

Diversified firms and Productivity in Japan*

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Abstract

This study analyzed the relationship between the diversification of Japanese corporate firms and productivity, using “Financial Statements Statistics of Corporations by Industry” by the Ministry of Finance. The diversification indicated by the statistics showed that the share for diversified firms declined substantially from 2003. The diversification tendency was stronger for non-manufacturing industries than for manufacturing industries and less for specialized industries. Enterprises were diversified to expand into real estate, rental service and retail/wholesale industries. Manufacturers were diversified within the manufacturing sector.

Diversified firms, though featuring less productivity than non-diversified ones, tended to improve productivity over a long time. The improvement was greater for firms with greater management divisions. Non-manufacturing firms diversified to expand into manufacturing reduced productivity.

Key words: Diversification, Total factor productivity

JEL Classification: L11, L22, L25

I. Introduction

In Japan, we observe firm activities at industrial level by formal statistics. But if the firm’s activity is spread between multiple industries, we cannot estimate their activity precisely. Though this problem is solved by using firm or establishment level data, it is not perfect.

For “Census of Manufacturing” by the Ministry of Economy, Trade and Industry (METI) is surveyed not at the firm-level but the establishment-level (and product-level for an amount of shipments), we can calculate the activity of multiple-producing firms. But a diversified report has not been published after 1990 and the subjects of this survey are limited to manufacturing establishments. “The Basic Survey of Japanese Business Structure and Activities” by METI reports firms’ sales by department section. Though this survey supplies

* Policy Research Institute, Ministry of Finance supplied an individual data of “Financial Statements Statistics of Corporations by Industry”, Dr. Orihara who is a former economist of the institute advised about conversion of the data into panel data. Moreover, in a conference at the institute, I received many comments. I appreciate their contribution. All of the error in this paper attribute to the author.

information about diversifying firm's activity, the department section defined is classified by one-digit level. So, we cannot see the details.

In the questionnaire of "Financial Statements Statistics of Corporations by Industry" by the Ministry of Finance, firms report not only prime activity sales but also subsidiary activity (we call prime industry, first industry, and subsidiary industry, second industry) and other activities. Moreover, a classification of this survey is 2-digit level which is based on Japanese Standard Classification. "Financial Statements Statistics of Corporations by Industry" is superior to the two surveys in the aspect of observation of a firm's diversification. But the sales of second industry is not reported formally.

In recent years, many researchers focus on a firm's diversification (Bernard, Redding and Schott (2010), Eckel and Neary (2010) abroad, Kawakami and Miyagawa (2013), Dekle, Kawakami, Kiyotakaki and Miyagawa (2015) in Japan). This research investigates incumbent firms' products added and dropped, but the research subjects are only manufacturing firms because of the data subject's limitation.

Considering the above, this paper observes a firm's diversification and compares the productivity between firms that are not diversified and those that are diversified. Previous literature has suggested that diversified firms which have enough management resources and core competence grew rapidly. But the hypotheses are not investigated by enough empirical works. This paper estimates the hypotheses by using rich individual data of Japanese corporations. The estimation results suggest that diversified firms are less productive for their level of productivity and more productive in terms of their growth of productivity compared to non-diversified firms.

In the next section, we suggest hypotheses for estimations from previous literature. Section 3 shows a summary of statistics of the "Financial Statements Statistics of Corporations by Industry" and Section 4 shows the detail of diversification in Japan. In Section 5, we estimate the relationship between diversification and productivity, and Section 6 shows a conclusion of the estimation and the remaining problems.

II. Previous Literatures and Hypothesis

In a classic, economics regarded diversification in a frame of "Economies of Scopes", which is that firms that produce more than two products can reduce their costs. In contrast, Penrose (1962) focuses the character of diversification in aspect of firm growth. Penrose (1962) suggested that firms which are not diversified face constraints by the growth of the market that the firms belong to. So, diversified firms will be able to grow because their flexibility to change within the market in the long term while Penrose (1962) referred that the firms need core competence and management resources for success of diversification.

Tece (1982, 1986) suggested that "Dynamic Capability", which is a skill to integrate, construct and re-structure resources in the organization is important for vertical diversification and maintaining competitiveness in the long term based on Penrose (1962) and a transaction cost approach with Williamson (1975).

Prahalad and Hamel (1990) focused on a firm's expertise. They defined "Core competence", which is the skill or ability to produce products or services not to be imitated by competitors. Additionally, core competence is defined as an ability to stimulate multiple products or enter multiple markets. Prahalad and Hamel (1990) suggested the engine technology of Honda in Japan as an example of core competence for diversifying. Honda could produce lawnmowers and snow removers by using engine technology based on producing cars. This practice shows that core competence is important for diversification. But in other words, diversifying to other industries which are far from core competencies of the firm's main products are less productive (Eckel and Neary (2010)).

In contrast to the suggestion of previous works, empirical works estimated for both results that diversified firms are more productive and less productive than non-diversified firms. For example, Schoar (2002) investigated that diversified firms reduce productivity through the reduction of main product lines. Maksimovic and Phillips (2003) estimated that firms with multiple segments are less productive compared to single segment firms because of the entered segment's less productivity.

Goto, Low and Makhija (2008) studied the American electric industry and estimated that a condition of success in diversification is holding technology represented by holding patents. Jan, Weng and Wang (2005) focused on growth of productivity being stimulated by the diversification of products by 4-digit or 7-digit classifications by empirical analysis of the Taiwan electronics industry.

Many theoretical works showed that diversification stimulates the efficiency and growth of firms. But empirical works were not matched with theoretical suggestion. For investigation of the relationship between diversification and productivity, we verify below the hypotheses based on the literature above.

Penrose (1954) emphasized that diversification gives the firms the ability to maintain competitiveness. Considering this suggestion, we learned the hypothesis below.

Hypothesis 1: Diversified firms grew greater than non-diversified firms.

This paper does not compare the growth of sales or employment but total factor productivity to assume the firms compared are in the same markets and are the same size for estimation of their competitiveness.

Teece (1982, 1986) suggested that dynamic capability is a key factor for success of diversification. Penrose (1954) also directed the role of excess of managing resources. Their hypothesis gives an empirical hypothesis.

Hypothesis 2: Managing resources stimulates an effect of diversification to productivity.

We adopt a ratio of the executives' total compensation to the total compensation as a proxy indicator of managing resources.

Prahalad and Hamel (1990) suggested that the firms should diversify to markets near the

market of their core competency to earn the benefits from diversification. In other words, diversified markets which are distant to core competencies stimulate marginal cost (Eckel and Neary (2010)).

Hypothesis 3: Diversifying markets which are far from main markets is inefficient.

We break down diversification into diversifying to industries different from the main industry and the same industry. The classification of the break down consists of manufacturing, non-manufacturing and primary sectors.

III. Data

In this section, topics that are introduced include a summary of “Financial Statements Statistics of Corporations by Industry”, calculation methodology of a second industry, relative productivity index and converting panel data. We use individual data of “Financial Statements Statistics of Corporations by Industry” which reports yearly financial items. The subjects of “Financial Statements Statistics of Corporations by Industry” are for-profit corporations in Japan. Because the survey did not follow financial corporations until the year of 2008, the financial industry is excluded from estimating subjects. A former survey was implemented from 10 January and a latter survey from 10 July. The survey years we use are from 1983 to 2014 and the sample size is 23,748.

The industrial classification of “Financial Statements Statistics of Corporations by Industry” is based on Japan Standard Industrial Classification (JSIC). But the industrial classification of the survey was revised in 1994, 2004, 2008 and 2009, uniquely. Because of the revision of the classification, we must unite the same industrial classification for each company. In this paper, we divide classification type A integrating between 1983-2014 and type B integrating 2004-2014. We set type B classification because the names of second industries were surveyed from 2003 and recent industry classification is detailed and subdivided, especially in the service industry¹. Industrial classifications are shown in Table 1.

‘Sales by industries’ in the survey items in “Financial Statements Statistics of Corporations by Industry” provides information to calculate diversifying activity. Table 2 is a questionnaire sheet of “Financial Statements Statistics of Corporations by Industry”². For the questionnaire, the answering firms write the sales of their first industry, second industry and other industries. So, we cannot learn the value of other industries at each firm in detail. And the statistics only surveyed the sales of second and other industries without the name of the second industry. Moreover, the definition of diversification is based on the industrial classification in each survey year.

¹ The definition of classification in Kawakami and Miyagawa (2010) is 6-digit level.

² In ‘Fill Guidance of Financial Statements Statistics of Corporations by Industry in 2016’, it is written that “If your company have multiple activities, write first and second industry’s sales in descending order and residual sales in “other industry””.

Table 1. Classification of industry in “Financial Statements Statistics of Corporations by Industry”

Classification A (1983-)		Classification B (2004-)		Classification from 2014	
1	Agriculture, Forest	1	Agriculture, Forest	1	Agriculture
8	Fishing	8	Fishing	6	Forest
10	Mining	10	Mining	8	Fishing
15	Construction	15	Construction	10	Mining
18	Food	18	Food	15	Construction
20	Textile	20	Textile	18	Food
22	Woods	22	Woods	20	Clothe and other textile
24	Pulp	24	Pulp	21	Textile
25	Printing	25	Printing	22	Woods
26	Chemical	26	Chemical	24	Pulp
27	Petroleum and coal	27	Petroleum and coal	25	Printing
35	Machinery	29	Machinery	26	Chemical
30	Ceramic, stone and clay products	30	Ceramic, stone and clay products	27	Petroleum and coal
31	Steel	31	Steel	29	Machinery
32	Non-ferrol metal	32	Non-ferrol metal	30	Ceramic, stone and clay products
33	Fabricated metal	33	Fabricated metal	31	Steel
34	General machinery	34	General machinery	32	Non-ferrol metal
35	Electric machinery	35	Electric machinery	33	Fabricated metal
36	Cars	36	Cars	34	General machinery
38	Other vehicle	38	Other vehicle	35	Electric machinery
39	Other manufacturing	39	Other manufacturing	36	Cars
40	Wholesale	40	Wholesale	37	Business oriented machinery
49	Retail, Restaurant	49	Retail	38	Other vehicle
34	General machinery	50	Restaurant	39	Other manufacturing
59	Real Estate	34	General machinery	40	Wholesale
89	Other service	59	Real Estate	49	Retail
61	Land transportation	60	Other service	50	Restaurant
64	Water transportation	61	Land transportation	51	General machinery
89	Other service	64	Water transportation	59	Real Estate
70	Electric	69	Other service	60	Other service
71	Gas, heat supply and water	70	Electric	61	Land transportation
89	Other service	71	Gas, heat supply and water	64	Water transportation
75	Hotel	73	Other rental	69	Other service
76	Life related service	89	Other service	70	Electric
89	Other service	75	Hotel	71	Gas, heat supply and water
79	Entertainment Industry	76	Life related service	73	Other rental
		77	Leasing	74	Other service
		79	Entertainment	75	Hotel
		80	Medical and welfare	76	Life related service
		60	Information	77	Leasing
		89	Other service	79	Entertainment
89	Other service	85	Education	80	Medical and welfare
		89	Other industry	81	Broadcasting
				82	Holding companies
				83	Other education and professional service
				85	Education
				86	Placement, Temporary employment agency
				89	Other service

Table 2. Questionnaire of sales by industry (in Japanese)

2. 業種別売上高

決算期	年1回	月	年2回	月、	月
業種コード		最近決算期1年間の売上高			
					百万円
そ の 他					01
合 計					

For estimation of productivity growth, we must set panel data. But “Financial Statements Statistics of Corporations by Industry” does not give the identity number all firms. For giving the identity number, we define a unique firm as the same firm name, address, capital stock and total assets. At first, to adjust sways of Japanese notation in the firm name and address, we convert hiragana, katakana and alphabet from full-width to half-width, eliminate p-sounds and consonant signs attached to kana and symbols.

If both the firm’s name and address and “last year’s capital stock” or “last year’s total assets” and “this year’s capital stock” or “this year’s total assets” in last year’s survey are the same, we consider the surveyed firms as unique. The sample size of firms identified was 13,281 in 2004.

The indicator of productivity is a multilateral index suggested by Good, Nadiri and Sickel (1997). This index has calculated the difference between the difference of each firm’s sales and industry average sales and the difference of each of the firm’s inputs and industry average multiplied by each share cost. The calculation equation is below,

$$\ln TFP_{it} = \left(\ln Y_{it} - \overline{\ln Y_t} \right) + \sum_{s=1}^t \left(\overline{\ln Y_s} - \overline{\ln Y_{s-1}} \right) - \left[\frac{1}{2} \sum_{k=1}^3 (S_{ikt} + \overline{S_{kt}}) (\ln X_{ikt} + \overline{\ln X_{kt}}) + \frac{1}{2} \sum_{k=1}^3 \sum_{s=1}^t (\overline{S_{ks}} + \overline{S_{ks-1}}) (\overline{\ln X_{ks}} + \overline{\ln X_{ks-1}}) \right]$$

$\ln TFP_{it}$ is an index of firm i at year t . Y is the real value of sales, X_{ikt} is a deflated value of input k . Input k is capital, labor or intermediates. The line of the variable indicates the variable is at an average value at year t . S_{ikt} is cost share of input k . Table 3 is a descriptive statistic of variables for calculating the productivity index. This index is based on type B classification and calculated between 2004 and 2014.

Table 3. Summary Statistics of Variables for Estimating TFP

	mean	s.d.	minimum	maximum
lnY	8.227	2.240	1.327	16.173
lnK	5.778	2.471	0.475	14.483
lnL	4.579	1.810	0.693	11.328
lnM	7.897	2.374	0.697	16.008
Kshare	0.144	0.170	0.000	0.999
Lshare	0.186	0.144	0.000	0.969
Mshare	0.670	0.209	0.000	0.999

Figure 1 is a time-series comparison of productivity indexes between manufacturing and non-manufacturing firms. Non-manufacturers are less productive than manufacturers. Figure 2 shows that diversified firms are less productive than non-diversified firms.

Figure 1. Change of TFP by Industry

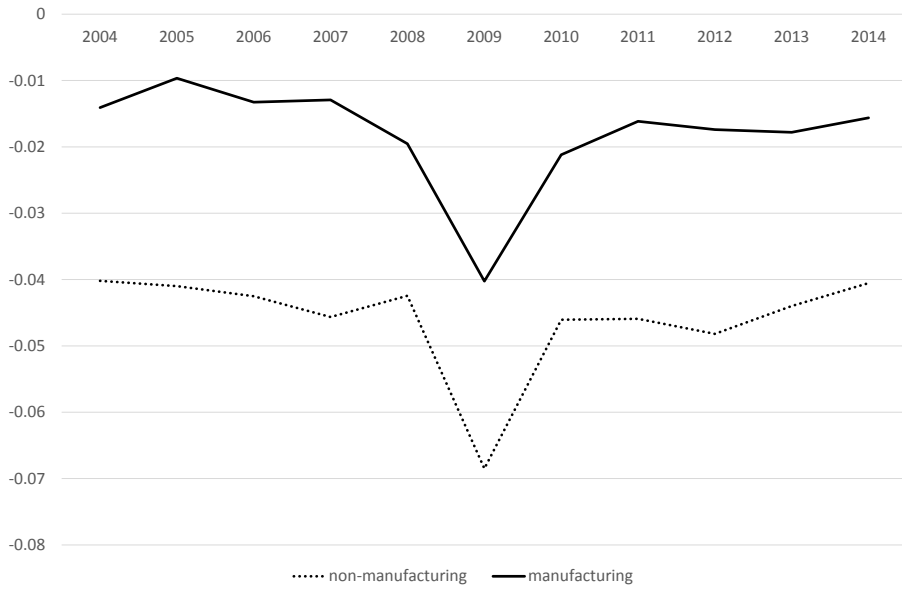
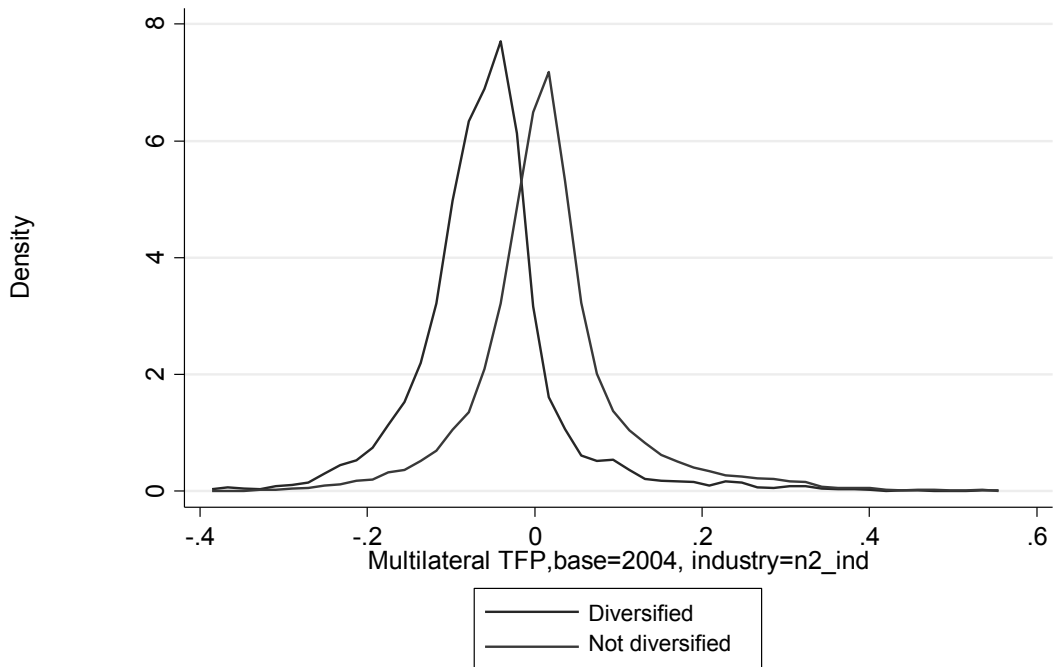


Figure 2. Distribution of TFP (2014)



IV. Diversification of Japanese Corporations

In this section, we review the diversification Japanese corporations from the second industry’s sales of “Financial Statements Statistics of Corporations by Industry”. Whether firms answer the sales of the second industry indicates if the firms are diversified or not³. The definition of diversification is based on the industrial classification of each survey year.

Figure 3 - 1 shows the change of diversification by manufacturing and non - manufacturing industries. Manufacturing firms diversified more than non - manufacturing firms. Obviously in the 80’s and 90’s, the gap is large. The tendency of diversification of Japanese corporations was gradually increasing among the 80’s and 90’s. In 2003, diversified firms consolidated sharply. This tendency is the same as the sales share base calculation (Figure 3 - 2).

Figure 3-1. Change of Diversification (Number of Firms Base)

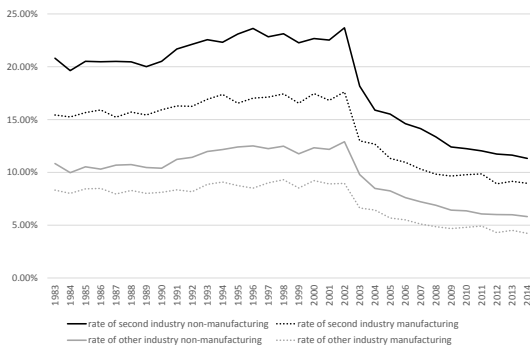


Figure 3-2. Change of Diversification (Sales Share Base)

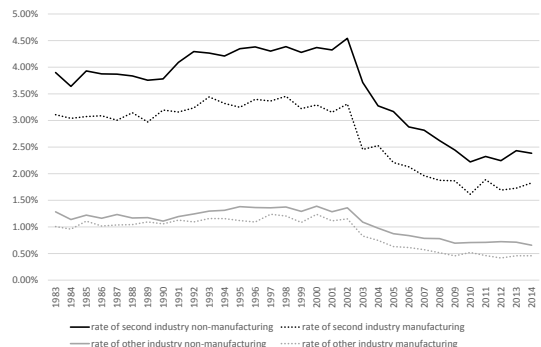


Figure 3-3. Change of Diversification (Sales Share Base, Only Diversification firms)

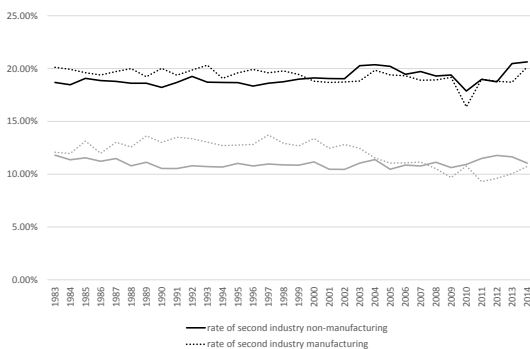
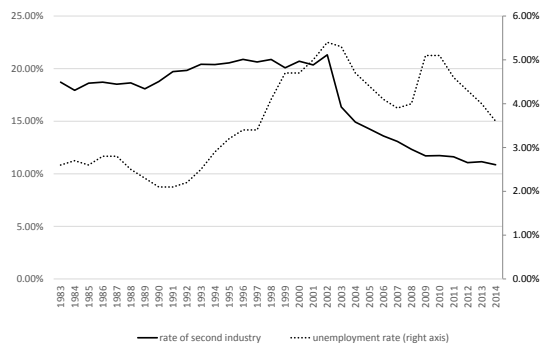


Figure 3-4. Change of Diversification and Unemployment Rate



³ We remove firms in estimated sample who answered only second industry sales (they answered zero value on sale of first industry).

Table 4. Matrix of First Industry and Second Industry for Diversified Firms (2014)

first industry	rate of second ind	second industry															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		1 Agriculture, Forest and Fishing	6.18%	0.00%	0.29%	1.76%	0.00%	0.00%	0.29%	1.18%	2.06%	0.00%	0.00%	0.29%	0.29%	0.00%	0.00%
2 Mining	12.82%	0.17%	0.58%	0.12%	1.12%	0.41%	0.29%	1.87%	5.89%	0.08%	0.46%	0.25%	0.12%	0.29%	0.04%	0.04%	1.08%
3 Manufacturing (Consumption goods)	9.27%	0.14%	0.43%	0.07%	0.86%	0.07%	1.18%	2.43%	2.23%	0.29%	0.43%	0.07%	0.29%	0.07%	0.00%	0.00%	0.71%
4 Manufacturing (Material goods)	9.44%	0.04%	1.31%	0.54%	1.55%	1.24%	0.54%	1.35%	1.86%	0.08%	0.12%	0.12%	0.04%	0.04%	0.00%	0.00%	0.43%
5 Manufacturing (Machinery goods)	7.70%	0.00%	0.65%	0.04%	0.91%	2.90%	0.53%	0.57%	1.11%	0.11%	0.15%	0.04%	0.04%	0.11%	0.00%	0.00%	0.53%
6 Manufacturing (Other goods)	5.82%	0.00%	0.71%	0.14%	1.28%	1.18%	0.00%	0.28%	1.28%	0.28%	0.00%	0.00%	0.00%	0.43%	0.28%	0.00%	0.00%
7 Wholesale and Retail	11.90%	0.05%	1.14%	0.30%	0.37%	0.30%	0.20%	2.20%	3.16%	0.12%	0.47%	0.15%	0.57%	0.47%	0.10%	0.12%	2.11%
8 Real estate and rental	9.83%	0.00%	2.15%	0.19%	0.09%	0.09%	0.09%	2.57%	0.25%	0.14%	0.47%	0.05%	0.80%	1.40%	0.14%	0.05%	1.31%
9 Information	4.98%	0.00%	0.28%	0.07%	0.07%	0.14%	0.00%	0.93%	1.28%	0.00%	0.14%	0.07%	0.07%	0.07%	0.21%	0.11%	1.14%
10 Transport	18.19%	0.00%	0.47%	0.08%	0.24%	0.00%	0.08%	1.57%	6.85%	0.00%	6.06%	0.24%	0.71%	0.71%	0.00%	0.00%	1.18%
11 Electric, gas, heat supply	8.22%	0.00%	2.80%	0.00%	0.00%	0.00%	0.00%	3.33%	0.22%	0.00%	0.00%	2.23%	0.00%	0.00%	0.00%	0.00%	0.44%
12 Hotel, restaurant	10.48%	0.00%	0.34%	0.52%	0.00%	0.00%	0.00%	1.37%	4.12%	0.00%	0.00%	0.00%	2.23%	0.86%	0.34%	0.17%	0.52%
13 Life related service and entertainment	9.26%	0.11%	0.44%	0.00%	0.00%	0.00%	0.00%	2.40%	3.49%	0.00%	0.44%	0.22%	6.65%	0.54%	0.22%	0.22%	0.54%
14 Medical and welfare	4.98%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.31%	2.49%	2.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15 Education	7.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.61%	1.82%	1.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.82%
16 Other service	6.92%	0.00%	1.40%	0.04%	0.12%	0.25%	0.21%	1.11%	1.73%	0.41%	0.04%	0.16%	0.29%	0.16%	0.08%	0.08%	0.82%
All industries	9.76%	0.04%	0.96%	0.20%	0.57%	0.63%	0.29%	1.60%	2.58%	0.14%	0.58%	0.16%	0.36%	0.43%	0.08%	0.06%	1.00%

Note) Colored cells indicate that the second industries are ranked in the top 3 in each of the 16 industries, respectively. And industries ranked in the top 1 are bold.

For checking a reason for the decline of the second industry’s sales share, Figure 3-3 shows the change for only diversified firms. This figure does not illustrate the decline of the share of diversified industries. The decline of second industries’ sales share was caused by the consolidation of diversified firm. These findings suggest that the consolidation of diversified firms stimulated a high unemployment rate in 2002 or 2003.

Table 4 is a diagram of diversification calculated by first and second industries. Transportation, mining, construction, wholesale and retail industries tend to have second industries. The finding above supplements the tendency shown in Figure 6-1 and Figure 6-2. Otherwise, ICT, medical and welfare and primary industries which need professional skills do not tend to have the activities of a second industry. The most diversified industry is the real estate industry (2.8%), and wholesale and retail (1.66%) and other service industries (1.00%) follow.

Manufacturing firms have a tendency to enter the market of manufacturers. While consumption related manufacturing firms diversify real estate, the wholesale and retail industry, material related manufacturing and machinery industries are diversifying industries classified to the same industry. This tendency that diversifying with related industries of the main activity has appeared in transportation, electric and hotel & restaurant industries.

V. Estimation a relationship between diversifying and productivity

We estimate the relationship between the level of productivity and growth of productivity. For verifying Hypothesis 3, the estimation is carried out by three types of sectors; industrial production sector (construction, mining and manufacturing) and non-manufacturing sector.

Table 5 illustrates the estimation results of the level of productivity and diversification. We adopted a fixed effect model and prepared a dummy variable which indicates diversification is defined as that the second industry’s sales are more than zero or zero. Moreover, the dummy variable distinguishes the types of diversified sectors (industrial sector, non-manufacturing sector and agricultural sector). The coefficients of the dummy variables mean the productivity difference with non-diversified firms. The estimation results show

that diversified firms are less productive than non-diversifying firms. Additionally, diversifying agriculture is inefficient. Especially, this relationship is obvious in industrial sector firms, which are investigated by an estimation of the limitation to industrial sector firms.

Hypothesis 1 is rejected but hypothesis 3 is accepted partly in the above estimations. But causality of the relationship is not considered in Table 5. For avoiding the causality of low level productivity firms entering new markets, we replace the level value with the growth value in the definition of dependent variables. The estimation is represented in Table 6.

Table 5. Diversification and Level of TFP

	All industry	All industry	Manufacturing	Non-manufacturing
Diversification dummy	-0.025 *** -19.50			
Diversification dummy (Agriculture)		-0.036 ** -2.24	-0.038 *** -2.79	-0.043 -0.98
Diversification dummy (Manufacturing)		-0.023 *** -10.48	-0.022 *** -10.25	-0.014 *** -2.90
Diversification dummy (Non-manufacturing)		-0.026 *** -17.43	-0.020 *** -9.35	-0.020 *** -9.92
Constant	-0.107 *** -19.25	-0.107 *** -19.20	-0.037 *** -6.24	-0.050 *** -19.46
Year dummy	YES	YES	YES	YES
Main Industry dummy	YES	YES	YES	YES
Sample size	197739	197424	87250	107469
Number of group	50734	50637	27052	35149
R2 (between)	0.014	0.014	0.013	0.015
R2 (within)	0.052	0.052	0.051	0.040
R2 (overall)	0.017	0.018	0.016	0.012
F statistics	67.380	64.870	48.310	41.440
	0.000	0.000	0.000	0.000

Note) Coefficients are in upper cells and heteroskedasticity-robust t statistic in lower cells. The method of estimation is fixed effect model. Asterisk *, ** and *** indicate significant levels for t-test are 10%, 5% and 1%, respectively.

Table 6. Diversification and Growth of TFP

	All industry	All industry	Manufacturing	Non-manufacturing
Diversification dummy	0.014 *** 6.81			
Diversification dummy (Agriculture)		0.024 1.01	0.047 1.39	-0.096 ** -2.13
Diversification dummy (Manufacturing)		0.011 *** 3.36	0.006 * 1.85	0.011 1.33
Diversification dummy (Non-manufacturing)		0.015 *** 6.35	0.011 *** 3.01	0.011 *** 3.77
Constant	0.081 *** 6.57	0.081 *** 6.58	0.013 1.00	0.001 0.17
Year dummy	YES	YES	YES	YES
Main Industry dummy	YES	YES	YES	YES
Sample size	108506	108365	49466	57693
Number of group	33861	33805	16884	20725
R2 (between)	0.009	0.009	0.007	0.014
R2 (within)	0.043	0.043	0.039	0.046
R2 (overall)	0.015	0.015	0.010	0.016
F statistics	38.120	36.580	27.860	35.830
	0.000	0.000	0.000	0.000

Note) Coefficients are in upper cells and heteroskedasticity-robust t statistic in lower cells. The method of estimation is fixed effect model. Asterisk *, ** and *** indicate significant levels for t-test are 10%, 5% and 1%, respectively.

While the productivity level is low in diversifying firms, the growth rate of productivity is greater in diversifying firms, greater than non-diversifying firms.

The firms whose main sector is industrial have a higher growth rate of productivity and particularly, diversified industry is in the non-manufacturing sector. In contrast, non-manufacturing sector firms earn the effect from entering the same sector. The latter result verifies assumption 3.

Additionally, we check the long-term effects of diversification. Figure 4-1, 4-2, 4-3, and 4-4 show the estimated diversification effects toward the change of productivity in the long term. The estimation methodology is OLS and the dependent variables are calculated from first lags to 10th lags in the difference of productivity, whose base year is 2004. In this estimation, we compare the firms who are not diversified with firms diversified over 10 years

Figure 4-1. Diversification at 2014 and Change of TFP (Manufacturing Firms)

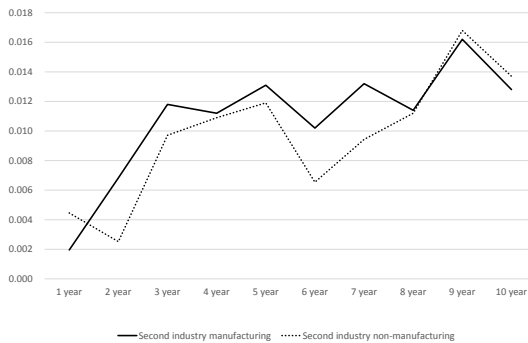
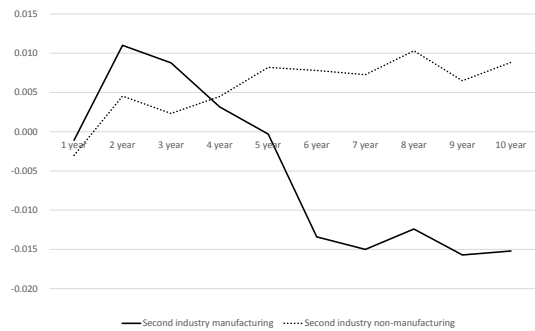


Figure 4-2. Diversification at 2014 and Change of TFP (Non-Manufacturing Firm)



Note) The line indicates the coefficient of diversifying a dummy of OLS estimation for the 2004 year sample. Dependent variables are the differences of TFP from first lags to 10th lags. We compare diversified firms over 10 years with single industry firms over 10 years.

Figure 4-3. Diversification at 2014 and Change of TFP (Manufacturing Firms, by Manage Intensive)

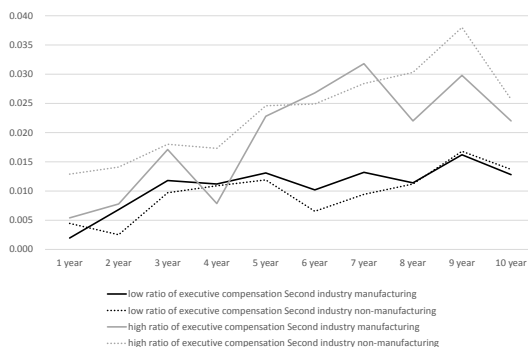
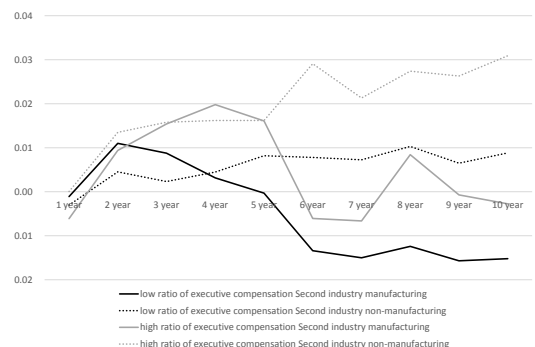


Figure 4-4. Diversification at 2014 and Change of TFP (Non-Manufacturing Firms, by Manage Intensive)



Note) See notes on Figure 4-1 and 4-2.

(2004-2010). Non-manufacturing sector firms do not have a long-term effect over the fourth year gap. The year of the effect disappears in 2008, which occurs due to the remaining shock.

VI. Conclusion

This paper compared diversified firm levels and growth productivity with non-diversified firms from “Financial Statements Statistics of Corporations by Industry”. Diversifying firms are less productive in level estimation but more productive in growth estimation. Moreover, the growth of productivity is observed in the long-term. Diversification is effective for long-term strategies of low productivity firms.

Non-manufacturing firms take much from diversification when the firms diversify to different types of industry with the main industry. This result shows diversification with distance to core competence is less productive for non-manufacturing firms. Otherwise, managing resources indicated by the ratio of executive compensation to general worker compensation stimulates diversifying effects for the growth of productivity.

Kiyota and Takizawa (2008) estimated low productivity firms have a tendency to exit the market. But our estimation suggested that these firms have a possibility to leave the market and recover their productivity through diversification. A support of diversification with consideration toward types of diversification and a firm’s management resources is effective for low productivity firms.

Our investigation has remaining unsolved issues. The classification of “Financial Statements Statistics of Corporations by Industry” is not efficient for calculating a firm’s diversification. Although the gaps of calculating the year remains, we can improve the calculation by using individual-level data of “Economic Census”. And we did not estimate the causality between diversification and productivity but the relationship.

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