Thailand and The World Economy
P-ISSN: 2630-0931
E-ISSN: 2651-0529
Homepage : https://www.tci-thaijo.org/index.php/TER
Vol. 40, No.1, January - April 2022 **Page [1-16]**

Firms' Financial Performance and Structural Change: The Case of Thailand

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Received 25 January 2021, Received in revised form 14 July 2021,
Accepted 3 August 2021, Available online 31 January 2021

Abstract

A key aspect of the development process is structural change. For most countries, this takes the form of a decline in the contribution of the agriculture sector in the economy accompanied by the rise of the shares of manufacturing and services. The theories and empirics of structural change have mostly focused on economy-wide and sectoral-level analysis. There is a scarcity of studies on the microeconomics of structural change due to the lack of long-term panel data at the firm level. This study undertakes a microeconometric analysis of structural change by studying how financial performance at the firm-level as defined by ROA and ROE is affected by structural change in the Thai economy. A key finding of this study is that trends in the financial performance of firms provide additional insights into micro-level aspects of structural change in the economy.

Keywords: Financial Performance, Structural Change, Microdata

JEL Classifications: L16, O12, O14

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1. Introduction

A key aspect of the development process is structural change, which involves the reallocation of economic activities across the broad sectors, namely, agriculture, manufacturing, and services.[1] For most developing countries, the process of structural change typically involves a decline in the contribution of the agriculture sector in the economy - in terms of national income and employment – and an increase in the contributions of the manufacturing and services sectors. For many of the emerging countries that have joined the ranks of middle-income countries such as Thailand, these changes have often been brought about by policies that aimed at promoting export-oriented industrialization. A favorable external environment in the form of a liberal world trade order was also an important factor for countries that have embarked upon this development strategy in the past.

In the past, many developing countries had hoped to leverage manufacturing activities to become developed and high-income countries. Industrialization was after all the experiences of high-income countries such as the United Kingdom, United States, Japan, and South Korea. Only when these countries have industrialized will their manufacturing sector's contribution begin to decline, with services becoming increasingly important (Figure 1).

The expectation that industrialization will eventually lead countries to become high-income economies has, to some extent, been dashed in recent years in many industrializing middle-income countries. These countries have witnessed a decline in the manufacturing sector's contribution to their economies even before they become developed countries. This phenomenon of "premature deindustrialization" has been observed in several middle-income developing countries in Asia, such as China, Indonesia, Malaysia, and Thailand (Figure 2).

Historically, the theories and empirics of structural change and premature deindustrialization have mostly focused on economy-wide and sectoral factors. Not much is understood about the micro-level empirics of structural change, even though the empirical literature in areas such as trade has moved towards greater use of micro evidence. This problem is primarily due to the lack of long-term panel data at the firm level. This study aims to fill this research gap.

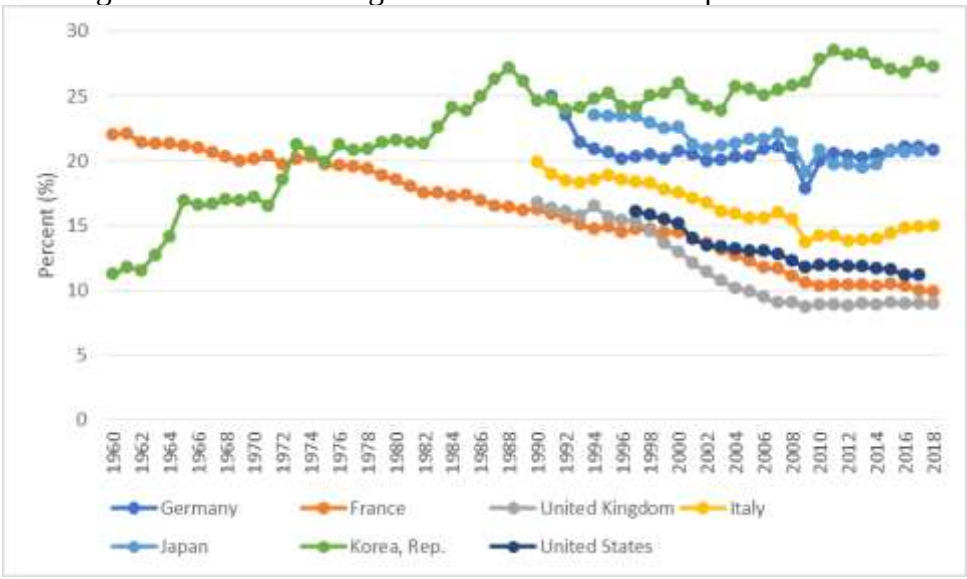
The goal of this study is to undertake a micro-level analysis of the relationship between structural change and financial performance at the firm level in the Thai economy. The firm-level panel data used in this study covers firms listed in the Stock Exchange of Thailand from 2000 to 2018.

This study makes several contributions to the existing literature. First, it provides a micro-level analysis of firms' financial performance which has changed within the context of long-term structural change in the economy. There is a paucity of this type of empirical analysis in the structural change literature. Second, by focusing on accounting-based measures of financial performance, this study hopes to complement and shed additional light on micro-level aspects of structural change that has mostly focused on productivity variables. The third contribution of this study is to provide an analysis of the possible consequences of premature deindustrialization for firms' financial performance in Thailand. Even though the Thai manufacturing's share of GDP has declined from a peak of 31 percent in 2010 to 27 percent in 2018, the implications of this

[1] See Herrendorf et al (2014). Another commonly used term for structural change is structural transformation.

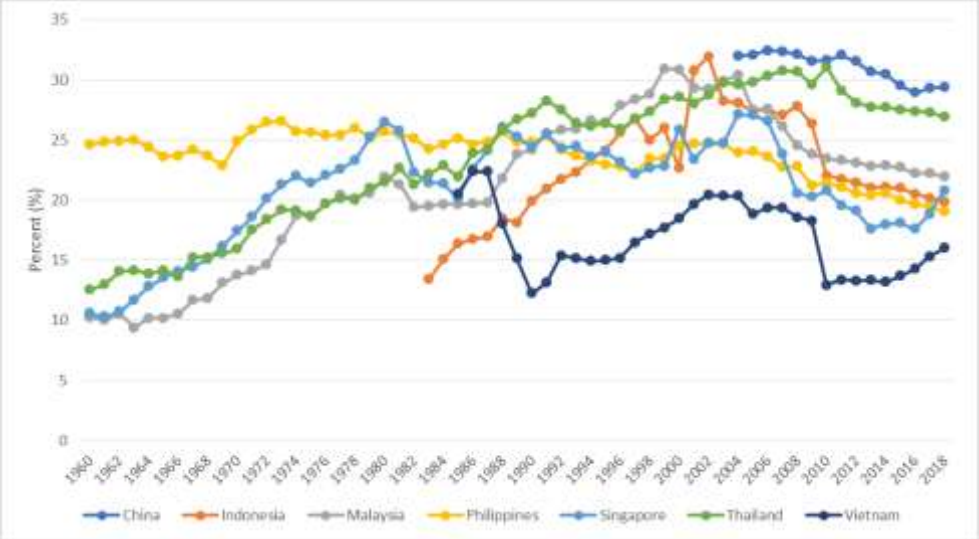
change for firms' financial performance in Thailand has not been explored thus far.

Figure 1: Manufacturing Share of GDP in Developed Economies



Source: World Bank

Figure 2: Manufacturing Share of GDP in Selected Southeast Asian Countries



Source: World Bank

The firm-level panel data used in this study covers 627 firms listed in the Stock Exchange of Thailand over a period of 19 years from 2000 to 2018. There are 8,306 observations in the dataset used. These are distributed across 27 industries (see Appendix Table). Two measures of firms' financial performance are used in this study, namely, return on assets (ROA) and return on equity (ROE).

The outline of the rest of this paper is as follows. Section 2 will review the theoretical and empirical literature on structural change and firms' financial performance. Section 3 will examine the recent trends in structural change and firms' financial performance. An econometric analysis of the relationship between structural change and financial performance is undertaken in Section 4. Section 5 concludes.

2. Literature Review

The literature of structural change has a long and distinguished history. The early awareness of the evolution of economic structure in terms of the two primary sectors – agriculture and manufacturing – was already evident in the pioneering economic literature of the Physiocrats (Quesnay's Tableau), Adam Smith, and Marx (Backhouse, 2002). The more contemporary and modern focus on structural change can be traced back to the development economics literature from the 1950s to the 1970s. These included, among others, the works of Kuznets (1957, 1966), Chenery (1960), and Chenery and Syrquin (1975). The drivers of structural change that were identified by these scholars included technological change/adoption, change in demand composition, trade, urbanization, and demographic transition. Much of the empirical work on structural change that were carried out from the 1950s to the late 1980s used data at the macro and industry level (Syrquin, 1988).

However, by the 1990s, empirical work began to shift towards a more micro-level analysis of firm heterogeneity within the manufacturing sector (Roberts and Tybout, 1996; Tybout 2000). Firm-level dynamics in these studies took the form of firm growth, entry, exit and market share reallocation. The work of Melitz (2003) ushered in a renewed focus on the impact of trade on inter-firm reallocation towards more productive firms. Key findings from the literature include exporters tending to be larger, more skill-intensive, more capital intensive, and more productive (Bernard et al., 2012). However, this body of literature which relies on general equilibrium models has not directly addressed the empirics of structural change.

One strand of literature does study firm-level heterogeneity across different sectors. This literature focuses on firm size distributions and their evolution across different sectors and time. One key finding is the differences in the dispersion of firm size across sectors with high dispersion observed in some services sectors (Pagano and Schivardi, 2003). Another study by Cabral and Mata (2003) did not find a selection effect to be a factor explaining the evolution of firm size distribution at the sector level. Though these studies do highlight firm-level heterogeneity across sectors, they do not examine how firm heterogeneity evolves in the context of structural change. One rare exception is the recent study by Bernard et al. (2017), which examined deindustrialization using microdata. They showed that the decline in manufacturing in Denmark was due to firm exit, reduction in employment in existing firms and switching of manufacturing firms to become services firms.

To sum up, the empirical studies on structural change have primarily been undertaken using macro and industry-level data. Even though there has been a distinct shift towards more firm-level empirical studies especially in the area of globalization (exporting) and evolution of firm size distribution, there is a paucity of studies on the microeconomics of structural change. It is the aim of this study to fill this research gap.

3. Trends in Structural Change and Firms' Financial Performance in Thailand

The nature of structural change in Thailand is examined in this section from two perspectives. First, a sectoral analysis is undertaken. Second, firm-level data is used to analyze firm-level heterogeneity and dynamics across sectors.

3.1 Sectoral Change

The pattern of structural change experienced by the Thai economy is very similar to the experience of many developing countries. The GDP share of the agriculture sector declined significantly; from 36 percent in 1960 until it reached a plateau of about 8-10 percent in 1993 (Figure 3). Manufacturing's share of GDP rose from 12 percent in 1960 to reach a peak of 31 percent in 2010. The sector's share of GDP subsequently declined to about 27 percent in 2018. The services sector's share of GDP has fluctuated and remained above 50 percent since 1960. Following a decline between 1992 and 2010, the sector's share increased to 57 percent in 2018.

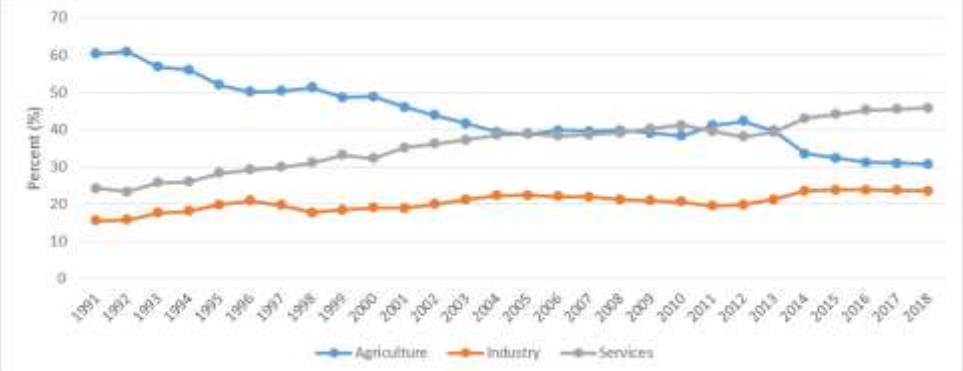
The trends in the sectoral share of total employment are similar for agriculture (Figure 4). Though this share declined continuously in the past, its current share at around 30 percent does indicate that this sector continues to be an important source of employment in Thailand. Long-term data on manufacturing employment is not available, but the industrial sector's share of total employment has remained at around 23 percent since 2014. The services' sector share of total employment rose consistently from 23 percent in 1992 to 46 percent in 2018.

Comparing Thailand's structural change with other countries, Klyuev (2015) argue that the agriculture sector's share of total employment is high for the country's level of income. The dispersion in productivity levels across sectors in Thailand is also relatively large with the productivity levels in agriculture low in comparison with the rest of the Thai economy. These findings suggest that the relocation of labour from agriculture sector to other sectors is an important source of potential growth. In this regard, the services sector is likely to be a key sector (Koonnathamdee, 2013).

Figure 3: Sectoral Composition of GDP (%)

Source: World Bank

Figure 4: Sectoral Composition of Total Employment (%)



Source: World Bank

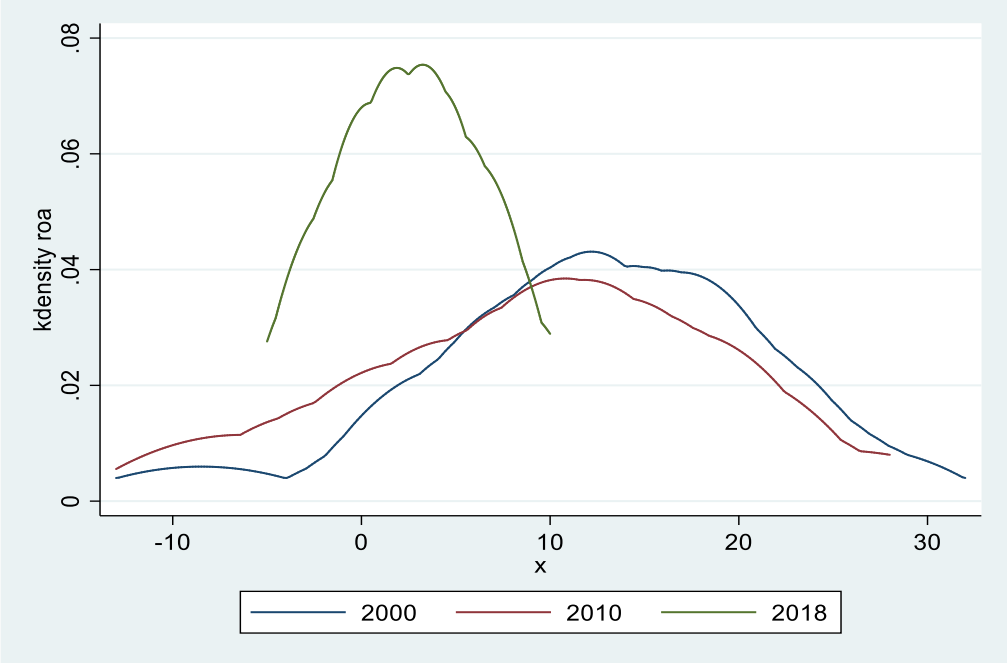
3.2 Firms' Financial Performance and Structural Change

The distributions of ROA are compared to investigate how firms have performed financially in each of the three sectors (agriculture, manufacturing, and services). This exercise is undertaken over three points in time, namely, 2000, 2010, and 2018. The distributions of ROA also provide how the profiles of firm-level heterogeneity evolve over time.

3.2.1 Agriculture Sector

The density function for the ROA in the agribusiness industry indicates a decline of the average ROA over the 19 years (Figure 5). The decline in ROA is particularly sharp in the later period from 2010 to 2019. This seems to suggest that financial performance in the agriculture sector deteriorated significantly with the decline in the contribution of agriculture sector to the economy.

Figure 5: Agribusiness - Estimated Probability Density Function for ROA

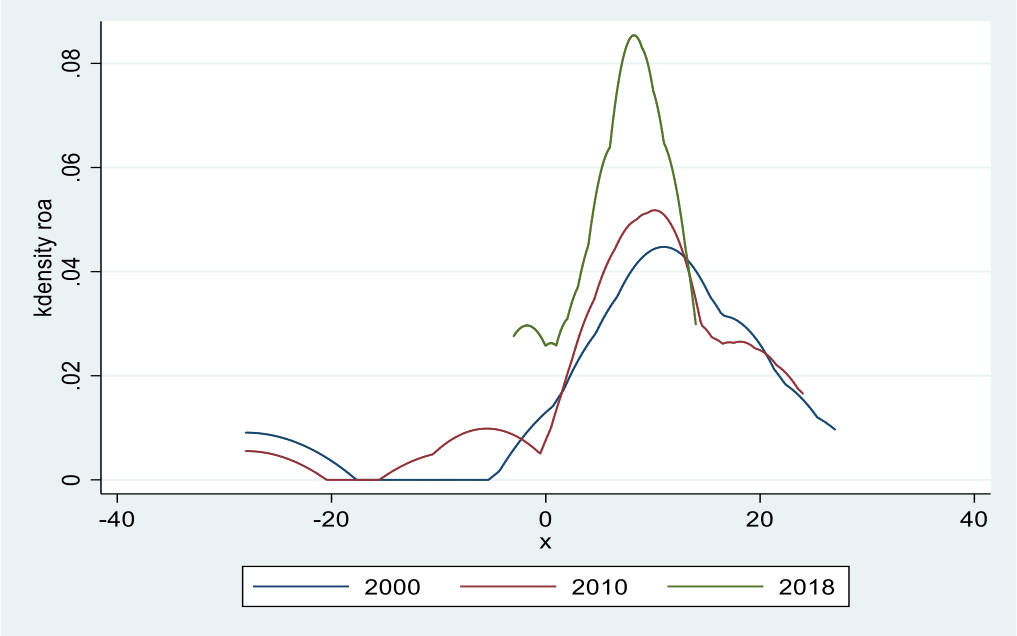


Source: Authors' computations based on data from the Stock Exchange of Thailand

3.2.2 Manufacturing Sector

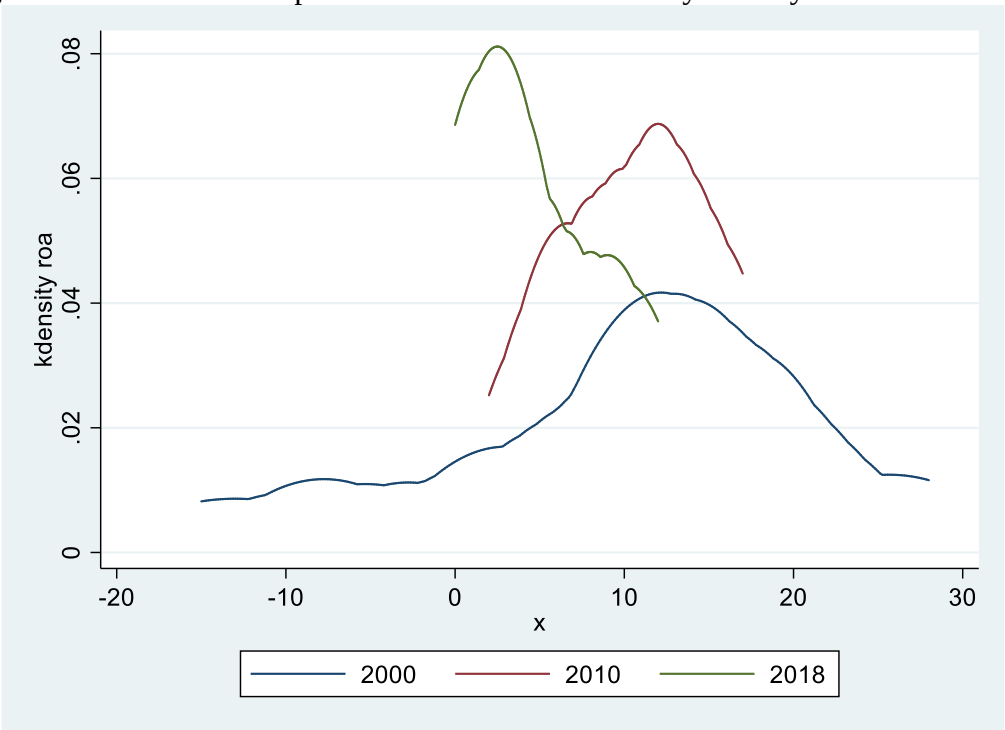
The automotive industry is a major industry in the manufacturing sector. There is a gradual decline in the average ROA in the industry from 2000 to 2018 (Figure 6). However, the shapes of the density functions suggest that the number of firms with lower ROA rose sharply in the later period of 2010-2019. This latter period coincided with the possibility of premature deindustrialization of the Thai economy. A similar trend is also observed in another important manufacturing industry, namely the electronic components industry (Figure 7). The leftward shift in the density function in 2018 is very drastic indicating a sharp drop in the ROA of firms in this industry in 2018 compared to 2010. Overall, the decline in ROA of firms in two key manufacturing industries in 2018 compared to 2010 does suggest that the premature deindustrialization may have had taken place in the later period of 2010-2018.

Figure 6: Automotive - Estimated Probability Density Function for ROA



Source: Authors' computations based on data from the Stock Exchange of Thailand

Figure 7: Electronic Components - Estimated Probability Density Function for ROA



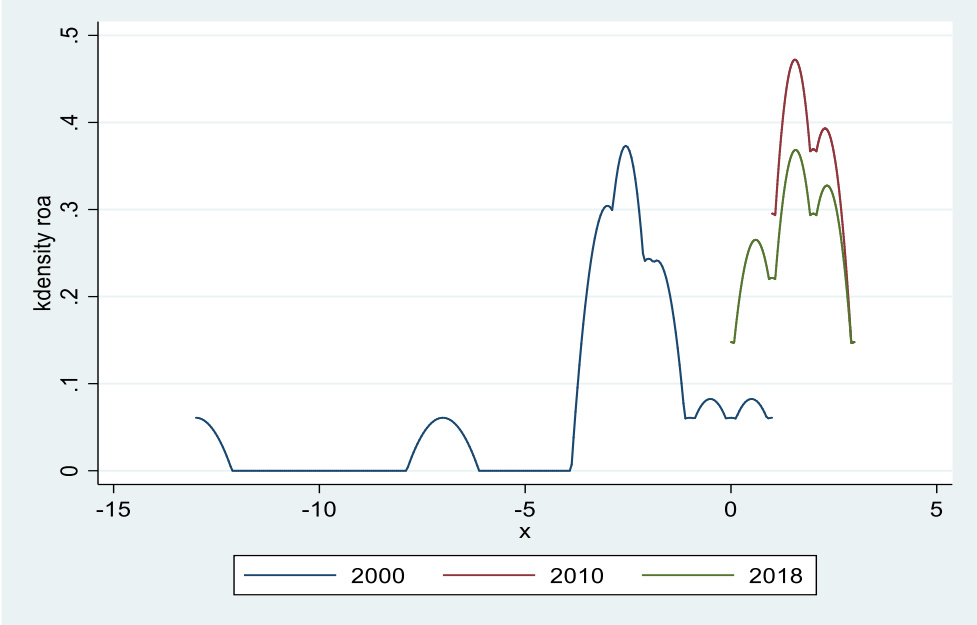
Source: Authors' computations based on data from the Stock Exchange of Thailand

3.2.2 Services Sector

The contribution of the services sector to the Thai economy has increased, especially since 2010. The sector, however, is very diverse. The impact of the rise the services sector on the financial performance of firms in the sector may depend on the type of services industry. This is borne out in the evolution of the distributions of ROA in the different sectors. Firms in the financial sector have benefited from this structural change. This is particularly true in the banking industry – the industry's ROA density

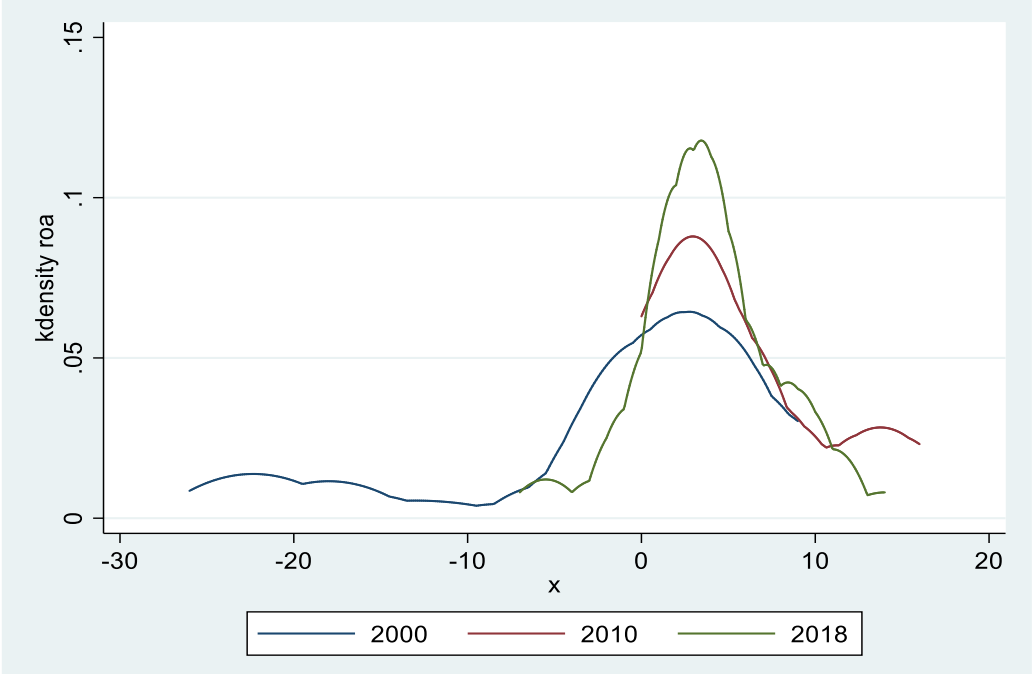
function shifted upward and rightward significantly (Figure 8). Likewise, the financial performance of firms in the finance and securities as well as property development also improved but to a lesser extent than the banking industry (Figure 9 and Figure 10). Over the same period, the retail sector (commerce) is likely to have become more unequal over time – with the density function becoming more flat indicating greater dispersion but more firms earning higher ROA (Figure 11).

Figure 8: Banking - Estimated Probability Density Function for ROA



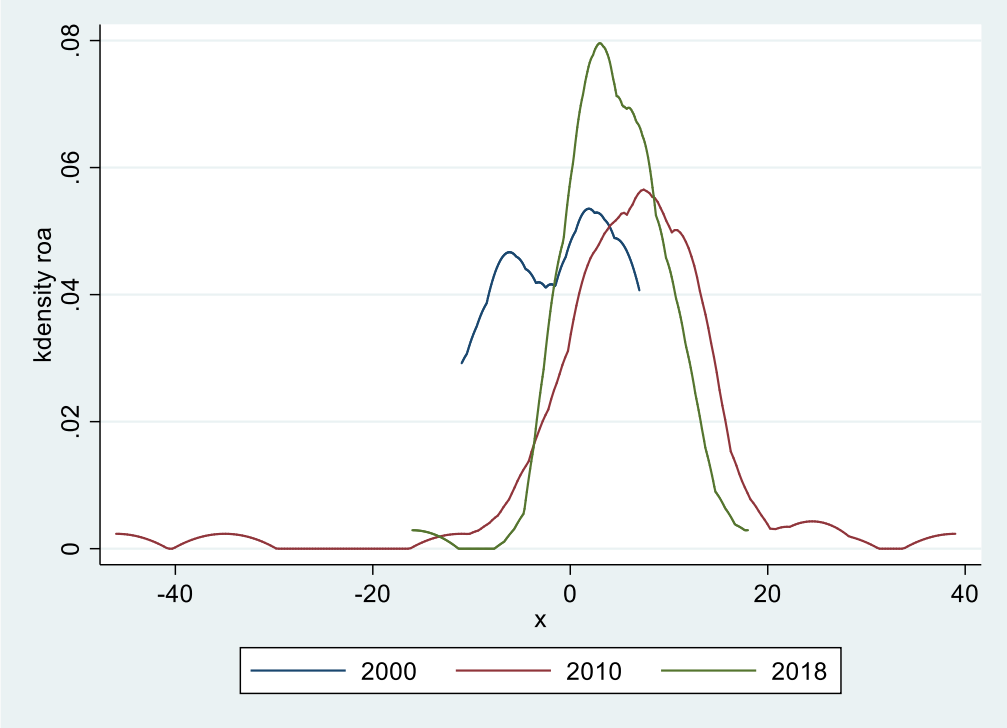
Source: Authors' computations based on data from the Stock Exchange of Thailand

Figure 9: Finance & Securities - Estimated Probability Density Function for ROA



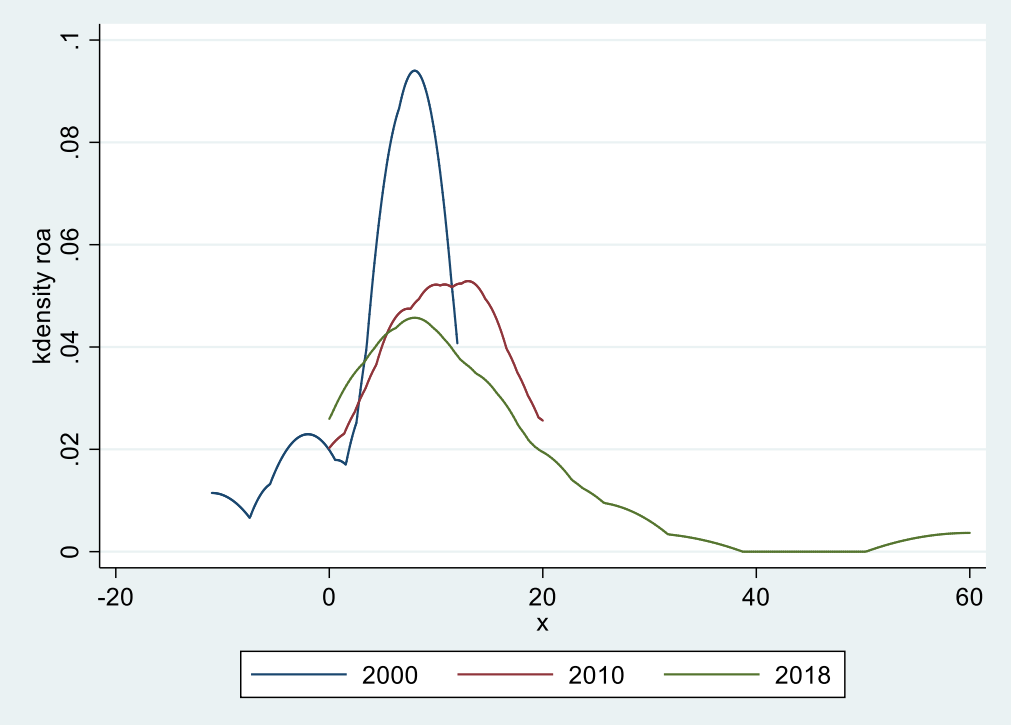
Source: Authors' computations based on data from the Stock Exchange of Thailand

Figure 10: Property Development - Estimated Probability Density Function for ROA



Source: Authors' computations based on data from the Stock Exchange of Thailand

Figure 11: Commerce - Estimated Probability Density Function for ROA



Source: Authors' computations based on data from the Stock Exchange of Thailand

4. Empirical Analysis

An analysis of the evolution of the distribution of ROA does suggest that there might be a relationship between firms' financial performance and structural change.[2] This relationship is investigated more carefully by undertaking an econometric analysis. Variations in financial performance across firms provides firm-level heterogeneity in the econometric analysis.

4.1 Methodology

A firm's financial performance is hypothesized to be correlated to structural change in the economy. To test this hypothesis, the following equation is estimated for a firm i located in industry j:

$$PERF_{ijt} = \beta_0 + \boldsymbol{X}_{ijt}'\beta_1 + \boldsymbol{Z}_{jt}'\beta_2 + \varepsilon_{ijt} \quad (1)$$

where PERF is the financial performance, $\boldsymbol{X}$ the vector of firm characteristics and $\boldsymbol{Z}$ the vector of sectoral and macroeconomic variables. Two measures of financial performance are used, namely, the return on asset (ROA) and return on equity (ROE). The firm characteristic variables used include total asset (to proxy firm size), a dummy variable for family-owned business (25% equity threshold) and foreign-owned business (25% equity threshold). The economic variable used that capture structural change is sectoral GDP share and sectoral employment share.[3] The inclusion of GDP growth accounts for the effects of the business cycle on firm performance. The Hausman test is implemented to check whether fixed and random effects estimations should be used. Panel data regressions and panel data quantile regressions are undertaken. The latter, which is based on Powell (2015), has the advantage of taking into account the non-normal distribution of the financial performance variables across firms.

Firm-level panel data is used to estimate the above model. The data covers 627 firms listed in the Stock Exchange of Thailand from 2000 to 2018. There are 8,306 observations in the dataset. These are distributed across 27 industries. The sectoral GDP and employment shares, as well as GDP growth data, are all obtained from the World Bank.

The summary statistics for the variables that are used in this study are presented in Table 1. Overall, there are significant variations in the values for ROA and ROE. The firms in the dataset are all large as they are listed companies. This is reflected in the total asset size. About a third of the firms in the sample are family-controlled firms based on a 25 percent threshold. Using a similar threshold, about 14 percent of firms in the sample have significant foreign participation. The sectoral shares for GDP and employment have a wide range of values as well. This applies to GDP growth as well.

[2] As a reviewer has noted, it might be problematic to correlate firm-level productivity with GDP-related variables. Even though financial performance is affected by productivity, industry and sector-level affects driven by exogenous sectors drive financial performance. A highly productive firm in a declining sector can experience low financial returns.

[3] The correlation between sectoral GDP share and sectoral employment share at -0.0847 is weak.

Table 1: Summary Statistics

	Obs	Mean	Std. Dev.	Min	Max
ROA (%)	8,300	6.6	11.6	- 274	127.0
ROE (%)	7,933	0.22	383	-32,545	1,292
Total Asset (Thai Baht)	8,222	4.21 mil	215 mil.	73,521	3.19 bil
Sectoral GDP Share (%)	8,328	9.54	1.06	8.12	11.59
Sectoral Employment Share (%)	8,328	31.06	9.48	18.83	48.79
GDP Growth (%)	8,328	3.95	2.23	-0.69	7.51
		No	Yes		
Family Ownership	Number	5,640	2,684		
	Percent	67.76	32.24		
Foreign Ownership	Number	7,182	1,142		
	Percent	86.28	13.72		

Source: Authors

4.2 Empirical Results

Two tests are carried out to ensure the estimations are correctly implemented. First, the results from the test for autocorrelation in panel data suggested by Wooldridge (2002) indicated that autocorrelation is not a problem. Second, the Hausman specification test indicated that the fixed effects model is appropriate for the estimation. Results from the panel regression and panel quantile regression estimations for both ROA and ROE are reported in Table 2 and Table 3 respectively.[4] As a determinant of financial performance, both firm size and foreign ownership are statistically significant. Larger firms and foreign ownership are likely to be associated with lower financial performance in terms of ROA. The result for ROE is different for the quantile regression suggesting that non-normal distribution of ROE could effectively mean the reverse results. The influence of sectoral change is evident, particularly for GDP share. Sectoral GDP is positively and significantly related to financial performance for both ROA and ROE. The results suggest that a firm operating in a sector with increasing sectoral share is likely to enjoy a better financial performance. Sectoral employment share is not statistically significant. This could be due to existing barriers to the relocation of workers across sectors in Thailand as noted by Klyuev (2015). A higher rate of overall economic growth is also associated with higher levels of ROA and ROE. Overall, these results do support the qualitative evidence presented earlier using probably density functions.

[4] The cluster sandwich estimator is also implemented to relax the requirement that the observations be independent. The results do not change when this estimator is used.

Table 2: Econometric Results – Panel Regression

Variables	(1) ROA	(2) ROE
Total Assets	-0.110***	-0.0764***
	(0.0143)	(0.0172)
Family-owned	-0.0239	-0.0515
	(0.0330)	(0.0400)
Foreign ownership	-0.104**	-0.322***
	(0.0516)	(0.0617)
Sectoral GDP Share	0.686***	0.586***
	(0.0769)	(0.0920)
Sectoral Employment Share	0.0578	0.0481
	(0.0446)	(0.0534)
GDP Growth	0.106***	0.131***
	(0.0134)	(0.0161)
Observations	6,411	6,147
Number of firms	601	598

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Source: Authors

In terms of their relevance to the existing literature, the results provide another perspective on the firm-level dynamics during the process of structural change. In the existing theoretical and empirical literature, resource reallocation takes place with entry-exit and changes in firm size. Productivity level is a key feature or variable in these studies. Though productivity and financial performance are likely to be related, the latter is likely to be a more direct measure or variable that affects business decisions.

Table 3: Econometric Results – Quantile Panel Regression

Variables	(1) ROA	(2) ROE
Total Assets	-0.0921***	0.0541***
	(0.00751)	(0.00117)
Family-owned	-0.0197	0.0376**
	(0.0187)	(0.0155)
Foreign ownership	-0.0372	-0.0441***
	(0.0532)	(0.00771)
Sectoral GDP Share	0.309***	0.985***
	(0.0797)	(0.0797)
Sectoral Employment Share	0.0248	0.144***
	(0.0414)	(0.00857)
GDP Growth	0.142***	0.121***
	(0.0179)	(0.0139)
Observations	6,411	6,147
Number of firms	601	598

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
Source: Authors

5. Conclusions

Structural change is a process that involves resource reallocation across sectors. At the firm-level, the process by which this takes place involves entry, exit, and change in firm size. Productivity is a key variable in this story. Another perspective of this process involves looking at the financial performance of firms. This study finds that firms in economic sectors that are expanding (e.g., services) tend to have better financial performance compared to their counterparts in shrinking sectors. Sectoral GDP is a good measure of these changes especially in the case of Thailand which encounters inter-sectoral reallocation of labour.

From a policy perspective, the policy response to structural change needs to map sector-level development to more micro-level performance at the firm level. Data and trends at both levels can provide complementary indicators on the effects of structural change to policymakers. This study makes several contributions to the growing literature on financial performance, especially using accounting-based performance as a measurement. The use of statistical distributions for firm performance also provides a good picture of how structural change is affecting firms in terms of the number of firms affected and intensity of the impact.

Even though the use of listed companies as a data source has several advantages, there are some limitations. First, such data covers only large firms. This may not necessarily be a weakness as large firms tend to dominate the economy. In a recent work, Carvalho and Grassi (2019) showed that a large fraction of macro-dynamics is driven by large firms. Another weakness is that the population of listed firms is relatively stable, with very few entries and exits. Firm-level churning most occur amongst smaller firms. Such dynamics are not captured when listed company data are used. Another weakness pertains to changes in business portfolios during structural change. The business classification used in this study is static. Thus, the effects of business switching and diversification cannot be captured using the data used in this study. Despite the above weaknesses, the use of financial performance data to study the effects of structural change at the micro-level provides useful insights.

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Appendix

Table 1: Distribution of Firms Across Industries

Industry	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
1.Agribusiness	21	20	20	21	20	20	21	20	18	18	15	15	15	15	16	12	12	12	11	322
2.Food & Beverage	22	22	22	23	22	22	26	24	24	23	25	26	26	28	33	39	39	39	39	524
3.Fashion	26	26	26	26	25	25	27	24	24	24	23	23	23	23	23	23	23	23	23	460
4.Home & Office Products	7	7	7	7	8	8	12	12	11	11	10	10	10	10	13	11	11	11	11	187
5.Personal Prod & Pharmaceuticals	2	2	2	2	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	94
6.Banking	14	14	14	14	12	14	13	11	11	12	11	11	11	11	11	11	11	11	11	228
7.Finance & Securities	21	22	27	29	33	35	36	34	33	33	31	31	29	29	29	31	31	31	31	576
8.Insurance	22	21	21	20	20	19	18	18	16	17	17	17	17	18	18	16	16	16	16	343
9.Automotive	8	8	9	10	12	19	20	19	20	19	18	19	17	16	17	19	18	18	18	304
10.Industrial Materials & Machinery	4	3	3	2	2	2	21	21	23	23	23	7	7	7	8	9	9	9	9	192
11.Paper & Printing Materials	5	4	4	3	3	3	3	3	2	2	2	2	2	2	1	1	1	1	1	45
12.Petrochemicals & Chemicals	13	12	12	12	13	14	13	12	12	11	12	12	12	12	13	14	14	14	14	241
13.Packaging	14	12	13	13	15	14	13	13	13	13	13	13	13	14	14	17	17	17	17	268
14.Steel	0	0	0	0	0	0	0	0	0	0	0	27	26	26	26	27	27	27	27	213
15.Construction Materials	24	23	18	22	28	37	29	31	31	31	30	19	19	20	21	19	19	19	19	459
16.Property Development	24	23	29	31	41	49	54	58	58	60	61	62	63	67	51	55	55	55	55	951
17.Construction Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	19	19	19	19	94
18.Energy & Utilities	11	10	9	11	15	17	22	21	26	25	25	24	26	28	30	38	38	38	38	452
19.Mining	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	31
20.Commerce	12	13	14	15	13	11	15	14	14	14	14	13	16	19	19	21	21	21	21	300
21. Health Care Services	11	10	10	12	13	13	14	13	13	13	13	13	14	15	15	16	16	16	16	256
22. Media & Publishing	15	15	18	22	24	28	26	26	26	25	25	26	27	28	27	29	29	29	29	474
23. Professional Services	2	2	2	2	4	4	2	3	3	3	3	3	3	3	3	3	3	3	3	54
24. Tourism & Leisure	12	12	10	10	12	11	16	15	15	14	13	13	12	12	12	12	12	12	12	237
25.Transportation and Logistics	12	12	12	12	13	13	14	14	15	15	16	16	16	16	17	19	19	19	19	289
26. Electronic Components	18	18	18	22	26	26	12	11	10	11	11	11	11	11	11	11	11	11	11	271
27. Information & Comm Technology	9	11	12	15	17	18	25	25	27	27	27	27	27	27	27	30	30	30	30	441
Total	**330**	**323**	**333**	**357**	**396**	**427**	**459**	**450**	**453**	**452**	**446**	**448**	**450**	**465**	**481**	**510**	**509**	**509**	**508**	**8,306**

Source: Authors

Table 2: Classification of Industries by Sectors

Agriculture	Manufacturing	Services
1.Agribusiness 19.Mining	2.Food & Beverage 3.Fashion 4.Home & Office Products 5.Personal Prod & Pharmaceuticals 9.Automotive 10.Industrial Materials & Machinery 11.Paper & Printing Materials 12.Petrochemicals & Chemicals 13.Packaging 14.Steel 15.Construction Materials 26. Electronic Components 27. Information & Comm Technology	6.Banking 7.Finance & Securities 8.Insurance 16.Property Development 17.Construction Services 18.Energy & Utilities 20.Commerce 21. Health Care Services 22. Media & Publishing 23. Professional Services 24. Tourism & Leisure 25.Transportation and Logistics

Source: Authors