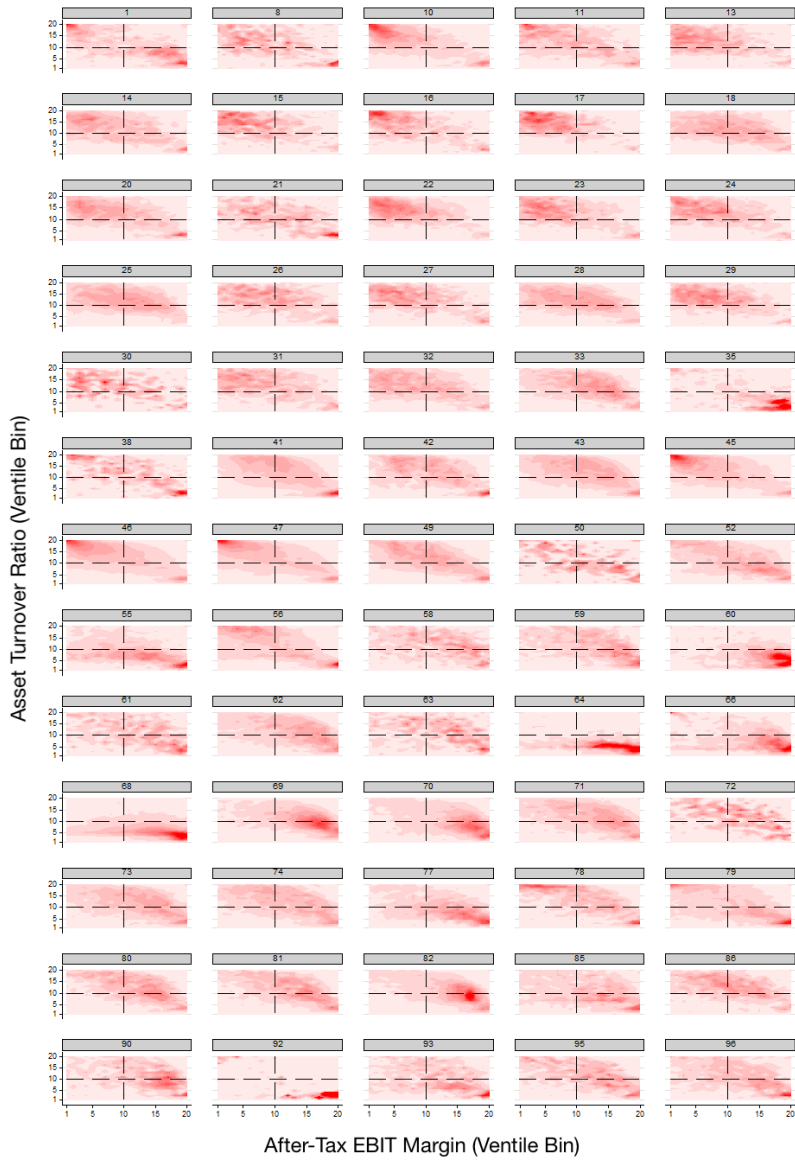
<sup>17</sup>These include electricity, gas, steam and air conditioning supply (35) and programming and broadcasting activities (60), as well as financial, insurance, and real estates activities (64-68).

Figure 21: After-Tax EBIT Margin and Asset Turnover by Firm Size (2016)



Remark: The observations are registered firms in Thailand in 2016. Each panel plots the after-tax EBIT margin (i.e., after-tax EBIT divided by total revenue) and the asset turnover ratio (i.e., total revenue divided by total asset) of each firm in 2016. The shades of the contour represent the frequency of firms for each of 20x20 bins jointly determined by the after-tax EBIT margin and the asset turnover ratio ventiles of all firms regardless of size.

Figure 22: After-Tax EBIT Margin and Asset Turnover by Industry (2016)



Remark: The observations are registered firms in Thailand in 2016. Each panel plots the after-tax EBIT margin (i.e., after-tax EBIT divided by total revenue) and the asset turnover ratio (i.e., total revenue divided by total asset) of each firm in 2016. The shades of the contour represent the frequency of firms for each of 20x20 bins jointly determined by the after-tax EBIT margin and the asset turnover ratio ventiles of all firms in all industries.



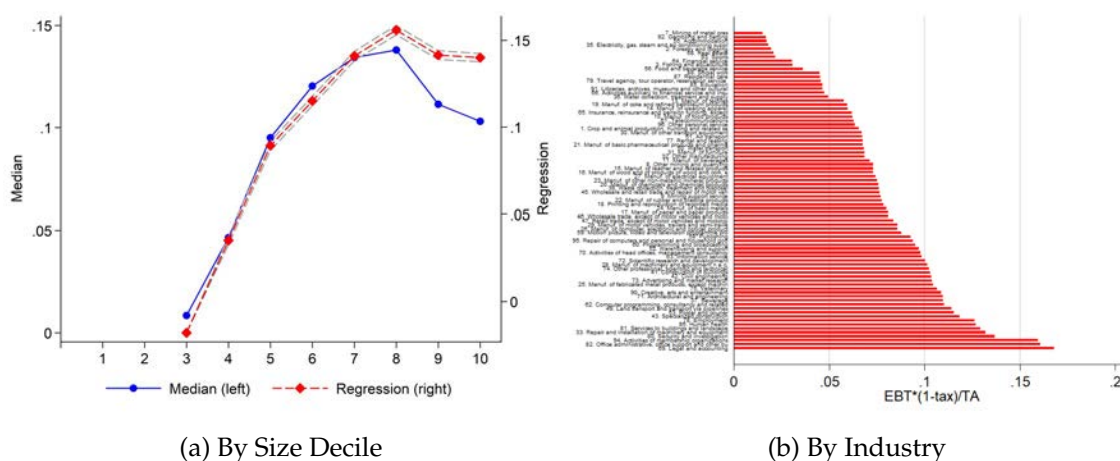
## 5.2.5 Return on Equity

Return on equity (ROE) is a measure of firm performance in using the resources provided by *owners* to generate income. Income used in ROE calculation is the firm's net income or profit after compensation to input suppliers (including interest payments to lenders) and tax payments are made. Specifically, ROE is calculated as net income divided by total equity of the firm:

$$\text{ROE} = \frac{\text{Net Income}}{\text{Total Equity}} = \frac{(1 - \text{Tax Rate}) \cdot \text{EBT}}{\text{Total Equity}},$$

where EBT is earnings before taxes. Figure 23 summarizes ROEs of Thai firms in 2016 by size and industry.

Figure 23: Return on Equity, ROE (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Return on equity is calculated as net income divided by total equity. Firms with negative equity is omitted from the graphs.

**ROE is increasing for small firms.** The solid line in the left panel of Figure 23 shows that, similar to those of the ROA, the relationship between ROE and firm size is non-monotonic and exhibits a mild hump shape. The right panel shows that ROE is highly heterogeneous across industries. Once controlled for industry fixed effects, ROE is increasing with firm size for small firms, but are slightly decreasing once firm size is larger than a certain level, as shown by the dashed line on the left panel.

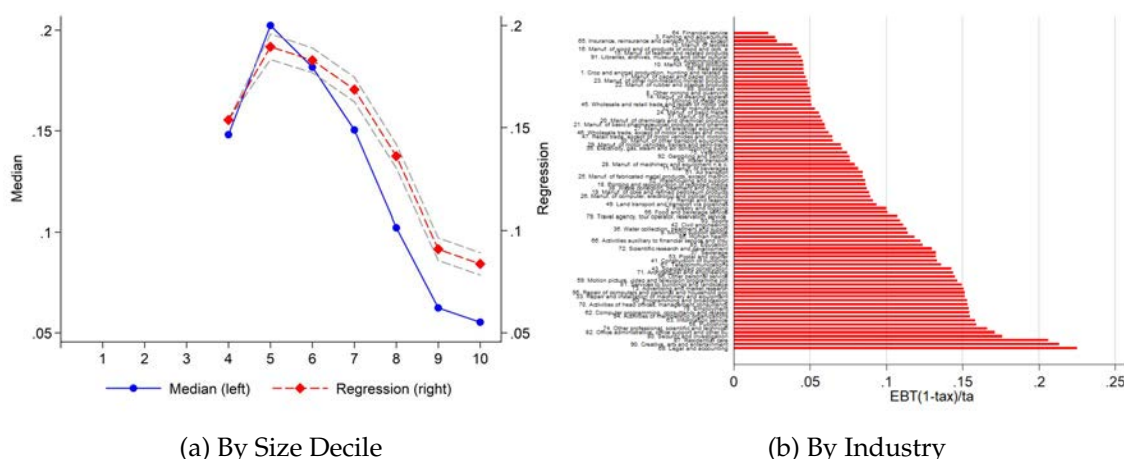
Similar to ROA decomposition, we can disentangle ROE into components:

$$\text{ROE} = \frac{(1 - \text{Tax Rate}) \cdot \text{EBT}}{\text{Total Equity}} = \frac{\text{EBT}}{\text{Total Revenue}} \cdot \frac{\text{Total Revenue}}{\text{Total Asset}} \cdot (1 - \text{Tax Rate}) \cdot \frac{\text{Total Asset}}{\text{Total Equity}}$$

where EBT is earning before tax. The first component is the EBT margin, which is a measure of firm's profitability based on its earning before paying tax. The second term is the asset turnover ratio, which is precisely identical to what we discussed earlier. The third

term is the tax retention rate, which has also been discussed. Figure 24 presents the product of the first three components. This is in fact the net income to total asset ratio, where net income is identical to after-tax EBT. This ratio is commonly used as a convenient measure of *return on asset*. With slight differences, this figure broadly resembles Figure 15 presented earlier. The relationship between this ratio and firm size follows a hump shape, with the firms in the fifth to seventh deciles having highest ratios.<sup>18</sup> Finally, the last component in the ROE decomposition is the *financial leverage ratio*, which is in fact a variant of the total liability to total asset ratio already presented.<sup>19</sup> Figure 25 presents this last component and shows that there is a positive relationship between firm size and leverage, consistent with Figure 12 shown earlier.<sup>20</sup>

Figure 24: Net Income to Total Asset Ratio (2016)



Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Net income to total asset ratio is computed as net income divided by total asset. Firms with negative equity is omitted from the graphs.

### Unbundling Return on Equity: Asset Return vs Leverage

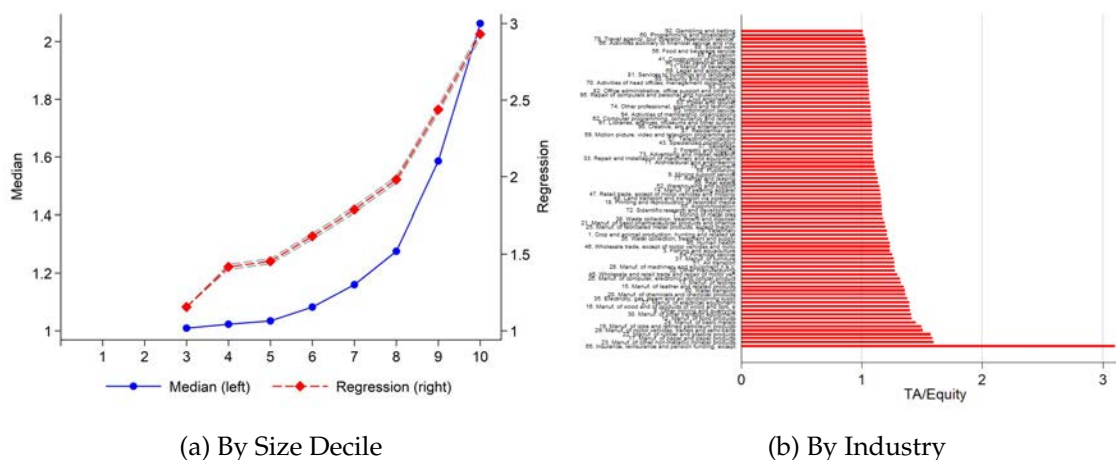
Similar to our analysis of ROA, we can further explore the joint distribution of factors contributing to ROE. We combine the first three components (EBT margin, asset turnover, and tax retention) into one composite measure, namely, the net income to total asset ratio.

<sup>18</sup>This is not surprising given that the difference between EBIT and EBT is interest expense. For zero or low leveraged firms, EBT is therefore almost identical to EBIT.

<sup>19</sup>There is a one-on-one relation between Total Asset/Total Equity and Total Liability/Total Asset. This is straightforward from an accounting identity that total asset is identical to the sum of total liability and total equity. The higher the total liability to total asset ratio, the higher the total asset to total equity ratio.

<sup>20</sup>From the ROE decomposition, it is obvious that, unlike ROA, ROE is dependent on how the firm's asset is financed. Holding everything else constant, the more the firm finances its asset through debt (the more the firm is leveraged), the higher the return on equity. This effect of leverage on ROE is through the fourth component of the decomposition above. The explanation is that debt payments are generally pre-specified and independent of how the firm performs while equity holders are residual claimants of the firm's income and assets. When the firm asset increases, its equity thus increases more than proportionately.

Figure 25: Total Asset to Total Equity Ratio (2016)



Remark: Decile bins are based on total revenue in 2016.

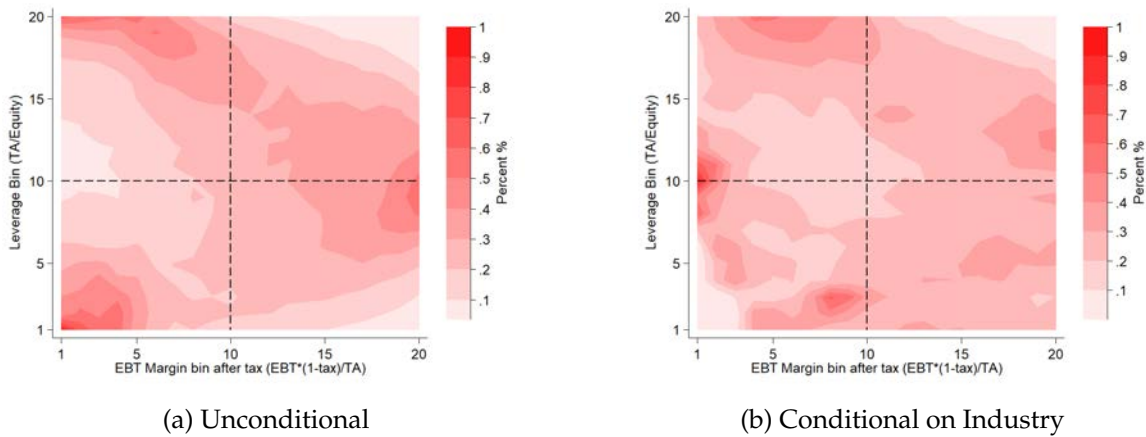
We then plot a contour graph that shows the frequency of firms in each of the 20x20 bins jointly determined by the net income to total asset ratio and the leverage ratio ventiles. The left panel of Figure 26 presents this contour plot.

**The Thai corporate sector exhibits both inefficient capital allocation and financial vulnerability.** The left panel of Figure 26 provides several insights about corporate sector in Thailand. Firms in the top-right and the bottom-right quadrants are those with high asset return, as measured by the net income to total asset ratio. However, while firms in the bottom-right quadrants are productive, they do not have much leverage, suggesting that they may face financial constraints and their access to credit may be limited. In contrast, firms in the top-left quadrant are those with high leverage but low productivity, which could make them financially vulnerable– unable to generate enough income to service their debt. Firms in the bottom-left are those with low leverage and low profitability. Although these firms do not create instability to the financial system, their existence could crowd out capital that would otherwise be available for more productive firms. Given that there are large masses of firms in the top-left and bottom-left quadrants, this contour plot implies both inefficient capital allocation and financial vulnerability of Thailand’s corporate sector. Capital should be reallocated to firms in the two right quadrants and more credit should be reallocated to those in the bottom-right quadrant.

**A large part of the inefficiency seems to come from between-industry misallocation.** The right panel of the figure plots a contour graph of the residual net income to total asset ratio and the residual leverage ratio after controlling for industry fixed effects. The distribution is less concentrated on the top-left and the bottom-left corners and more evenly distributed across the figure, suggesting that between-industry misallocation accounts for a large part of the problem. However, there still appears within-industry misallocation since there are several firms with low ROA but high leverage (top-left quadrant), or with high leverage but low ROA (bottom-right quadrant).

**Medium firms and firms in the service sectors seem to be financially constrained.** Figure 27 shows contour plots of ROE decomposition by firm size bin. The very small

Figure 26: Asset Return and Leverage (2016)



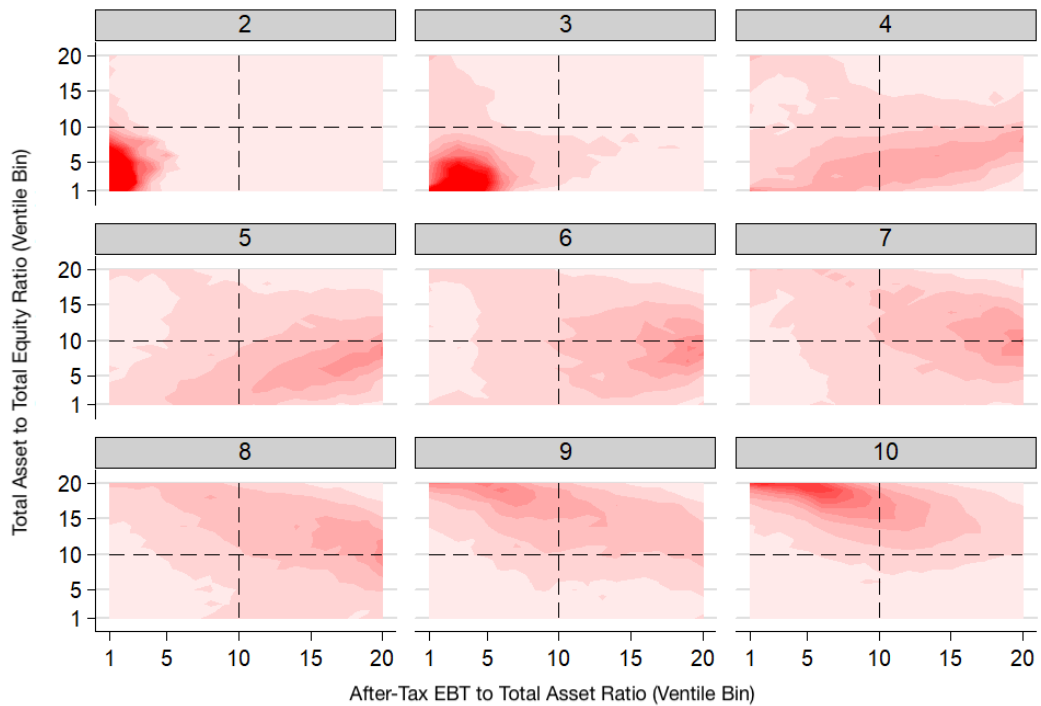
Remark: The observations are registered firms in Thailand in 2016. The left panel plots the crude net income to total asset ratio and the crude leverage ratio of each firm in 2016. The right panel plots the residual net income to total asset ratio and the residual leverage ratio for each firm, after controlling for industry fixed asset. The shades of the contour represent the frequency of firms for each of 20x20 bins jointly determined by net income to total asset and leverage ratio ventiles.

firms, i.e., those in the second and the third deciles have both low net income to asset ratio and low leverage. The reason why firms in these groups do not borrow much could be that they have low growth opportunity. At the other extreme, the very large firms, i.e., those in the ninth and the tenth deciles have low net income to asset ratio but high leverage. This result suggests that firms in these groups are unlikely to be credit constrained despite their lower performance. The medium-size firms, i.e., those in the fourth to eighth deciles, tend to have high net income to asset ratio and medium leverage. These firms are most likely to be credit constrained, since they have high growth opportunity but do not borrow more to invest. The patterns are also different across industries. Industries with high leverage and low net income to asset ratio are mostly manufacturing.<sup>21</sup> An industry with low leverage and low net income to asset ratio is gambling and betting activities (92). Industries with medium leverage and high net income to asset ratio are mostly service; these firms are possibly financially constrained.<sup>22</sup>

<sup>21</sup>These industries include manufacturing of food products (10), manufacturing of wood and products of wood and cork (16), manufacturing of rubber and plastics products (22), and manufacturing of other non-metallic mineral products (23).

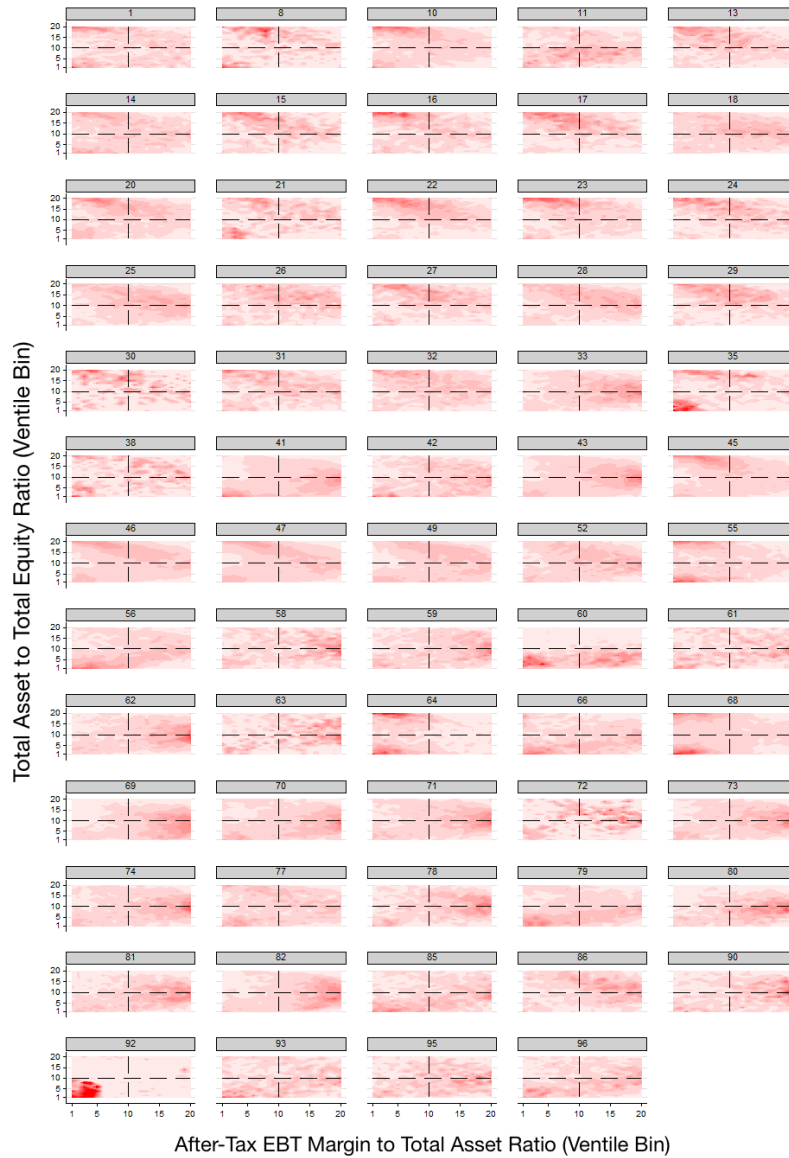
<sup>22</sup>These industries include advertising and market research (73), other professional, scientific and technical activities (74), security and investigation activities (80), and creative, arts and entertainment activities (90).

Figure 27: Asset Return and Leverage by Firm Size



Remark: The observations are registered firms in Thailand in 2016 in each size bin based on total revenue in 2016. Each graph plots the net income to total asset ratio and the leverage ratio for each firm. The shades of the contour represent the frequency of firms for each of 20x20 bins jointly determined by net income to total asset and leverage ratio ventiles.

Figure 28: Asset Return and Leverage by Industry (2016)



Remark: The observations are registered firms in Thailand in 2016 for each industry. Each graph plots the residual net income (after-tax EBT) to total asset ratio and the residual leverage (total asset to total equity) ratio for each firm, after controlling for industry fixed effects. The shades of the contour represent the frequency of firms for each of 20x20 bins jointly determined by net income to total asset and leverage ratio ventiles.

### 5.3 Measures of Working Capital Management

Finally, we analyze short-term working capital management of Thai firms. Due to data limitation, we consider three broad financial items as components of working capital: inventories and accounts receivable on the asset side, and accounts payable on the liability side. Generally speaking, holding inventories and accounts receivable is costly for firms as they usually have low (even zero or negative) returns while having accounts payable provides firms with cheap or costless financing as they are usually interest-free. However, having too much current liabilities (including accounts payable) in comparison to current assets (including inventories and accounts receivable) could lead to short-term liquidity shortage.

**There is a trade-off between static efficiency and liquidity of Thai firms, which is reflected in their working capital.** We have seen earlier that most Thai firms have high current ratio, i.e., they have higher current asset than current liability. With this finding, we have argued that these firms are less likely to face liquidity problem. However, holding a large amount of current assets also implies that firms forego the opportunity to use this asset to generate positive return while at the same time need to finance this asset with costly interest-bearing debt or equity. We explore this issue in more detail here.<sup>23</sup>

#### 5.3.1 Inventory Turnover Ratio and Days Inventory Outstanding

Inventory turnover ratio indicates how fast a firm sells its inventory, measured in terms of the rate of movement of goods into and out of the enterprise. This ratio is computed from the total inventory sold divided by the total inventory stock, where the total inventory sold is proxied by the firm's cost of goods sold. Inventory turnover ratio also implies the average number of days that a particular inventory item remains in the firm before being sold. This financial ratio is called days inventory outstanding (DIO) and is computed as the number of days in the accounting period (365, in our annual data) divided by inventory turnover ratio. Firms with high inventory turnover ratio (i.e. those with low DIO) are considered more efficient in managing inventories as they do not have to hold inventories for a long time, hence saving storage and financing costs. Figure 29 summarizes inventory turnover ratios and DIO of Thai firms.

**Large firms tend to be more efficient in managing inventory.** The solid lines in the top-left panel of Figure 29 shows that large firms tend to have higher inventory turnover ratio. In other words, the speed of goods coming in and going out of these firms is faster than that of small firms. Equivalently, this finding is also reflected in the bottom-left panel where firms in the fourth decile have median days inventory outstanding of over 150 days, i.e., almost half a year, while the median for firms in the top decile is below 50 days. This finding implies that small firms will have to incur cost of storing and financing inventory for 100 days longer than large firms. The right panel of these two figures shows heterogeneity of inventory turnover across industries. After controlling for industry fixed

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<sup>23</sup>Note that inventories, accounts receivable, and accounts payable are optional items in the CPFS data. Among the firms that submit this information, there is no standardized format. For our analysis, we use information from firms that report all of this information. There is of course a selection bias as large firms tend to report more detailed financial statements than small firms.

effects, our results still show that large firms tend to be more efficient in managing inventory, having higher inventory turnover ratio and lower days inventory outstanding than small firms.

### 5.3.2 Accounts Receivable Turnover Ratio and Days Sales Outstanding

Accounts receivable turnover ratio indicates how quickly a firm collects cash from sales (accounts receivable). We compute the accounts receivable turnover ratio from the firm's total revenue divided by its total accounts receivable. Similar to inventory turnover, accounts receivable turnover ratio also implies days sales outstanding (DSO), which is the average number of days that accounts receivable are outstanding (not-yet-collected). Firms with higher accounts receivable turnover ratio (i.e., those with low DSO) are considered more efficient in managing accounts receivable as they can collect cash faster, hence saving financing cost of providing goods and services to customers without being paid. Figure 30 summarizes accounts receivable turnover ratios and DSO of firms in Thailand in 2016.<sup>24</sup>

**Medium firms seem to be most efficient in managing accounts receivable.** The solid line in the top-left panel of Figure 30 shows that there seems to be a hump-shape relationship between firm size and accounts receivable turnover ratio. Our result suggests that firms in the fifth decile bin are most efficient in collecting cash from sales. Equivalently, this is what we see in the bottom-left panel of the figure as well. Specifically, the median firm in the fifth decile is able to collect cash within approximately one month after the sales while the median firms in the 10th decile need more than 50 days. This finding is robust after controlling for industry fixed effects, as shown by the dashed lines in both charts.

### 5.3.3 Accounts Payable Turnover Ratio and Days Payable Outstanding

Accounts payable turnover ratio indicates how quickly a firm pays cash for its purchases. This ratio is computed from the firm's total purchase divided by its total accounts payable. Accounts payable turnover ratio implies days payable outstanding (DPO), which is the average number of days that accounts payable are outstanding (not-yet-paid). Firms with lower accounts payable turnover ratio or higher DPO are those who can extend their payments to supplier longer, enjoying more benefit of interest-free financing. Figure 31 summarizes accounts payable turnover ratios and DPO of firms in Thailand.

**The patterns of accounts payable turnover ratio and days payable outstanding reflect those of accounts receivable.** The solid line in the top-left panel of Figure 31 shows that there seems to be a hump shape relationship between firm size and accounts payable turnover ratio. The median firms in the fifth decile have highest ratio, meaning they have to pay their supplier faster than firms in smaller and larger size bins. Similarly, this finding is reflected in the bottom-left panel where the median days' payable of the fifth decile is less than a month while that of the top decile is over 50 days. This finding is also robust after controlling for industry fixed effects.

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<sup>24</sup>In the limit where all sales are in cash, the accounts receivable turnover ratio is infinitely large; the days sales outstanding is zero accordingly.



### 5.3.4 Cash Conversion Cycle

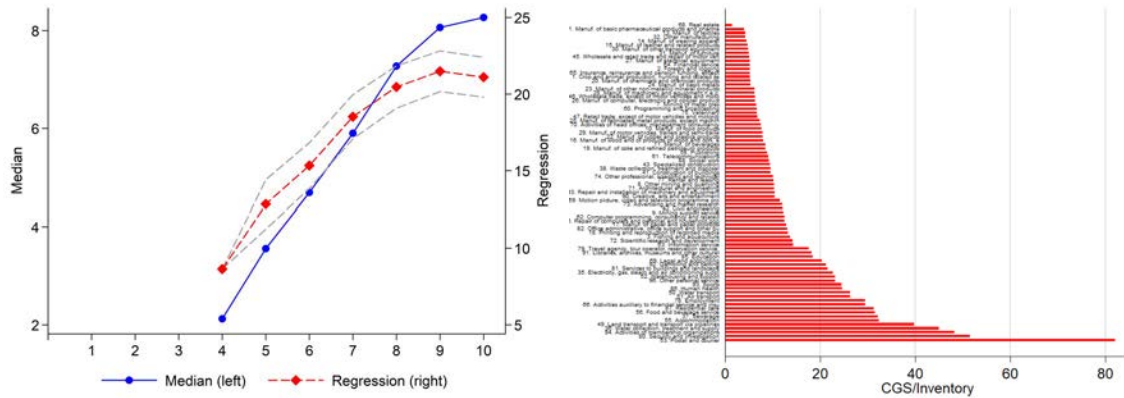
Cash conversion cycle (CCC) measures the length of time for cash to complete the operation cycle. It is computed from:

$$\text{CCC} = \text{DIO} + \text{DSO} - \text{DPO}$$

Firms with positive CCC need to have cash finance this period, which is costly for them. In contrast, firms with negative CCC can enjoy cash provided to them with no financing cost. In general, the shorter the CCC, the more efficient the firm manages its working capital. Note that the patterns for DSO and DPO presented earlier are very similar so CCC for most Thai firms is largely driven by DIO.

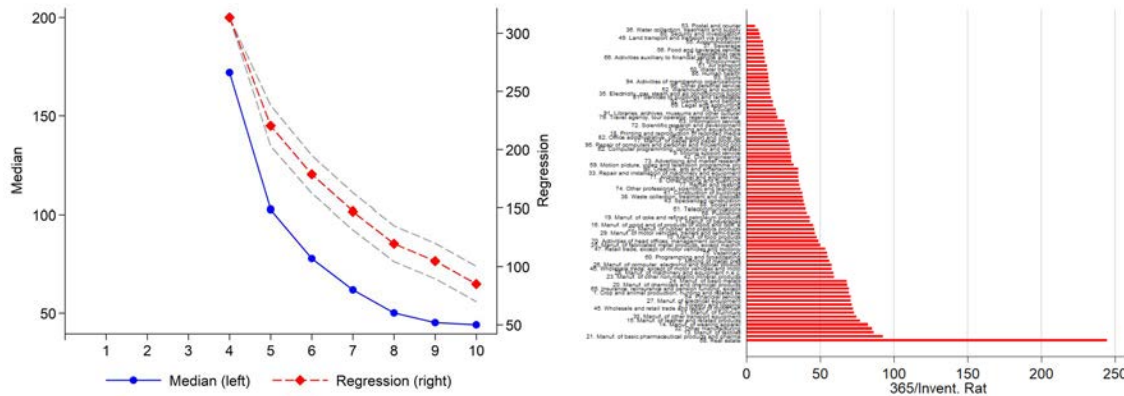
**Large firms tend to manage working capital more efficiently than small firms.** Figure 32 presents CCC of Thai firms by size and by industry in 2016. The figure exhibits a clear pattern that large firms tend to manage working capital more efficiently, having a much lower CCC than smaller firms. More specifically, the median firms in the top decile bin has CCC of less than 50 days while the median of the fourth decile bin has CCC above 150 days. In other words, the median firm of the fourth decile bin has to finance 100 more days of its working capital than that of the top decile bin. This finding implies that it is more costly for small firms to finance their short-term capital.

Figure 29: Inventory Turnover Ratio and Days Inventory Outstanding (2016)



(a) Inventory Turnover Ratio by Size Decile

(b) Inventory Turnover Ratio by Industry

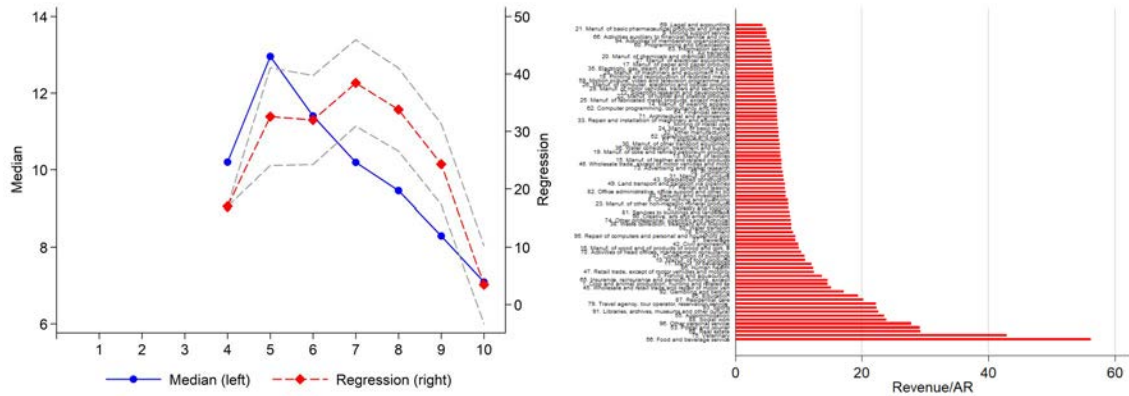


(c) Days Inventory Outstanding by Size Decile

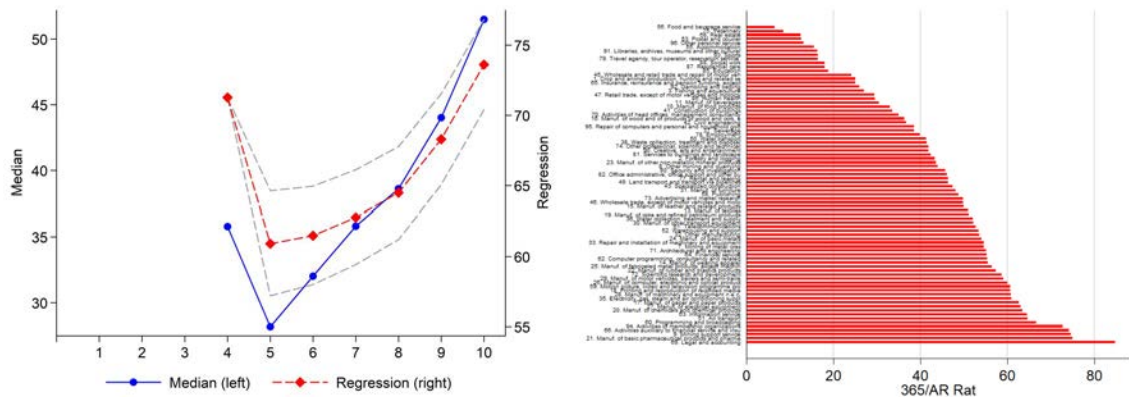
(d) Days Inventory Outstanding by Industry

Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Inventory turnover ratio is computed from cost of goods sold divided by total inventory. Days inventory outstanding is computed from 365 divided by inventory turnover ratio. Industries with high inventory turnover (i.e., lowest days inventory outstanding), are postal and courier (53), security and investigation (80), membership organizations (94), water collection, treatment, and supply (36), and land transportation (49). Industries with low inventory turnover are real estate (69), manufacturing of pharmaceutical product (21), manufacturing of textile (13), other manufacturing (32), and manufacturing of wearing apparel (14).

Figure 30: Accounts Receivable Turnover Ratio and Days Sales Outstanding (2016)



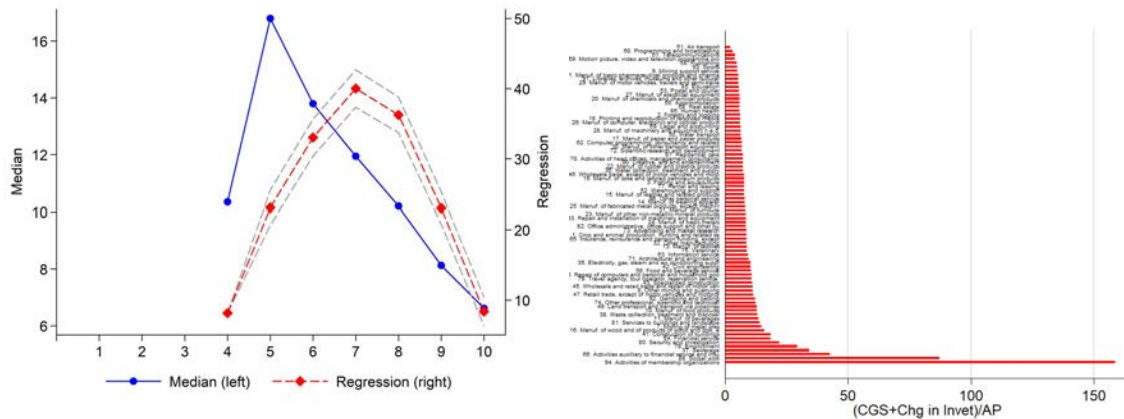
(a) Accounts Receivable Turnover Ratio by Size Decile (b) Accounts Receivable Turnover Ratio by Industry



(c) Days Sales Outstanding by Size Decile (d) Days Sales Outstanding by Industry

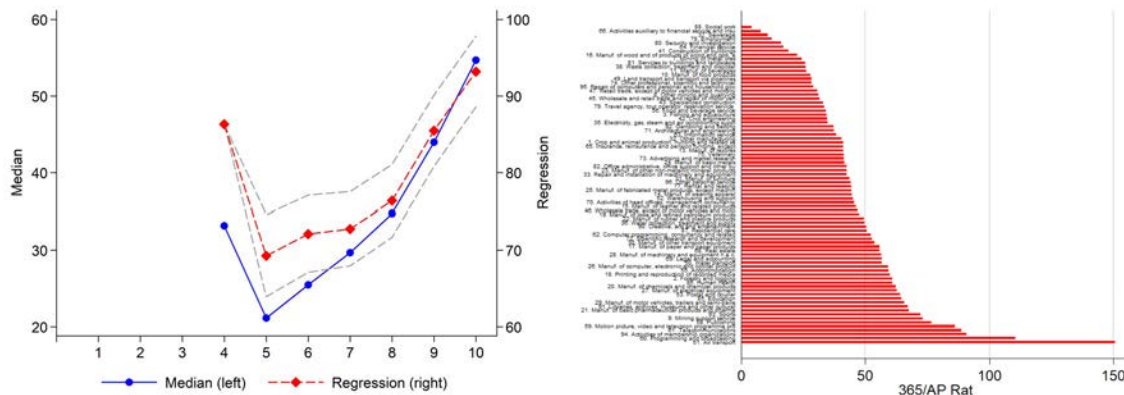
Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Accounts receivable turnover ratio is computed from total revenue divided by total accounts receivable. Days sales outstanding is computed from 365 divided by accounts receivable turnover ratio.

Figure 31: Accounts Payable Turnover Ratio and Days Payable Outstanding (2016)



(a) Accounts Payable Turnover Ratio by Size Decile

(b) Accounts Payable Turnover Ratio by Industry

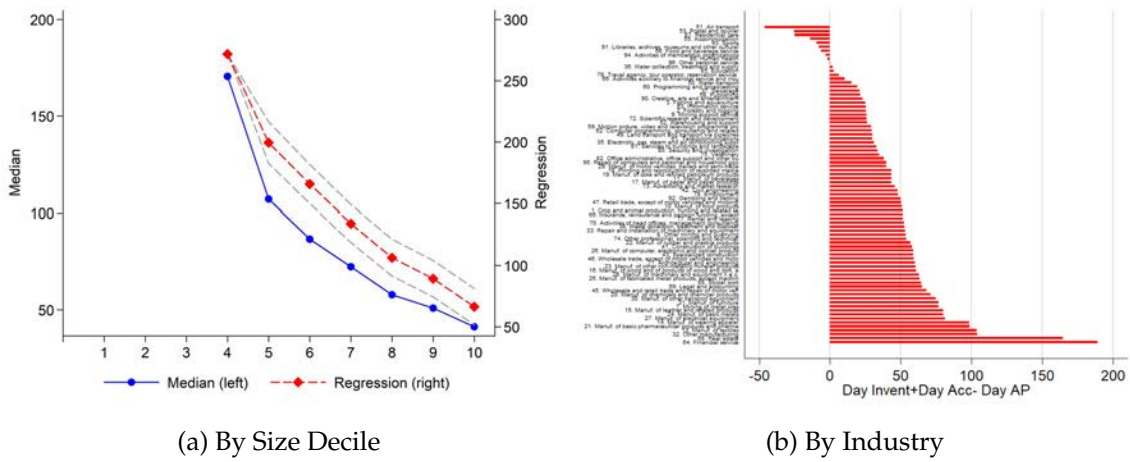


(c) Days Payable Outstanding by Size Decile

(d) Days Payable Outstanding by Industry

Remark: The observations are registered firms in Thailand in 2016. Decile bins are based on total revenue in 2016. Accounts payable turnover ratio is computed from total purchase divided by total accounts payable. Days payable outstanding is computed from 365 divided by accounts payable turnover ratio.

Figure 32: Cash Conversion Cycle, CCC (2016)



Remark: Decile bins are based on total revenue in 2016.

## 6 Conclusion

**This study analyzes firm-level panel data of registered firms in Thailand in order to better understand the corporate sector of the country.** The findings from this study can be summarized as follows. First, we find that firm size distribution in Thailand is smooth, with a majority of firms in the middle of the distribution. We argue that the apparent “missing middle” phenomenon is entirely driven by arbitrary categorization of SMEs. Second, the Thai corporate sector is very concentrated and the concentration has risen over the past decade. Third, larger firms seem to have advantages over smaller firms regarding financing. Fourth, smaller firms seem to invest disproportionately in fixed assets than larger firms. Finally, the relationship between ROA and firm size exhibits a hump shape, i.e., firms in the middle of the size distribution have the highest ROA.

**Overall, our results suggest that the Thai corporate sector exhibits both inefficient capital allocation and financial vulnerability.** Large firms have high leverage but low ROA while small firms have both low leverage and low ROA. Meanwhile, firms in the middle of the size distribution, i.e., those with the highest ROA, tend to have low leverage, consistent to a symptom of credit constraints. This conclusion is consistent with the findings in a related paper that studies SME debt in Thailand based on loan-level data from Thailand’s National Credit Bureau (NCB).<sup>25</sup>

**This paper contributes to the understanding of the corporate sector in Thailand in many ways.** First, we illustrate that public companies are not representative of Thai firms in general; we thus caution the generalization of findings from the studies based exclusively on those companies. Second, we argue that policy recommendations based on arbitrary SME cutoffs may not be appropriate as they ignore the diversity across small firms. Given that small firms are the majority of firms in the economy, heterogeneity among them are tremendous and we should not treat them as being similar. In contrast, very-large small enterprises, medium enterprises, and large enterprises may not be very different despite being classified into different size categories by the official definition.

**Our study has important policy implications regarding resource allocation in general and entrepreneurship and SME promotion in particular.** First, if the increasing concentration found in this study linked to the increasing market power, it could be a hindrance to an efficient resource allocation. Further study on market power is needed and the policies promoting competition might be necessary. Second, we find that firms in the middle of size distribution seem to have financial constraints and face limit to expansion. Policies targeting this group of firms should focus on providing them with easier and

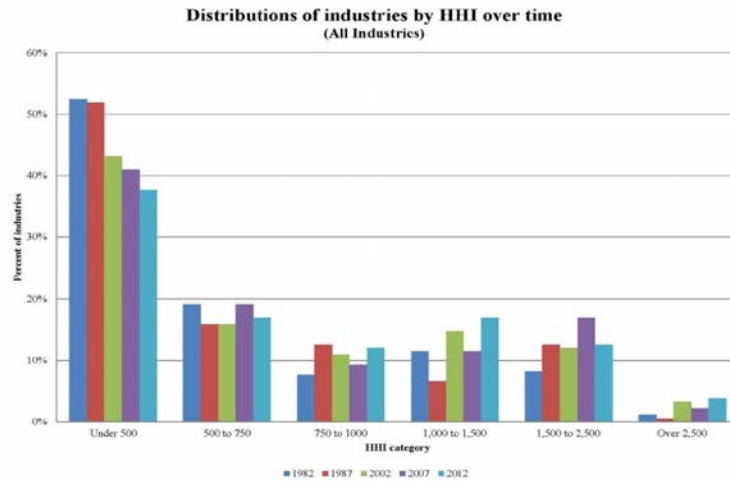
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<sup>25</sup>See Archawa Paweenawat, Jaree Pinthong, Krislert Samphantharak, and Nada Wasi, “Corporate Debt in Thailand: What We Learn from the National Credit Bureau Data”, aBRIDGE Issue 13/2018, Puey Ungphakorn Institute for Economic Research (PIER), 24 July 2018. Main findings in the paper are as follows: First, in 2016, only 31% of registered SMEs have loans from formal financial institutions. Second, each SME tends to borrow from a single lender—46% of registered firms in Thailand have only one loan (hence borrowing from one financial institution) and another 28% have multiple loans but from the same lender. Third, size matters in credit markets—large firms are more likely to have formal loans than small firms. However, credit is an important source of fund for small firms since large firms also have access to other funding sources. Fourth, while size matters, performance as measured by ROA does not guarantee access to credit. Fifth, firm’s fixed assets are associated with participation in credit markets. Finally, age also matters—young firms are less likely to have formal loans. Overall, these findings are symptoms of credit constraints faced by small, young firms in Thailand.

cheaper access to finance. Note that these firms are categorized as small and not medium enterprises by the official SME definition. Third, we find that the very small firms may not have access to finance, but they are not very productive. Although financial support that would allow them to overcome large fixed costs generally faced by small enterprises are necessary, it is neither sufficient nor sustainable. In particular, subsidized loans to these enterprises will likely become non-performing unless there are also other measures that help the firms improve their productivity. If the government would like to support these entrepreneurs, other non-financial policies are also needed. These policies may involve skill training, innovation and product design, and access to broader markets.

## Appendix

Figure A1: Concentration by Industry in the U.S.



Source: Dennis Carlton, "The Recent Assault on Antitrust and What the Trump Administration's Response Could Be", Lecture Note, University of Chicago; original source from Sam Pelzman, untitled.

Table A1: Selected Financial Ratio by Industry (2016)

ISIC	Industry	Number of Firms	FA/TA	TL/TA	Current Ratio	ROA	EBIT Margin	Asset Turnover	DIO	DSO	DPO
1	Crop and animal prod.	2166	0.1401	0.1987	4.2698	0.0053	0.0367	0.2478	67.69	27.06	41.41
2	Forestry and logging	107	0.0568	0.0505	7.7658	-0.0008	0.0124	0.0049	60.11	44.26	60.82
3	Fishing and aquaculture	200	0.1176	0.2917	2.7561	-0.0041	0.0111	0.2231	24.68	26.97	34.51
5	Mining of coal and lignite	13	0.0003	0.1263	7.9171	-0.0171	-2.3675	0.0043	65.37	38.80	35.37
6	Petroleum/natural gas ext.	49	0.0232	0.3529	4.1130	0.0062	0.1154	0.1872	48.14	48.34	125.13
7	Mining of metal ores	500	0.0000	0.1362	6.6979	-0.0045	-0.0633	0.0071	56.22	52.44	24.64
8	Other mining/quarrying	965	0.2511	0.2845	3.7968	0.0064	0.0477	0.4024	34.97	44.78	32.42
9	Mining support service	190	0.0066	0.1924	4.4982	-0.0028	0.0048	0.1978	22.21	74.59	92.40
10	Manuf. of food	7491	0.1908	0.3365	3.0251	0.0147	0.0270	0.8308	47.34	32.28	27.39
11	Manuf. of beverages	1688	0.0125	0.0528	11.8322	0.0153	0.0356	0.6544	43.37	30.86	27.45
12	Manuf. of tobacco	47	0.1249	0.3443	4.5015	0.0158	0.0589	0.4482	51.72	35.57	12.57
13	Manuf. of textiles	2002	0.1062	0.3570	3.2054	0.0226	0.0340	0.8908	86.79	52.25	41.24
14	Manuf. of wearing apparel	3234	0.0151	0.1970	5.2948	0.0237	0.0411	0.8405	85.29	56.67	45.53
15	Manuf. of leather	1093	0.0390	0.3563	2.9132	0.0279	0.0314	1.0805	77.72	50.74	47.02
16	Manuf. of wood	1589	0.1234	0.3595	3.2939	0.0268	0.0332	0.8622	46.31	36.36	22.53
17	Manuf. of paper	1490	0.1558	0.4338	2.0479	0.0400	0.0361	1.2642	27.40	62.69	55.96
18	Printing and recorded med	4749	0.0489	0.1797	4.0646	0.0330	0.0610	0.7969	27.67	61.85	60.51
19	Manuf. of coke/petroleum	379	0.1071	0.3311	2.5620	0.0077	0.0338	0.3582	42.11	49.82	46.07
20	Manuf. of chemicals	5007	0.0416	0.2419	3.8271	0.0165	0.0394	0.7237	69.74	64.59	63.99
21	Manuf. of pharmaceuticals	1173	0.0178	0.1449	5.8911	0.0033	0.0484	0.3544	97.66	77.39	68.97
22	Manuf. of rubber	4789	0.2092	0.4422	2.2532	0.0362	0.0369	1.1162	45.40	57.30	49.67
23	Manuf. of other non-metal	2636	0.2320	0.4842	2.2732	0.0260	0.0371	0.9044	59.82	43.52	42.64
24	Manuf. of basic metal	1829	0.1527	0.3721	2.3675	0.0349	0.0424	0.9660	67.27	54.59	43.75
25	Manuf. of fabricated metal	6851	0.1061	0.1854	4.2255	0.0617	0.0766	0.9143	48.96	56.50	44.83
26	Manuf. of computer/electronics	1602	0.0704	0.3006	2.9802	0.0291	0.0474	0.8972	58.14	61.11	60.14



Table A1: Selected Financial Ratio by Industry (2016), cont.

ISIC	Industry	Number of Firms	FA/TA	TL/TA	Current Ratio	ROA	EBIT Margin	Asset Turnover	DIO	DSO	DPO
27	Manuf. of electrical equipment	1756	0.0739	0.3215	2.9680	0.0313	0.0427	0.9501	72.52	64.40	64.31
28	Manuf. of machinery	5905	0.0845	0.2463	3.3678	0.0481	0.0671	0.8895	58.83	61.68	57.89
29	Manuf. of motor vehicles	1962	0.2156	0.4024	2.0877	0.0370	0.0456	0.9577	46.97	59.38	66.47
30	Manuf. of other transport equipment	473	0.0977	0.3704	2.9090	0.0180	0.0346	0.7508	75.53	53.74	54.43
31	Manuf. of furniture	2082	0.0397	0.2777	4.0318	0.0211	0.0372	0.9253	75.37	48.30	44.69
32	Other manufacturing	3350	0.0384	0.2898	3.9345	0.0190	0.0376	0.7986	89.04	56.18	42.66
33	Repair and install. of machine	4352	0.0170	0.0849	7.1584	0.0810	0.1150	0.8493	33.27	54.95	42.80
35	Electricity & gas	steam	& air cond.	2637	0.0000	0.0683	6.0421	-0.0030	0.0149	0.0074	14.28
61.01	36.30										
36	Water collect & treatment & supply	106	0.0107	0.1616	2.9607	0.0071	0.0928	0.1038	7.34	55.20	52.66
37	Sewerage	168	0.0059	0.0695	10.4567	0.0250	0.0831	0.5584	7.76	38.56	11.43
38	Waste collect & treatment & disposal	704	0.0256	0.1391	4.9854	0.0123	0.0549	0.4377	38.15	42.46	24.46
39	Remediation activities	39	0.0060	0.1267	6.4549	0.0052	0.0866	0.4018	89.36	51.51	10.62
41	Construction of buildings	38807	0.0000	0.0284	15.5253	0.0348	0.0985	0.5899	37.82	34.58	17.05
42	Civil engineering	3078	0.0021	0.0424	10.9454	0.0480	0.0891	0.6773	29.34	37.30	32.54
43	Specialized construction	15603	0.0094	0.0729	8.0915	0.0637	0.0996	0.8667	37.43	48.75	32.05
45	Wholesale & retail (motor)	17013	0.0130	0.2921	4.5923	0.0277	0.0291	1.0487	73.49	24.09	30.89
46	Wholesale (no motor)	82620	0.0082	0.1860	4.9185	0.0245	0.0335	0.9250	57.87	49.99	47.15
47	Retail (no motor)	63911	0.0074	0.1360	6.4799	0.0258	0.0323	0.9077	53.44	27.72	29.59
49	Land transport	13531	0.0184	0.1233	4.9526	0.0599	0.0849	0.8541	7.04	46.78	27.80
50	Water transport	527	0.1142	0.3946	2.1936	0.0083	0.0423	0.4177	14.06	41.43	57.22
51	Air transport	124	0.0067	0.2119	3.5157	0.0115	0.0364	0.3868	13.84	72.57	169.46
52	Warehousing	5107	0.0166	0.1385	5.4080	0.0441	0.0902	0.6068	13.55	54.24	49.58
53	Postal and courier activities	344	0.0063	0.0671	7.8052	0.0710	0.0837	0.8451	3.03	12.53	64.10
55	Accommodation	8049	0.5933	0.4708	1.9560	-0.0012	0.0123	0.1604	10.44	15.44	64.08
56	Food and beverage service	9397	0.0375	0.0806	4.8872	-0.0003	0.0188	0.6625	10.99	6.00	35.17

Table A1: Selected Financial Ratio by Industry (2016), cont.

ISIC	Industry	Number of Firms	FA/TA	TL/TA	Current Ratio	ROA	EBIT Margin	Asset Turnover	DIO	DSO	DPO
58	Publishing	1374	0.0117	0.1334	6.4848	0.0000	0.0384	0.5564	41.78	59.76	90.84
59	Motion pic & video and TV program	2726	0.0199	0.0990	6.6604	0.0120	0.0745	0.4858	25.86	71.37	89.93
60	Programming and broadcasting	2650	0.0000	0.0128	43.1858	0.0061	0.2696	0.0461	41.51	79.48	124.78
61	Telecommunications	1147	0.0104	0.1381	4.8766	0.0042	0.0480	0.4139	30.91	60.54	94.92
62	Computer programming	5516	0.0167	0.0881	7.2333	0.0232	0.0782	0.6209	28.39	58.05	57.25
63	Information service	916	0.0092	0.0820	7.1385	0.0043	0.0592	0.4234	23.40	74.22	46.81
64	Financial service	3126	0.0012	0.2227	5.9726	0.0076	0.1950	0.0629	215.71	105.88	18.25
65	Insurance	110	0.0128	0.6561	1.5084	0.0132	0.0538	0.3943			
66	Auxiliary to financial service	4374	0.0000	0.0255	10.0897	0.0148	0.1613	0.1731	11.73	23.95	8.55
68	Real estate	47065	0.0057	0.2937	4.6387	0.0000	0.1006	0.0300	599.60	12.99	67.55
69	Legal and accounting	8736	0.0175	0.0457	12.1998	0.1124	0.2127	0.6261	17.76	81.04	58.31
70	Activities of head offices	10031	0.0043	0.0674	7.9413	0.0155	0.1284	0.3160	61.43	42.77	61.81
71	Architectural and engineering	6798	0.0238	0.1000	6.9100	0.0316	0.0871	0.6658	34.52	55.97	38.61
72	Scientific R&D	622	0.0308	0.1435	5.5391	0.0020	0.0471	0.4712	25.66	59.77	52.81
73	Advertising and market research	7100	0.0174	0.0957	6.2068	0.0320	0.0892	0.6917	29.21	52.16	42.57
74	Other professional & science and tech	4925	0.0138	0.0729	8.3073	0.0317	0.0784	0.7132	36.28	44.49	29.42
75	Veterinary activities	113	0.3404	0.3757	2.3237	0.0057	0.0260	1.1726	54.73	4.39	41.28
77	Rental and leasing activities	3725	0.0819	0.1645	4.1389	0.0194	0.1118	0.3166	33.41	49.42	47.40
78	Employment activities	2401	0.0042	0.0852	6.6814	0.0506	0.0710	0.9265	6.38	39.81	12.61
79	Travel agency and related act	7937	0.0003	0.0305	11.0369	0.0062	0.0419	0.3865	15.49	19.73	35.39
80	Security and investigation	2432	0.0015	0.0445	10.3786	0.0960	0.1311	0.8691	3.57	45.90	16.67
81	Services to buildings and landscape	2957	0.0073	0.0471	9.6902	0.0811	0.1355	0.7243	12.70	43.27	27.45
82	Office admin. and support	10777	0.0024	0.0574	9.1200	0.0836	0.1908	0.5692	25.35	47.33	43.29
84	Public defense & social security	46	0.0328	0.0859	3.7789	0.0497	0.0728	0.6785	14.63	103.66	127.89
85	Education	3408	0.0129	0.0502	7.7048	0.0008	0.0436	0.4008	19.49	18.80	70.02

Table A1: Selected Financial Ratio by Industry (2016), cont.

ISIC	Industry	Number of Firms	FA/TA	TL/TA	Current Ratio	ROA	EBIT Margin	Asset Turnover	DIO	DSO	DPO
86	Human health activities	2603	0.1592	0.2034	3.0454	0.0326	0.0641	0.8460	14.65	29.19	61.25
87	Residential care activities	99	0.0054	0.0749	5.8115	-0.0006	0.0327	0.1904	11.66	18.02	50.62
88	Social work w/ o accommodation	191	0.0120	0.0424	6.9720	0.0000	0.0398	0.4455	39.42	17.96	562.76
90	Creative & arts and entertainment	1166	0.0143	0.0775	8.0131	0.0300	0.1124	0.5599	34.97	41.88	60.20
91	Libraries & archives and museums	76	0.2421	0.3255	2.6570	-0.0005	0.0355	0.2655	10.96	14.62	67.20
92	Gambling and betting activities	2075	0.0000	0.0078	41.2480	0.0000	0.4286	0.0049	17.80	25.96	37.30
93	Sport & amusement and recreation	1704	0.0606	0.1791	3.7616	-0.0049	-0.0001	0.2778	15.77	17.09	79.90
94	Membership organization	99	0.0046	0.0427	11.4702	0.0474	0.1837	0.5624	15.39	72.67	90.89
95	Repair of personal and hh goods	979	0.0056	0.0581	10.1649	0.0460	0.0893	0.7490	31.79	38.93	34.43
96	Other personal service	2997	0.0157	0.0635	6.2433	0.0035	0.0532	0.4693	13.51	12.98	46.32
97	Households as employers	8	0.0000	0.0169	61.4415	0.1750	0.3397	0.4671			
98	Undifferentiated goods and services	37	0.0023	0.0796	5.8225	0.0136	0.0491	0.8643	17.38	39.05	54.72
99	Extraterritorial organization	1	0.0000	0.0041	246.5808	-0.0259	-29.6089	0.0009			