Firm Size, Rate of Return on Capital, and Increasing Returns to Scale – The Japanese Financial and Information Communication Service Sectors –[1]

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Abstract

Parallel to rising income inequalities in OECD countries, a few large firms have become mega giants, generating superstar firms and superstar managers, particularly in the financial and information communication service sectors. The increasing returns to scale in these service sectors due to the network effect of information communication technology and globalization in these service sectors can produce this winner-take-most phenomenon. These effects can produce declining average costs and economies of scale, and thereby create the increasing returns to scale in these sectors. This study uses annual time series data for the financial and information communication industries from the Financial Statements Statistics of Corporations by Industry produced by the Japanese Ministry of Finance and the Analysis of Financial Statements of All Banks by the Japanese Bankers Association to investigate the correlation between firm size and the rate of return on capital, as well as the correlation between firm size and capital share in these sectors empirically. Based on a static imperfect competitive model that can produce the structure of increasing returns to scale, we show that this model shows not only the positive relationship between firm size and the rate of return on capital, but also the positive correlation between firm size and capital share. We then investigate this relationship using five-year average data from

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the same sources for four sectors: information and communication services, retail trade, wholesale, and manufacturing, and banking.

Our main findings are as follows. Although the trend in each sector differs, we find a positive relationship between firm size and the rate of return on capital in most service sectors except the information and communication services sector. However, for the movement of capital share, we find positive correlations between firm size and capital share in all service sectors, particularly in the information communication services sector. Thus, although it takes time to generate the positive relationship between firm size and the rate of return in the information and services sector, economies of scale are most likely to prevail in these service sectors even in Japan's economy, which suffered a prolonged stagnation. Conversely, in the manufacturing sector, which we limit to firms manufacturing transportation equipment; electrical machinery, equipment, and supplies; and in the iron and steel industry, the trend in the movement of the rate of return on capital by firm size can synchronize. This finding implies that the parts of the manufacturing sector we examined can potentially have constant returns to scale. Moreover, this study investigates the policy implications of income inequality.

Keywords: increasing returns to scale, firm size, rate of returns on capital, service sector, inequality

JEL Classification: C13, D24, D31, L11, L80

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1. Introduction

Parallel to rising income inequality in OECD countries,[2] a few large firms have become mega giants, generating superstar firms and superstar managers. Recently, Autor et al. (2017a, 2017b) demonstrate the superstar hypothesis, which emphasizes the positive relationship between the sales concentration of a few firms in an industry and a decline in the labor share empirically using micro panel data on the U.S. economy.[3] However, such winner-take-most phenomena can be produced by the mechanism of increasing returns to scale in an industry as an alternative hypothesis. Firms can produce increasing returns to scale via information and communication technology and globalization, particularly those in the service sectors such as the financial and information communication services industries. In these services sectors, due to the network effect of information communication technology and the global competition in the financial and goods markets, the highly expensive installation costs and the larger decline of the marginal costs can decrease average costs and provide economies of scale, and thereby create the increasing returns to scale.[4]

From the aspect of structural change in economic development,[5] we can see the causal relationship between the returns to scale and the associated rate of return on capital, which we illustrate in Figure 1. Namely, at the low level of capital accumulation in which the agriculture sector is relatively dominant, the decreasing returns to scale prevails because land scarcity, and therefore its return on capital, is decreasing (①in Figure 1). In the manufacturing sector, the constant returns to scale dominates, so its return on capital becomes constant, in line with capital accumulation (②in Figure 1). Lastly, at the higher level of capital accumulation, where the service sectors are dominant, the increasing returns to scale is likely to prevail, and thus the return on capital is increasing according to the capital level (③in Figure 1). Thus, in advanced economies with rising service sectors and declining manufacturing sectors, the return on capital is likely to be moving

[2] There are many explanations of rising inequality in OECD countries; for example, for the new technology and capital-labor substitutability, see Saint-Paul (2008), Piketty (2014), Karabarbounis and Neiman (2014), and Laurence (2015); for globalization, see Bliss (2007) and Bourguignon (2015); and for labor market institutions, see Autor (2014) and Atkinson (2015).

[3] See also Van Reenen (2018).

[4] For empirical analyses of economies of scale, see Noulas et al. (1990) and Wheelock and Wilson (2012), for a theoretical analysis, see Wan (2015). However, they do not focus on the Japanese banking sector.

[5] On structural transformation, see Herrendorf et al. (2014).

from phase ② to phase ③ in Figure 1, and we may thus postulate that the size of firm is correlated with the rate of return on capital in the service sectors.

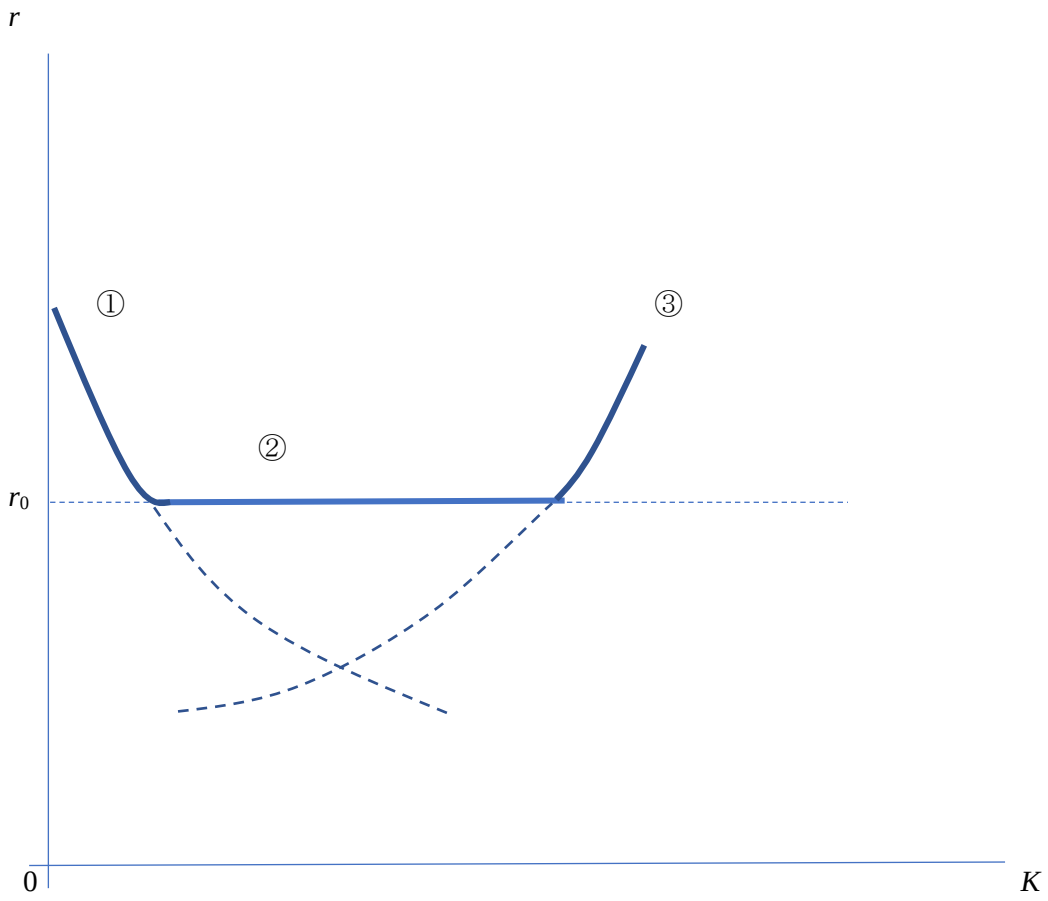


Figure 1 Returns to Scale and the Associated Rate of Return on Capital

This study uses annual time series data for the financial and information communication industries from the Financial Statements Statistics of Corporations by Industry produced by the Japanese Ministry of Finance and the Analysis of Financial Statements of All Banks by the Japanese Bankers Association to analyze the hypothesis empirically by investigating the correlation between the size of firms and the rate of return on capital. Additionally, this study examines the correlation between firm size and the capital share in these service sectors. [6]

[6] For empirical analyses of the Japanese banking sector, see Fukuyama (1996) and Drake and Hall (2003). However, they do not analyze the relationship between firm size and the rate of return, and thus do not investigate the emergence of economies of scale.

Based on a static imperfect competitive model that can produce the structure of increasing returns to scale, we show that this model can provide not only the positive relationship between firm size and the rate of return on capital, but also the positive correlation between firm size and capital share. Then, using five-year average data from the Japanese Financial Statements Statistics of Corporations by Industry published annually by the Japanese Ministry of Finance for four sectors (information and communication services, retail trade, wholesale, and manufacturing) and the Analysis of Financial Statements of All Banks published by the Japanese Bankers Association for the banking sector, we investigate the relationships among these data.

Our main findings are as follows. On the rate of return on capital, although the trends in each sector differ, we find a positive relationship between firm size and the rate of return on capital in almost all service sectors except the information and communication services sector. However, for the movement of capital share, there are positive correlation between firm size and the capital share in all service sectors we study. In particular, we find that it is extremely high in the information communication services sector. Thus, although it takes time to increase the rate of return for large firms in this sector, the illustrative analysis suggests that the structure of increasing returns to scale is almost likely to prevail in these service sectors, even in the Japanese economy, which suffered a prolonged stagnation. In contrast, in the manufacturing sector, the trend in the rate of return on capital by firm size is likely to synchronize, implying the potential to create constant returns to scale in these sectors. However, our data for the manufacturing sector is restricted to the manufacture of transportation equipment (including motor vehicles) and the manufacture of electrical machinery, equipment and supplies, and moreover, the iron and steel industry. Thus, if advanced countries have mainly service sector economies, the analysis suggests that we need policies to deal with the increasing income inequalities due to increasing returns to scale in the service sectors.

The structure of the paper is as follows. Section 2 presents the basic model. Section 3 provides Data and Section 4 presents the results. Section 5 concludes.

2. Basic Model

In this section, based on a simple model that illustrates the economies of scale in an imperfect competitive framework, we illustrate the positive correlation between firm size and the rate of return on capital and the positive relation between firm size and capital share.

Consider an imperfect competitive firm that has a two-factor Cobb-Douglas type production function in each industry:

$$Y = A(K)\,(K - F)^{\beta} L^{\alpha}, \qquad (1)$$

where Y is value-added output, K is capital stock, L is labor, A is total factor productivity and F is the fixed amount of capital needed for production. Here, we assume that A is an increasing function of K, implying that the technological knowledge is embodied in capital stock and its magnitude positively depends on the size of capital. We easily find that this production function that behaves increasing returns to scale. The factor markets in each industry are competitive, but we assume that each firm in each industry has its own factor market. This implies that the rate of return on capital r_i and wage rate w_i determined by its own marginal products in each firm differ according to the size of capital and labor in each firm. In an imperfect competitive goods market, each firm behaves as a price setter and determines its own price of goods, output and employment to maximize current profit subject to the expected demand for the goods produced by each firm $y_i = \eta\ (p_i/P)^{-\varepsilon}$ where η is the average demand for each firm, p_i is price set by firm i, P is the aggregate price level, and ε is the elasticity of demand of each firm with respect to relative prices and $\varepsilon > 1$ is assumed.[7]

In this setting, the nominal rate of return on capital in each firm R_i is as follows:

$$R_i = (1 - 1/\varepsilon)\ \eta^{-1/\varepsilon} A(K_i)^{1-1/\varepsilon}\ (K_i - F)^{\beta(1-1/\varepsilon)-1}\ L_i^{\alpha(1-1/\varepsilon)}\ [\gamma\ \{(K_i - F)/K_i\} + \beta]\ P, \qquad (2)$$

where γ ($\equiv A'K/A$) is the elasticity of total productivity A with respect to K. Since the real rate of return on capital is r_i ($= R_i/P$) from equation (2), we have the effect of increasing capital stock on the real rate of return on capital in the elasticity form as:

$$\hat{r}_i/\hat{K}_i = \gamma\ (1 - 1/\varepsilon) + \{\beta\ (1 - 1/\varepsilon) - 1\}\ K_i/\ (K_i - F) + \frac{\gamma}{\frac{\gamma(K_i - F)}{K_i} + \beta}\ \{\zeta\ (K_i - F)/K_i + F/K_i\}, \qquad (3)$$

where $\hat{x} \equiv dx/x$ and ζ ($\equiv \gamma' K/\gamma$) is the elasticity of γ with respect to capital. ζ represents the degree of the economies of scale; larger value of ζ implies a faster increase in the returns to scale. Indeed, as we see later, this degree of magnitude plays a significant role in the effect on the return on

[7] Blanchard and Giavazzi (2003) specify each firm's elasticity of demand with respect to relative prices as $\varepsilon \equiv \bar{\varepsilon} h(m)$, an increasing function of the number of firms m. If the increase in capital corresponds to the increase in the number of firms, then this implies that the higher competitiveness that produces the lower markup can lead to a negative relationship between firm size and labor share. However, based on the other mechanism of the productivity selection model in Bartelesman et al. (2013) that implies that higher competitiveness leads to more markup, Autor et al. (2017a, 2017b) obtain a positive relationship between firm size and labor share. We obtain the same results, even in the constancy of markup rates because our model alternatively depends on the property of increasing returns to scale technology. Therefore, our result does not significantly depend on the degree of market competitiveness. For the market power and macroeconomic implications, see De Loecker and Eeckhout (2017).

capital and capital share. Moreover, when the capital share is described as s_{Ki} ($\equiv \frac{R_i K_i/P}{p_i Y_i/P}$), the effect of increasing capital on capital share s_K in the elasticity form is

$$\widehat{s_{Ki}}/\widehat{K_i} = \frac{1}{\frac{\gamma(K_i-F)}{K_i}+\beta} \{\zeta K_i/(K_i-F) + F/K_i\} - \beta F/(K_i-F). \quad (4)$$

To simplify the analysis, we set $F = 0$, without loss of generality. Then, we have the following propositions.

Proposition 1:

A larger size of capital can lead to a higher rate of return on capital if

$$(\gamma + \beta)(1 - 1/\varepsilon) + \frac{\gamma}{\gamma+\beta}\zeta > 1. \quad (5)$$

Proposition 2:

A larger size of capital can lead to a larger capital share if

$$\zeta > 0. \quad (6)$$

Note that we derive our results from the property of increasing returns to scale. In other words, if the production technology depends on the property of constant returns to scale, then the increase in capital does not change the rate of return on capital nor the capital share. Therefore, we do not have these results in this case. We can confirm our results even if the production technology depends on the Cobb-Douglas type, implying an elasticity of substitution equal to one. The implication is that if the service sector has increasing returns to scale, then they can produce a positive correlation between both firm size and its rate of return on capital and firm size and its capital share. However, if the manufacturing sector has constant returns to scale, then it does not have these relationships. We later check the service and manufacturing sectors using Japanese data.

Among the properties of the increasing return to scale in the industry in our model, the factors enhancing the firm productivity (e.g., larger γ, larger ζ) play a significant role because the productivity effect can provide more sales, outputs, profits, and therefore a higher rate of return and larger capital share.

From these propositions based on the assumption of economies of scale,[8] the firm with a large capital stock has the higher rate of return on capital and capital share. Autor et al. (2017a, 2017b)

[8] Our analysis of economies of scale is rather static. For a dynamic perspective, Niehans (1963) developed an interesting model that captures the effect of economies of scale on endogenous capital and labor in a growing economy.

obtain similar results in their superstar firm model based on Bartelesman et al.'s (2013) productivity model and U.S. data. However, they focus mainly on the negative relationship between sales concentrations and the labor share.

In the next section, we investigate the correlation between firm size and the rate of return on capital and between firm size and the capital share in the main service sectors based on our intuitive analysis. We use mainly the data from the Japanese Financial Statements Statistics of Corporations by Industry.

3. Data

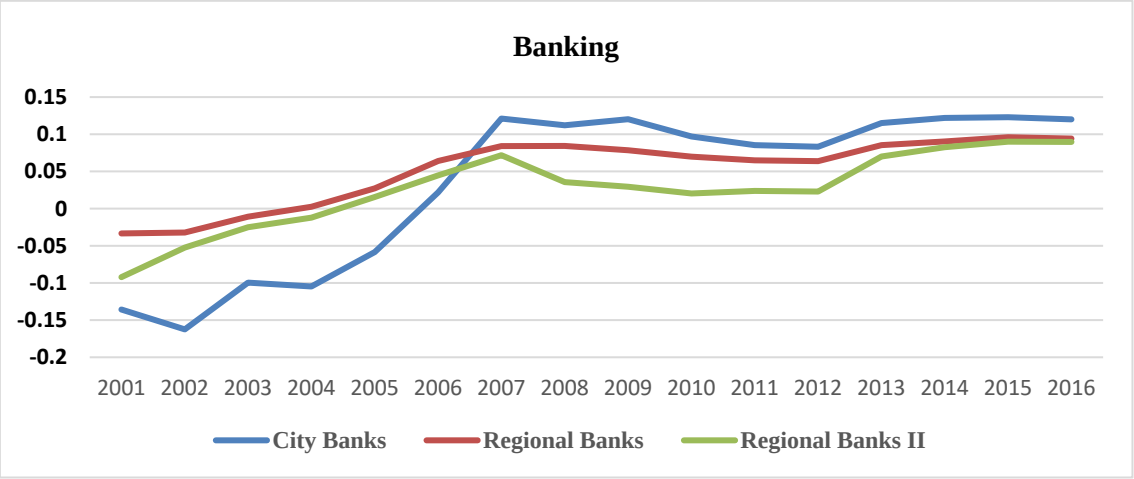
To focus on the main service and manufacturing sectors, we use data from the Japanese Financial Statements Statistics of Corporations by Industry issued by the Japanese Ministry of Finance annually for four sectors: information and communications services, retail trade, wholesale trade, and manufacturing. For the banking sector, we use data from the Analysis of Financial Statements of All Banks provided by the Japanese Bankers Association.[9] Specifically, for the information and communications services sector, we use the data for 2007-2016 by taking the five-year average. For the retail trade, wholesale trade, and manufacturing sectors, we use data from 1973 to 2016 by taking the five-year average. In the manufacturing sector, we focus on the iron and steel industry and the manufacturers of transportation equipment (including motor vehicles), and electrical machinery, equipment, and supplies. For the banking sector, we use data for 2000 to 2016 by taking the five-year average.

We calculate the rate of return on capital r and the capital share s_K in each sector as follows. First, to measure the capital share in each sector, we calculate the labor share s_L, which consists of the personnel expenses valued added outcomes ratio. Then, the capital share is one minus this labor share. Second, we calculate the rate of return on capital by multiplying the capital share by the value added outcome capital stock ratio; thus, $r = s_K \times Y/K$. To measure the value added capital stock ratio Y/K, for the four non-banking sectors, we use the value added output capital assets ratio in each sector from the Japanese Financial Statements Statistics of Corporations by Industry.[10] For the banking sector, we evaluate the rate of return on capital as the net income shareholders' equity ratio (equivalent to the return on equity net the return rate) from the Analysis of Financial Statements of All Banks because capital assets in the banking sector contain a lot of financial assets.

[9] Autor et al. (2017a, 2017b) consider six sectors: manufacturing, finance, services, utilities and transportation, retail trade, and wholesale trade.

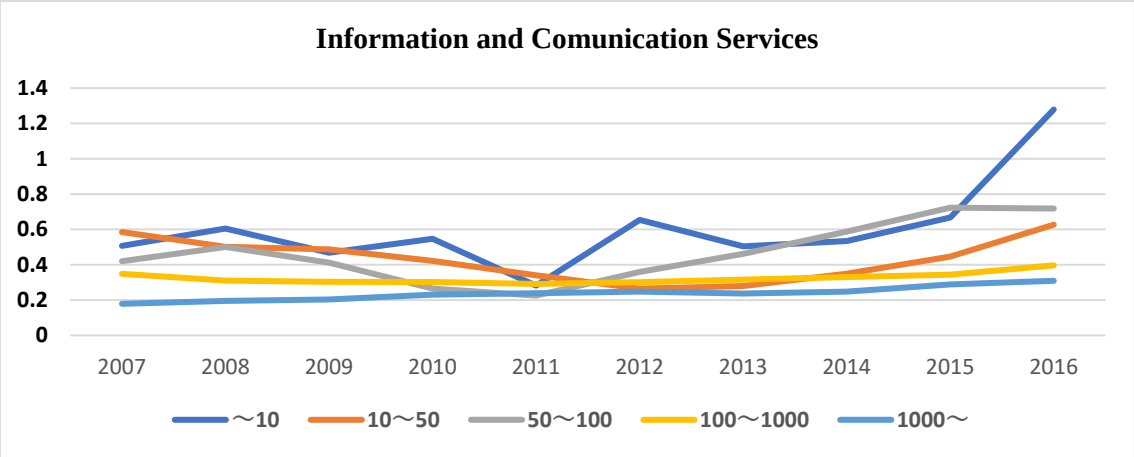
[10] These capital assets are the sum of tangible and intangible fixed assets.

Figure 2A: Rate of Return on Capital: Banking Sector



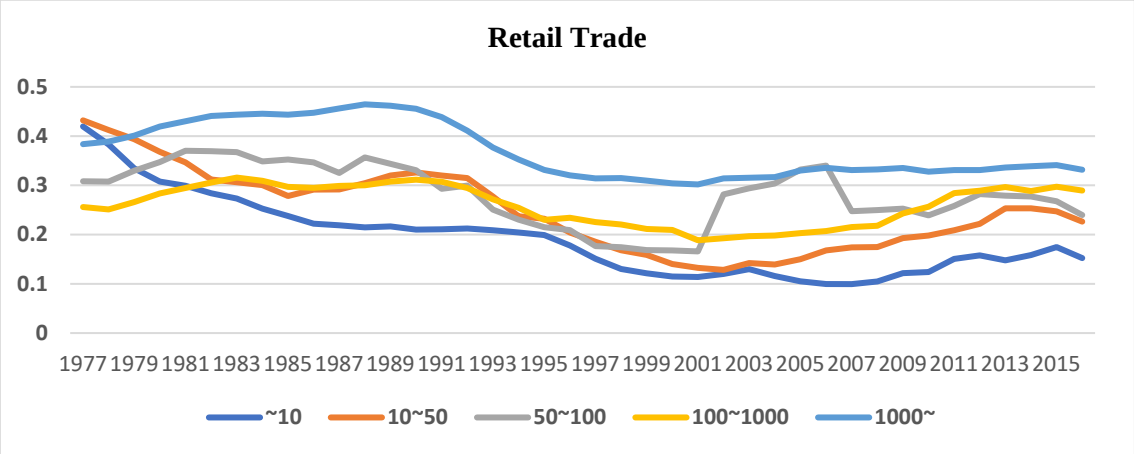
Source: Analysis of Financial Statements of All Banks by the Japanese Bankers Association

Figure 2B: Rate of Return on Capital: Information and Communication Services Sector



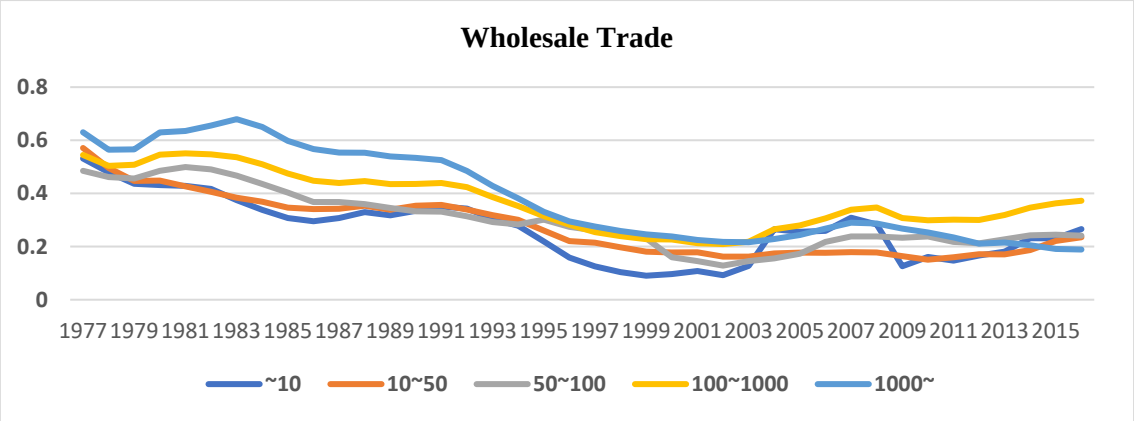
Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 2C: Rate of Return on Capital: Retail Trade Sector



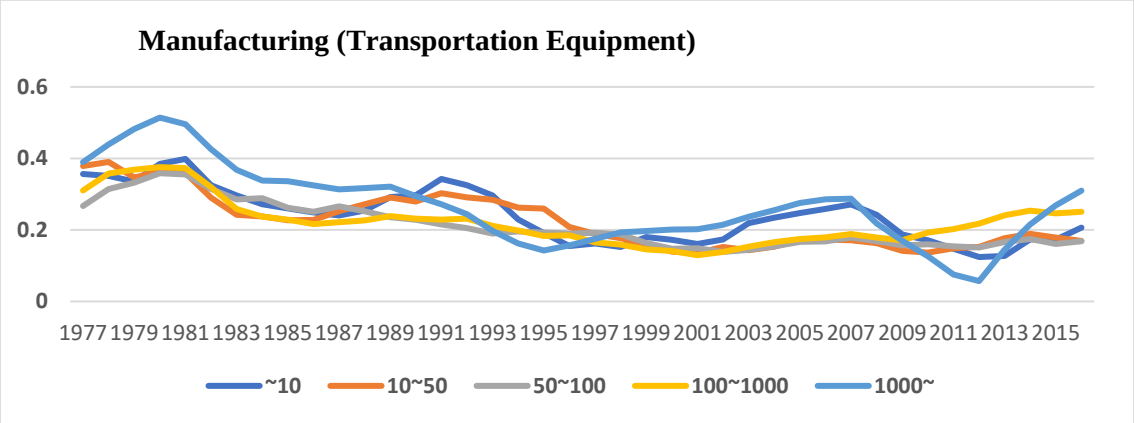
Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 2D: Rate of Return on Capital: Wholesale Trade Sector



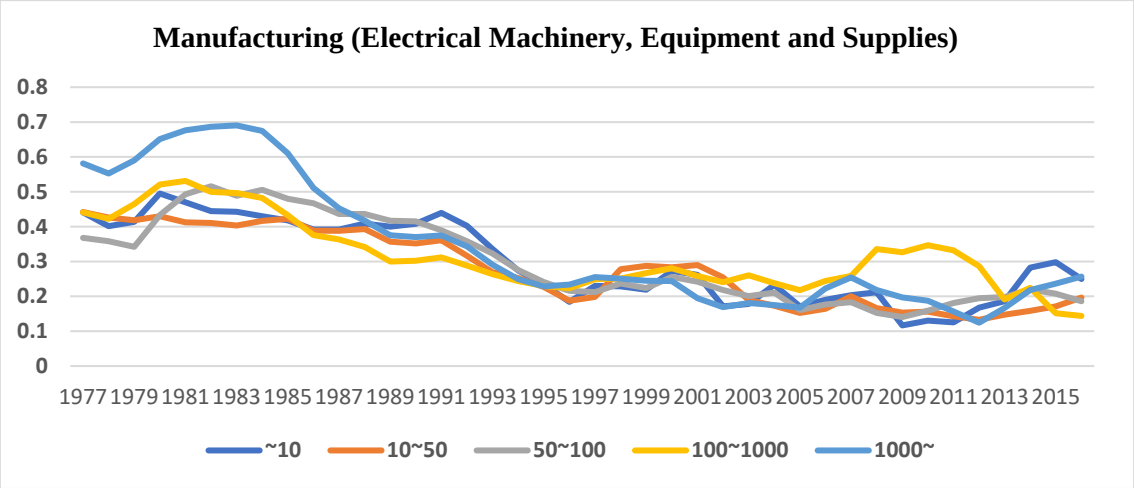
Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 2E: Rate of Return on Capital: Manufacturing Sector (transportation equipment, including motor vehicles)



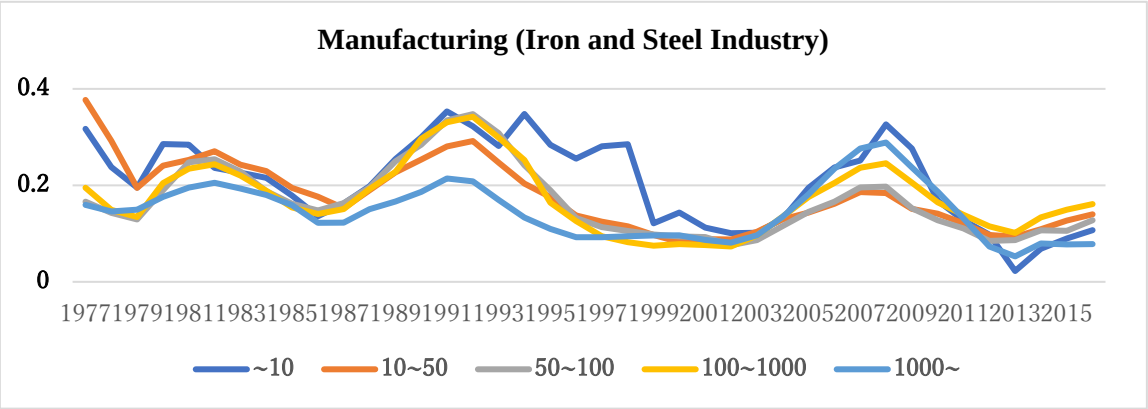
Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 2F: Rate of Return on Capital: Manufacturing Sector (electrical machinery, equipment and supplies)



Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 2G: Rate of Return on Capital: Manufacturing Sector (iron and steel industry)



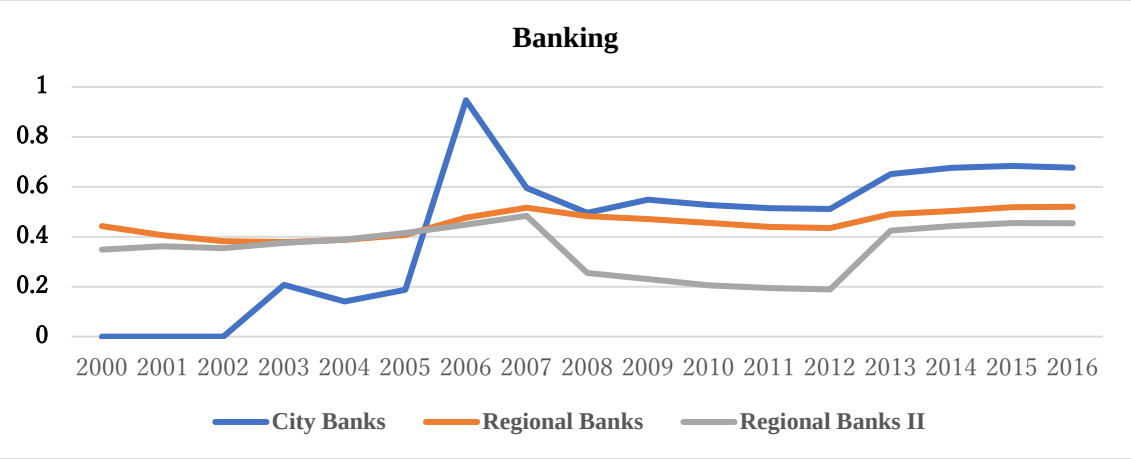
Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figures 2 plots the time series data of the rates of return on capital over five-year averages by the magnitude of the value of capital stock in the five sectors. [11] These figures represent the trends in the movement of the rate of return on capital according to the magnitude of firm size in each sector in the medium- and long-run. Figures 2A and 2B illustrate the movements of the rate of return on capital from 2001 to 2016 for the banking sector and from 2007 to 2016 for the information and communications service sectors, respectively, due to data limitations. For the other sectors, retail trade, wholesale trade, and manufacturing, Figures 2C, 2D, 2E, 2F, and 2G illustrate the movements of rate on return from 1977 to 2015. In addition, we depict the movements in the rates for six of the seven sectors in Figures 2B, 2C, 2D, 2E, 2F, and 2G according to five magnitude levels based on the value of capital stock (unit: one million JPY). From Figure 2, we can see three categories: large, medium, and small firms, corresponding to capital stock of more than one billion yen, from 50 to 100 million yen, and less than 10 million yen, respectively. For the banking sector, Figure 2A indicates banks categorized as mega banks, medium banks, and small banks; corresponding to city banks with capital stocks of 5,320 billion yen on average, regional banks with capital stocks of 276 billion yen on average, and regional banks II with capital stocks of 94 billion yen on average. These differences in the magnitude of capital stock represent the degrees of the different sizes of firms. The figures almost illustrate the positive correlation between firm size and the rate of return on capital.

[11] For more details including average and variance for rates of return on capital in each sector, see Appendix Tables 1.

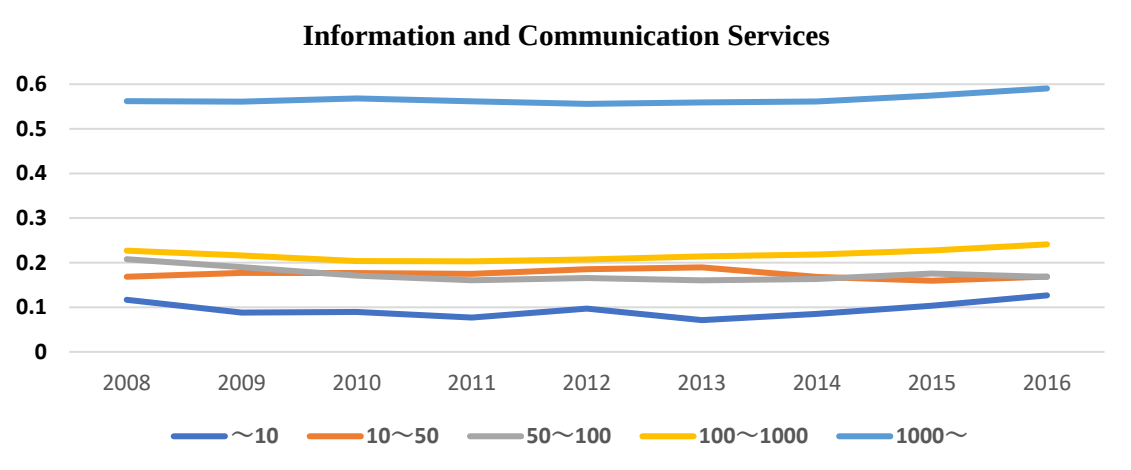
Similarly, Figures 3A-3G indicate the movements of capital shares according to the magnitude of capital stock in the seven sectors in the medium- and long-run. The statements for Figures 2A-2G also apply to Figures 3A-3G.

Figure 3A: Capital Share: Banking Sector



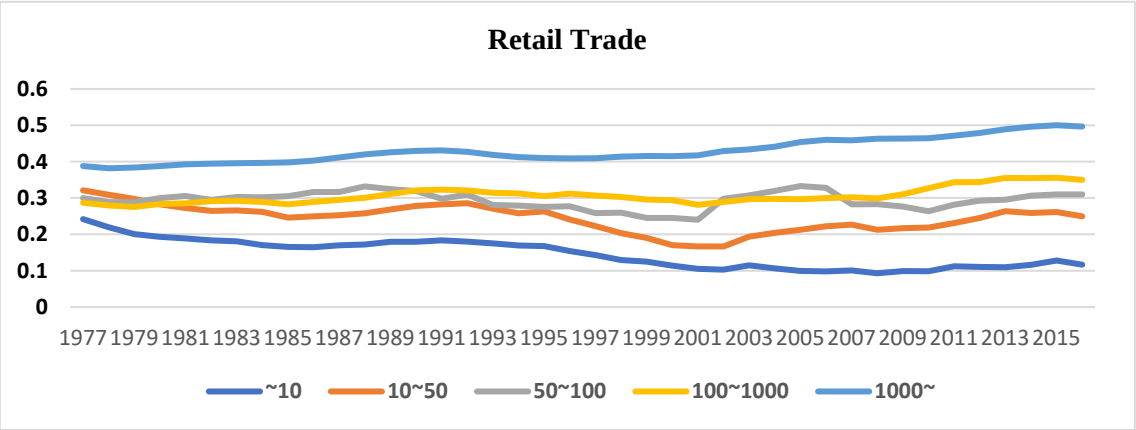
Source: Analysis of Financial Statements of All Banks by the Japanese Bankers Association

Figure 3B: Capital Share: Information and Communication Services Sector



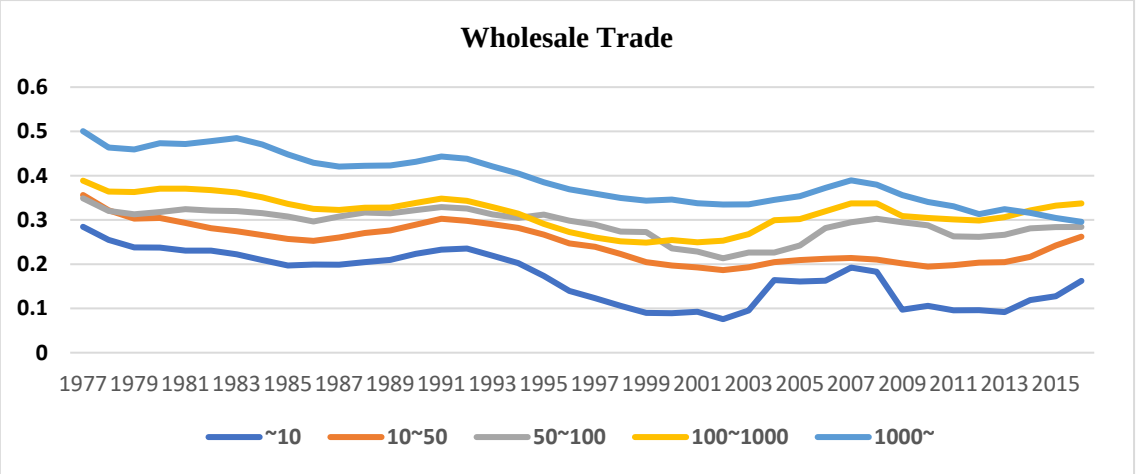
Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 3C: Capital Share: Retail Trade Sector



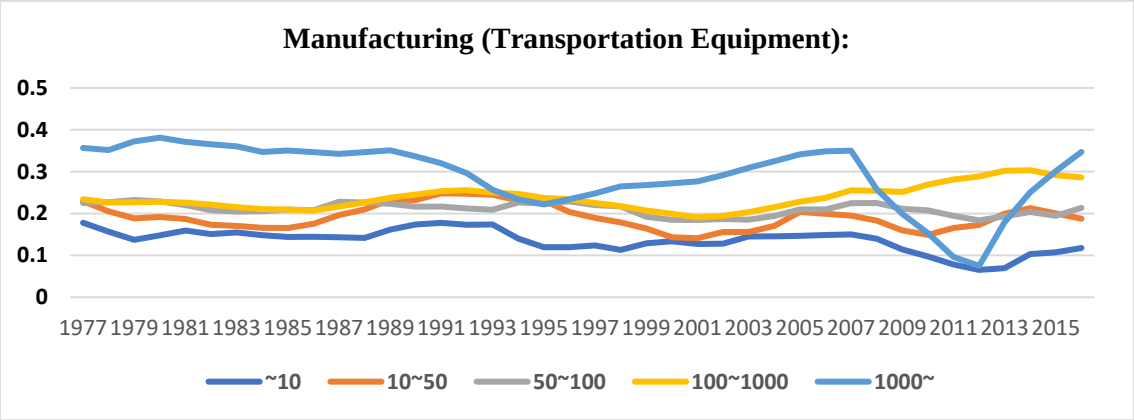
Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 3D: Capital Share: Wholesale Trade Sector



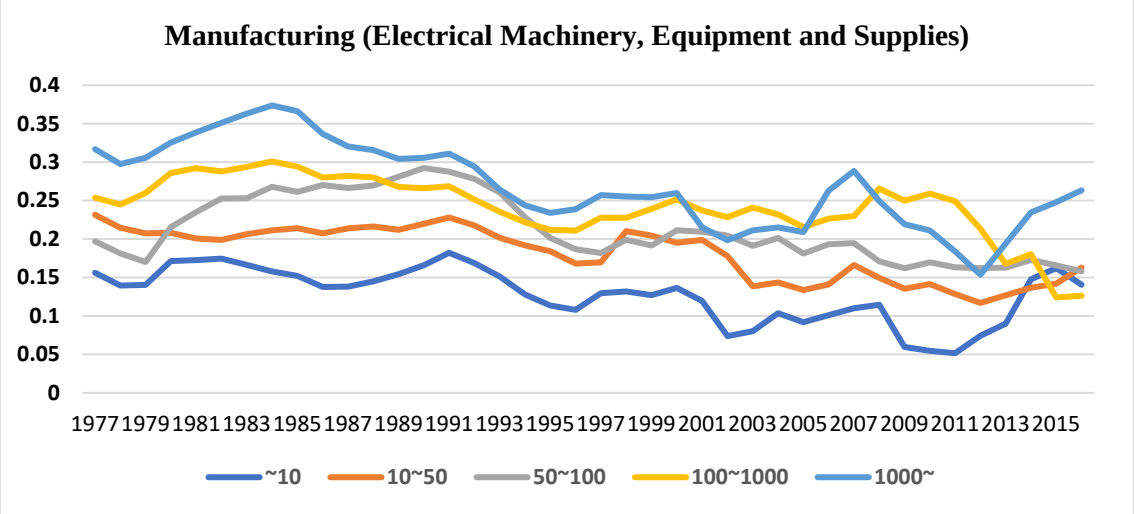
Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 3E: Capital Share: Manufacturing Sector (transportation equipment including motor vehicles)



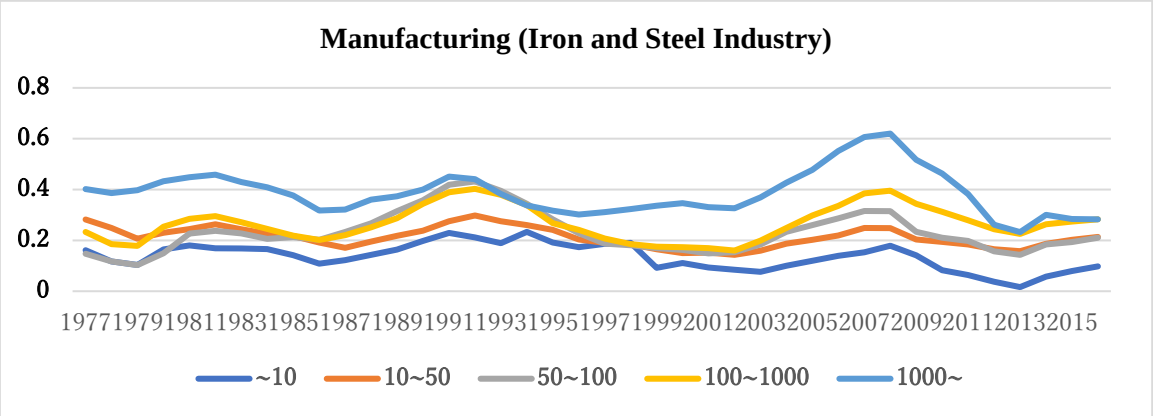
Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 3F: Capital Share: Manufacturing Sector (electrical machinery, equipment, and supplies)



Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Figure 3G: Capital Share: Manufacturing Sector (iron and steel industry)



Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

The next section shows the main findings.

4. Results

Figures 2A-2G present the results of the dynamic relation between firm size and the rate of return on capital. Figures 3A-3G present the results of the dynamic relation between firm size and capital share. The results for the banking and information and communication services sectors are for the recent decade, around from 2000 to 2015. The results for the other three sectors are from 1977 to 2015.

Rate of return on capital

Concerning the relation between firm size and the rate of return on capital over the recent decade, we have four main findings. First, we find a positive correlation in the banking and retail trade sectors; that is an upward trend in the rate of return on capital among mega banks and large firms in the retail trade sectors. A plausible reason for this result for both sectors is that mergers of large banks and large firms increase their size, which can produce increasing returns on capital. In particular, in the banking sector, after the collapse of economic bubble in Japan, which left it with secular stagnation,[12] the recovery took some time. However, the larger firms that reduced their bad loans gradually come back and increased their rate of return since around 2005 year. In the retail trade sector, firms using the new information technology such as e-commerce can produce an increasing return on capital, especially among larger firms such as Aeon and Ito-Yokado Stores.

[12] On secular stagnation, see Teulings and Baldwin (2014).

Second, however, we find a negative relationship between firm size and the rate of return in the information and communications services sector, which contains telecommunications, broadcasting, television program, internet support service, video picture information, sound information, character information production and distribution, as well as Google and Yahoo. The result could be due to the time it takes for the emergence of size effect and network effect as a result of some regulations in Japan.

Third, we see a downward trend in the rate of return in the wholesale trade sector, and the movement is synchronous for each size category. One reason is that some information and communications technology, such as Business to Consumer direct system, curtail the intermediate wholesale trade sector and thus reduce its rate of return.

Fourth, in the manufacturing sector, the trend in the movement of the rate of return for each firm size is likely to synchronize. This implies that the manufacturing sector may have the structure of constant returns to scale.

Capital share

Concerning the dynamic relation between firm size and the magnitude of capital share over the recent decade, we have three main findings. First, although the trend in the capital share in each sector differs, we find a positive relationship in almost all seven sectors. The upward trends in capital share appear in the banking, information and communication services, and retail trade sectors. Notably, the capital share of large firms in the information and communication services sector is extremely high because the magnitude of the capital output ratio is extremely high, implying vert high installing costs. Thus, it takes time to gain an increase in the rate of return, suggesting that we will eventually see a rise in the rates of return for larger firms.

Second, the capital shares in the manufacturing sector rather tend to move procyclically, particularly after the Lehman shock, the larger manufacturing firms, specifically those manufacturing motor vehicles, rebounded and gained a higher capital share. This is also true of the iron and steel industry due to its high capital intensity according to the magnitude of the firm's size.

Third, we see a downward trend in capital share in the wholesale trade sector. This would also be due to the disintermediation phenomena caused by Business to Consumer direct systems.

In summary, these features are likely to come from the emergence of increasing returns to scale in the service sectors. The potential explanation is the network effects of new technological progress, such as the advancement of information communication technology and computerization, and globalization in the financial and goods markets. Intuitively, these causes, as well as the high installation costs and decline in marginal costs, can produce declining average costs and thus economies of scale, thereby creating the increasing returns to scale in these sectors. These effects can also lead to the winner-take-most phenomenon. Based

on this phenomenon, Autor et al. (2017a, 2017b) advocate the superstar firms model, which indicates a negative correlation between sales concentrations and declining labor shares in six sectors of the U.S. industry empirically. Both Autor et al. (2017a, 2017b) and our model suggest that market structures are becoming oligopolies in many industries worldwide. However, even in the Japanese economy, which suffers from growth stagnation and has some regulated markets, our findings suggest that the service sectors, particularly the banking sectors, have increasing returns to scale. Additionally, the information communication services sector is on its way toward an increasing returns to scale structure, thereby producing the positive relationship between firm size and the rate of return on capital and the positive relationship between firm size and capital share. In contrast, although we need more data for the manufacturing sector, the illustrative analysis suggests the possibility of constant returns to scale in this sector. Thus, the implication is that if the advanced countries have economies consisting mainly of service sectors, we should carefully consider policies to deal with the increasing income inequality coming from the increasing returns to scale in these service sectors.

5. Concluding Remarks

This study uses annual time series data for several service sectors, including banking and information and communication services, as well as the manufacturing sector of the Japanese economy to analyze the hypothesis that these industries show increasing returns to scale empirically by investigating the correlation between firm size and the rate of return on capital, as well as the correlation between firm size and capital share in these service sectors within a simple imperfect competitive framework that can illustrate the increasing returns to scale. Based on the illustrative analysis, we find near-positive relations between firm size and the rate of return on capital, and positive relation between firm size and capital share. Thus, our results may imply that even in Japan, which suffered prolonged stagnation, increasing returns to scale is prevalent in most of these services sectors. Conversely, our analysis suggests that constant returns to scale might characterize the manufacturing sector. However, an empirical analysis using more profound data is needed, as is a wider analysis across all OECD countries. These analyses we leave to future research.

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Appendix

Table 1A: Rate of Return on Capital: Banking Sector

	Regional Banks 2	Regional Banks 1	City Banks
2000	-0.042	-0.006	-0.001
2001	-0.090	-0.070	-0.230
2002	-0.062	-0.010	-0.372
2003	0.062	-0.008	0.026
2004	0.070	0.107	0.054
2005	0.097	0.118	0.230
2006	0.055	0.114	0.172
2007	0.074	0.090	0.125
2008	-0.119	-0.007	-0.020
2009	0.039	0.078	0.095
2010	0.052	0.075	0.113
2011	0.073	0.089	0.113
2012	0.070	0.085	0.114
2013	0.117	0.100	0.139
2014	0.101	0.103	0.130
2015	0.089	0.103	0.118
2016	0.071	0.079	0.099

2000-2016	**Regional Banks 2**	**Regional Banks 1**	**City Banks**
Average	0.039	0.061	0.053
Variance	0.005	0.003	0.022

Source: Analysis of Financial Statements of All Banks by the Japanese Bankers Association

Table 1B: Rate of Return on Capital: Information and Communication Services Sector

	～10	10～50	50～100	100～1000	1000～
2005	0.714	0.695	0.406	0.424	0.145
2006	0.547	0.564	0.337	0.325	0.195
2007	0.261	0.496	0.517	0.295	0.197
2008	1.007	0.446	0.648	0.310	0.195
2009	0.136	0.518	0.071	0.303	0.219
2010	0.498	0.301	0.075	0.293	0.277
2011	0.212	0.201	0.530	0.278	0.219
2012	1.251	0.293	0.474	0.332	0.246
2013	0.050	0.346	0.381	0.338	0.246
2014	0.302	0.409	0.909	0.322	0.250
2015	1.650	0.583	0.879	0.372	0.371
2016	1.885	0.888	0.366	0.495	0.307

2005-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.709	0.478	0.466	0.341	0.239
Variance	0.372	0.037	0.068	0.004	0.004

Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Table 1C: Rate of Return on Capital: Retail Trade Sector

	~10	10~50	50~100	100~1000	1000~
1973	0.472	0.442	0.283	0.295	0.390
1974	0.539	0.439	0.323	0.241	0.383
1975	0.438	0.460	0.236	0.274	0.377
1976	0.338	0.353	0.325	0.243	0.394
1977	0.310	0.465	0.375	0.226	0.374
1978	0.290	0.345	0.280	0.271	0.417
1979	0.295	0.345	0.433	0.316	0.444
1980	0.304	0.331	0.323	0.362	0.468
1981	0.297	0.246	0.440	0.298	0.448
1982	0.232	0.292	0.371	0.281	0.427
1983	0.237	0.317	0.270	0.322	0.431
1984	0.193	0.316	0.339	0.283	0.453
1985	0.230	0.221	0.343	0.300	0.459
1986	0.219	0.311	0.410	0.289	0.468
1987	0.215	0.294	0.263	0.301	0.471
1988	0.215	0.380	0.428	0.329	0.472
1989	0.203	0.395	0.275	0.320	0.438
1990	0.197	0.252	0.279	0.318	0.428
1991	0.223	0.279	0.221	0.269	0.384
1992	0.223	0.268	0.294	0.238	0.333
1993	0.197	0.192	0.185	0.213	0.302
1994	0.181	0.194	0.173	0.233	0.315
1995	0.172	0.228	0.201	0.197	0.323
1996	0.117	0.139	0.192	0.290	0.329
1997	0.088	0.174	0.133	0.194	0.302
1998	0.093	0.106	0.173	0.189	0.305
1999	0.138	0.146	0.144	0.187	0.290
2000	0.139	0.135	0.197	0.187	0.294
2001	0.111	0.101	0.183	0.185	0.318
2002	0.119	0.153	0.712	0.214	0.363
2003	0.142	0.176	0.234	0.210	0.311
2004	0.069	0.131	0.192	0.194	0.296
2005	0.086	0.188	0.339	0.210	0.362

	~10	10~50	50~100	100~1000	1000~
2006	0.084	0.191	0.224	0.207	0.345
2007	0.118	0.183	0.248	0.254	0.341
2008	0.169	0.180	0.246	0.223	0.317
2009	0.152	0.222	0.207	0.320	0.311
2010	0.096	0.214	0.271	0.279	0.325
2011	0.218	0.245	0.319	0.346	0.361
2012	0.153	0.248	0.369	0.278	0.340
2013	0.119	0.337	0.229	0.261	0.344
2014	0.206	0.222	0.198	0.279	0.322
2015	0.177	0.184	0.223	0.322	0.337
2016	0.107	0.140	0.179	0.307	0.314

1973-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.203	0.254	0.279	0.263	0.369
Variance	0.011	0.001	0.011	0.002	0.003

2000-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.133	0.191	0.269	0.252	0.330
Variance	0.002	0.003	0.016	0.003	0.0004

Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Table 1D: Rate of Return on Capital: Wholesale Trade Sector

	~10	10~50	50~100	100~1000	1000~
1973	0.715	0.780	0.598	0.696	0.780
1974	0.736	0.693	0.518	0.597	0.729
1975	0.490	0.436	0.451	0.431	0.509
1976	0.382	0.498	0.445	0.515	0.625
1977	0.335	0.449	0.415	0.485	0.508
1978	0.458	0.405	0.479	0.492	0.453
1979	0.518	0.449	0.493	0.618	0.734
1980	0.465	0.442	0.596	0.621	0.827
1981	0.365	0.389	0.516	0.538	0.652
1982	0.278	0.347	0.371	0.467	0.610
1983	0.246	0.293	0.362	0.436	0.574
1984	0.336	0.375	0.335	0.488	0.587
1985	0.313	0.330	0.431	0.445	0.566
1986	0.305	0.359	0.338	0.403	0.499
1987	0.338	0.354	0.370	0.425	0.543
1988	0.357	0.350	0.325	0.470	0.569
1989	0.276	0.301	0.261	0.433	0.519
1990	0.396	0.405	0.369	0.448	0.537
1991	0.387	0.375	0.332	0.421	0.459
1992	0.299	0.267	0.284	0.345	0.338
1993	0.164	0.243	0.216	0.285	0.288
1994	0.145	0.215	0.216	0.264	0.286
1995	0.103	0.202	0.459	0.257	0.284
1996	0.084	0.176	0.197	0.258	0.276
1997	0.132	0.236	0.216	0.208	0.242
1998	0.055	0.154	0.133	0.209	0.206
1999	0.078	0.134	0.148	0.206	0.222
2000	0.134	0.187	0.106	0.251	0.246
2001	0.139	0.181	0.123	0.191	0.208
2002	0.055	0.153	0.132	0.191	0.207
2003	0.230	0.155	0.219	0.251	0.200
2004	0.770	0.196	0.197	0.442	0.280
2005	0.085	0.203	0.194	0.323	0.323

	~10	10~50	50~100	100~1000	1000~
2006	0.157	0.177	0.346	0.325	0.328
2007	0.300	0.165	0.236	0.352	0.318
2008	0.106	0.150	0.219	0.294	0.185
2009	-0.019	0.127	0.171	0.243	0.185
2010	0.260	0.135	0.220	0.282	0.248
2011	0.090	0.223	0.242	0.337	0.238
2012	0.396	0.221	0.209	0.345	0.200
2013	0.177	0.146	0.293	0.387	0.206
2014	0.234	0.210	0.248	0.383	0.132
2015	0.259	0.306	0.232	0.363	0.179
2016	0.262	0.292	0.224	0.384	0.227

1973-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.282	0.293	0.306	0.382	0.394
Variance	0.033	0.021	0.017	0.016	0.037

2000-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.214	0.190	0.212	0.314	0.230
Variance	0.031	0.003	0.003	0.005	0.003

Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Table 1E: Rate of Return on Capital: Manufacturing Sector (Transportation Equipment, including Motor Vehicles)

	~10	10~50	50~100	100~1000	1000~
1973	0.425	0.355	0.215	0.290	0.353
1974	0.419	0.463	0.195	0.261	0.234
1975	0.158	0.279	0.252	0.269	0.248
1976	0.155	0.298	0.328	0.275	0.438
1977	0.623	0.498	0.345	0.455	0.675
1978	0.400	0.413	0.453	0.529	0.601
1979	0.341	0.246	0.284	0.314	0.449
1980	0.402	0.361	0.383	0.305	0.408
1981	0.226	0.280	0.311	0.262	0.345
1982	0.256	0.152	0.143	0.190	0.326
1983	0.257	0.172	0.306	0.221	0.312
1984	0.218	0.223	0.301	0.208	0.300
1985	0.345	0.309	0.250	0.263	0.398
1986	0.168	0.284	0.253	0.201	0.287
1987	0.213	0.277	0.221	0.214	0.269
1988	0.326	0.267	0.235	0.246	0.330
1989	0.406	0.318	0.219	0.269	0.321
1990	0.370	0.252	0.214	0.227	0.266
1991	0.395	0.399	0.189	0.189	0.174
1992	0.128	0.219	0.170	0.226	0.130
1993	0.183	0.234	0.158	0.147	0.096
1994	0.070	0.208	0.247	0.204	0.143
1995	0.179	0.239	0.198	0.150	0.168
1996	0.214	0.141	0.177	0.197	0.247
1997	0.165	0.124	0.180	0.127	0.221
1998	0.133	0.172	0.137	0.117	0.185
1999	0.209	0.127	0.126	0.136	0.164
2000	0.140	0.133	0.118	0.128	0.189
2001	0.155	0.122	0.183	0.139	0.252
2002	0.229	0.208	0.129	0.173	0.283
2003	0.361	0.126	0.166	0.190	0.297
2004	0.286	0.177	0.175	0.199	0.254

	~10	10~50	50~100	100~1000	1000~
2005	0.206	0.224	0.180	0.174	0.289
2006	0.213	0.128	0.190	0.161	0.305
2007	0.292	0.200	0.182	0.219	0.291
2008	0.215	0.086	0.117	0.141	-0.050
2009	0.011	0.069	0.114	0.161	0.014
2010	0.125	0.198	0.195	0.282	0.072
2011	0.094	0.190	0.162	0.209	0.050
2012	0.176	0.221	0.168	0.293	0.199
2013	0.231	0.205	0.192	0.259	0.388
2014	0.243	0.130	0.156	0.225	0.367
2015	0.120	0.147	0.126	0.246	0.339
2016	0.263	0.143	0.200	0.232	0.254

1973-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.244	0.228	0.210	0.226	0.270
Variance	0.014	0.010	0.006	0.006	0.019

2000-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.198	0.159	0.162	0.202	0.22
Variance	0.007	0.002	0.001	0.003	0.016

Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Table 1F: Rate of Return on Capital: Manufacturing Sector (Electrical Machinery, Equipment and Supplies)

	~10	10~50	50~100	100~1000	1000~
1973	0.580	0.515	0.532	0.542	0.738
1974	0.474	0.429	0.487	0.389	0.554
1975	0.038	0.311	0.095	0.285	0.439
1976	0.608	0.529	0.241	0.497	0.608
1977	0.504	0.425	0.486	0.492	0.569
1978	0.382	0.436	0.481	0.448	0.593
1979	0.536	0.391	0.408	0.600	0.741
1980	0.445	0.369	0.548	0.567	0.745
1981	0.482	0.440	0.541	0.549	0.734
1982	0.378	0.416	0.601	0.334	0.619
1983	0.371	0.400	0.345	0.432	0.613
1984	0.472	0.459	0.494	0.530	0.662
1985	0.385	0.399	0.417	0.319	0.424
1986	0.351	0.268	0.477	0.263	0.238
1987	0.379	0.413	0.446	0.272	0.325
1988	0.455	0.426	0.347	0.324	0.437
1989	0.430	0.278	0.396	0.320	0.451
1990	0.427	0.373	0.409	0.330	0.398
1991	0.507	0.314	0.349	0.312	0.262
1992	0.192	0.191	0.290	0.156	0.168
1993	0.122	0.190	0.169	0.201	0.174
1994	0.122	0.195	0.161	0.220	0.245
1995	0.227	0.245	0.236	0.260	0.295
1996	0.257	0.117	0.223	0.278	0.286
1997	0.422	0.246	0.271	0.287	0.277
1998	0.117	0.587	0.292	0.210	0.152
1999	0.072	0.243	0.095	0.299	0.213
2000	0.495	0.224	0.397	0.330	0.292
2001	0.203	0.149	0.155	0.166	0.040
2002	-0.031	0.069	0.151	0.199	0.149
2003	0.151	0.264	0.205	0.307	0.212
2004	0.347	0.158	0.145	0.187	0.183

	~10	10~50	50~100	100~1000	1000~
2005	0.186	0.121	0.148	0.229	0.255
2006	0.298	0.210	0.235	0.300	0.314
2007	0.035	0.247	0.182	0.269	0.307
2008	0.193	0.095	0.052	0.692	0.032
2009	-0.128	0.095	0.086	0.143	0.077
2010	0.256	0.135	0.238	0.329	0.208
2011	0.270	0.142	0.346	0.226	0.161
2012	0.247	0.197	0.251	0.042	0.146
2013	0.285	0.168	0.069	0.216	0.242
2014	0.354	0.149	0.195	0.309	0.334
2015	0.334	0.200	0.176	-0.035	0.300
2016	0.028	0.267	0.239	0.187	0.263

1973-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.301	0.284	0.298	0.314	0.352
Variance	0.031	0.018	0.022	0.022	0.041

2000-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.207	0.170	0.192	0.241	0.207
Variance	0.025	0.004	0.008	0.023	0.009

Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY

Table 1G: Rate of Return on Capital: Manufacturing Sector (Iron and Steel Industry)

	~10	10~50	50~100	100~1000	1000~
1973	0.580	0.716	0.377	0.454	0.235
1974	0.453	0.737	0.440	0.393	0.227
1975	-0.110	0.105	0.013	-0.0006	0.100
1976	0.319	0.164	-0.081	0.039	0.140
1977	0.345	0.163	0.081	0.090	0.096
1978	0.183	0.291	0.262	0.224	0.165
1979	0.240	0.250	0.371	0.320	0.247
1980	0.340	0.335	0.316	0.351	0.233
1981	0.313	0.225	0.208	0.187	0.237
1982	0.104	0.252	0.114	0.137	0.146
1983	0.133	0.153	0.133	0.105	0.106
1984	0.187	0.183	0.169	0.163	0.180
1985	0.156	0.160	0.186	0.178	0.126
1986	0.099	0.134	0.138	0.118	0.053
1987	0.237	0.132	0.190	0.188	0.148
1988	0.312	0.338	0.295	0.314	0.246
1989	0.468	0.369	0.439	0.340	0.259
1990	0.383	0.293	0.358	0.522	0.227
1991	0.367	0.270	0.391	0.289	0.193
1992	0.083	0.189	0.255	0.246	0.117
1993	0.107	0.114	0.098	0.097	0.054
1994	0.800	0.152	0.107	0.108	0.076
1995	0.063	0.153	0.097	0.082	0.109
1996	0.223	0.079	0.104	0.097	0.107
1997	0.211	0.125	0.161	0.088	0.116
1998	0.130	0.066	0.058	0.036	0.063
1999	-0.019	0.062	0.071	0.070	0.085
2000	0.174	0.080	0.076	0.099	0.111
2001	0.067	0.110	0.098	0.088	0.060
2002	0.153	0.123	0.077	0.073	0.087
2003	0.134	0.145	0.111	0.150	0.140
2004	0.127	0.190	0.216	0.266	0.277
2005	0.492	0.149	0.223	0.301	0.344

	~10	10~50	50~100	100~1000	1000~
2006	0.280	0.201	0.204	0.233	0.326
2007	0.224	0.243	0.224	0.230	0.296
2008	0.510	0.136	0.120	0.197	0.202
2009	-0.124	0.027	-0.008	0.066	0.018
2010	-0.047	0.099	0.098	0.098	0.093
2011	0.075	0.101	0.119	0.103	0.049
2012	0.075	0.123	0.095	0.112	0.004
2013	0.133	0.117	0.129	0.129	0.100
2014	0.107	0.105	0.093	0.227	0.151
2015	0.060	0.188	0.093	0.177	0.084
2016	0.161	0.166	0.228	0.162	0.051

1973-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.212	0.194	0.172	0.181	0.147
Variance	0.034	0.020	0.014	0.014	0.007

2000-2016	**~10**	**10~50**	**50~100**	**100~1000**	**1000~**
Average	0.153	0.136	0.129	0.160	0.141
Variance	0.026	0.003	0.004	0.005	0.012

Source: Japanese Financial Statements Statistics of Corporations by Industry. Note: Size unit is one million JPY