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The Decline in the Labor Share: Evidence from Japanese Manufacturers' Panel Data

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The Decline in the Labor Share: Evidence from Japanese Manufacturers' Panel Data

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Abstract

This paper replicates Kehrig and Vincent (2021) using Japanese data and tests whether the overall labor share decline is led by an increase in low-labor-share firms. The results can be summarized as follows. The overall labor share in Japan declined until around 2006, but then rose during the recession in 2008 and then leveled off. The results of this paper are similar to the results shown in Autor et al. (2020) and Kehrig and Vincent (2018) for the United States in the following points. First, although the labor share of median firms did not rise while the overall labor share was declining, the rate of decline in the labor share of the median firm was slower than the overall rate of decline. Second, the value-added share of firms with a low labor share increased while their salary share did not increase when the overall labor share declined. Third, entry and exit are not important to the decline in overall labor share, as in the United States.

The results of this paper differ from Autor et al. (2020) and Kehrig and Vincent (2018) in the following points. First, the role of firms with an extremely low labor share, say under decile, which is a good explanation of the change in labor share in the United States, is limited in Japan. Second, the change in actual labor share is very similar to $\sum \omega_{i,initial} \lambda_{it}$, the product of the initial

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value-added share and labor share at the time, which suggests that firms with a large value-added share are lowering their labor share in Japan.

Keywords: Labor share

JEL Classification Number: F16 D33

1 Introduction

The labor share, once said to be very stable (Keynes (1939) and Solow (1958)), has been declining globally at least for the last 20 years. (Blanchard (1997), Karabarbounis and Neiman (2014), and Dao et al. (2017)). In the U.S., the overall labor-share decline is led by some firms (Autor et al. (2020) and Kehrig and Vincent (2018)). The labor share of a typical (median) firm rose during 1967–2012, while the overall labor share in manufacturing declined. Kehrig and Vincent (2018) and Autor et al. (2020) show that the share of value-added of firms with a low labor share has been increasing, contributing to the decline of the overall labor share in the United States. However, it is not yet clear whether this will be true in other countries where there are not as many monopolies as in the United States.

The aim of this paper is to verify that this tendency can be seen in Japan, which is significantly different from the United States, in the following two ways. First, although Autor et al. (2020) show that sample firms with a high mark-up and/or low fixed overhead labor will be low-labor-share firms, Adachi and Saito (2020) show that Japanese firms show a smaller increase in markups relative to the U.S. until 2006. Second, Acemoglu and Restrepo (2020) show that robot adoption at the industry level is associated with low labor share and employment in the United States. However, Adachi et al. (2020) show that in Japan robots and labor are complementary until 2017.

Therefore, we replicate Autor et al. (2020) and Kehrig and Vincent (2021) using

the Basic Survey of Japanese Business Structure and Activities (BSJBSA). First, we compare the overall labor share with the labor share of the median firm in Japanese manufacturing and see whether the overall labor share is declining and whether the labor share of the median firm is increasing as in the United States. Second, to see how the entry and exit of firms affect changes in labor share, we compare overall labor share, calculating the labor share using a balanced panel. Third, to investigate how the proportion of low-labor-share firms contributed to the overall decline in labor share, we decompose the change in overall labor share to the following four, (1) within-firm components, (2) a between-firms (reallocation) component, (3) an exiting component, and (4) an entrant component. Fourth, to see the role of low-labor-share firms on the overall decline in labor share, we compare actual labor share with the labor share calculated on the sample of firms excluding the lowest decile. Fifth, to investigate whether this change was caused by a decrease in payroll or an increase in value-added, we calculate payroll and value-added share of each labor-share decile by year. Sixth, to investigate whether the firms with a low labor share initially increased the value-added share or whether the firms with a large value-added share initially decreased the labor share, we calculate the following two hypothetical labor shares, $\sum \omega_{i,initial}\lambda_{it}$ and $\sum \omega_{it}\lambda_{i,initial}$, and compare them with actual aggregate labor share (where ω is the value-added share and λ is the labor share).

The results can be summarized as follows. The overall labor share in Japan also declined until around 2006, but then rose during the recession in 2008 and then leveled

off. The results of this paper are similar to the results for the United States shown in Autor et al. (2020) and Kehrig and Vincent (2018) in the following points. First, although the labor share of median firms did not rise during the period when the overall labor share was declining, the rate of decline in the labor share of the median firm was slower than the overall rate of decline. Second, the value-added share of firms with a low labor share increased while the salary share of those did not increase when the overall labor share declined. Third, entry and exit are not important for the decline in overall labor share, as in the United States.

The results of this paper differ from Autor et al. (2020) and Kehrig and Vincent (2018) in the following points. First, the role of firms with an extremely low labor share, say under decile, which is a good explanation of the change in labor share in the United States, is limited in Japan. Second, the change in actual labor share is very similar to $\sum \omega_{i,initial}\lambda_{it}$, the product of initial value-added share and labor share at the time, which suggests that firms with a large value-added share are lowering their labor share in Japan.

2 Empirical Analysis

This paper uses the Basic Survey of Japanese Business Structure and Activities 1995–2016. This survey, which is compiled by Japan's Ministry of Economy, Trade and Industry, is conducted every year. The Basic Survey of Japanese Business Structure and Activities, Japanese METI defined value-added as follows. Value-added = Operat-

ing profit + Total payroll + Depreciation expenses + Welfare expenses + Real estate and movables property rental + Taxes and public imposition. It should be noted that this value-added is gross value-added and does not include dividends from overseas. Although this survey contains firm-level information on imports and imports from affiliates, several points should be noted. First, this survey does not contain information on the self-employed. So this paper does not analyze the labor share of gross domestic product but merely the payroll share as in many studies, such as Kehrig and Vincent (2021). Second, although the role of small-to-medium enterprises in Japan is important, manufacturing firms with less than 20 employees produce 10% of total value-added and hire 25% of total employees, firms with less than 50 employees or capital less than 30 million yen are not included in the survey. However, these statistics cover a wide range of firms compared with other Japanese statistics such as the Financial Statements Statistics of Corporations (Ministry of Finance). Third, salary information for on-call workers, who have increased recently in Japan, is not available. Fourth, the definition of payroll was changed in 2007. Until 2006, "payroll" included severance pay while the employer's share of social security payment was excluded. After 2007, severance pay is excluded from payroll and the employer's share of social security payment and severance pay is included as "welfare payment." Therefore, the labor share, which is defined as $\frac{\text{payroll}}{\text{value-added}}$, before 2006 cannot be compared with that after 2006. So, we divide our sample period into pre-2006 and post-2006.

First, we compare the overall labor share with the labor share of the median firm

in Japanese manufacturing as in Kehrig and Vincent (2021). The results are shown in Figure 1. The left panel shows the results from the 1996–2006 sample and the right panel shows the results from the 2007–2016 sample. The green dashed line shows the labor share of the firm at the median. The changes in overall labor share are depicted as the blue dashed line. It should be noted that the trend in the labor share of the gross domestic product may be different from that of manufacturing because Japanese manufacturers hire fewer females and more standard workers compared with other industries. Therefore, we include the labor share calculated from the National Accounts. The pink dashed line shows the labor share calculated using System of National Account. The red line shows the labor share of the firm at the 10% decile. Figure 1 can be summarized as follows. First, the overall labor share is always below the median and shows a similar change in lower, say, 10%, decile of labor share as in Kehrig and Vincent (2018). Second, in the left panel, which shows the result for 1996–2006, the overall labor share decreases faster than the median firm's labor share. Unlike the result for the United States shown in Kehrig and Vincent (2018), the labor share of the median firm is not increasing. Third, in the right panel, which shows the result for 2007–2016, the overall labor share increases faster than the median firm's labor share from 2007 to 2009. In Figure 1, we can see there are differences in changes in the labor share between the overall and the median firm in Japan.

To investigate the role of entry and exit of firms on this difference in changes in the labor share between overall and the median firm, we compare the labor share overall

with the labor share calculated using our balanced panel. The results are shown in Figure 2. In Figure 2, the blue dotted line shows the change in labor share calculated using our balanced panel and the red line shows the change in the labor share calculated using the whole sample. it can be seen that these two changes are very similar, suggesting that the role of entry and exit is very limited, similar to the result for the United States shown in Kehrig and Vincent (2018).

Figure 1 suggests the difference in changes in the labor share between overall and the median firm may be caused either by low-labor-share firms increasing their value-added share or large value-added-share firms decreasing their labor share. To examine the role of value-added reallocation between firms on the change in the overall labor share, this paper follows Autor et al. (2020) and decomposes the changes in the overall labor share.

The decomposition method is as follows. Overall labor share can be written as $\sum \lambda_{it} = \sum \omega_{it}\lambda_{it}$, where λ_{it} is the labor share of individual firm i at time t, defined as $\lambda_{it} = \frac{\text{salary}_{it}}{\text{value-add}_{it}}$ and ω_{it} is the value-add share of firm i at time t, defined as $\omega_{it} = \frac{\text{value-add}_{it}}{\sum \text{value-add}_{it}}$. Then, the change in labor share can be decomposed as follows.

$$\begin{aligned}\Delta\lambda = \Delta\bar{\lambda_s} + \Delta(\sum(\omega_i - \bar{\omega_s})(\lambda_i - \bar{\lambda_s}))_s \\ +\omega_{X,1}(\bar{\lambda_{s,1}} - \bar{\lambda_{X,1}}) + \omega_{E,2}(\bar{\lambda_{E,2}} - \bar{\lambda_{s,2}}),\end{aligned} \tag{1}$$

where subscript s means firms extant both at $t = 1$ and $t = 2$ in an industry, E means Entrants and X means eXiters. We call (1) $\Delta\bar{\lambda_s}$ the within part, (2) $\Delta(\sum(\omega_i - \bar{\omega_s})(\lambda_i - \bar{\lambda_s}))_s$ the between part, (3) $\omega_{E,2}(\bar{\lambda_{E,2}} - \bar{\lambda_{s,2}})$ the entrant part, and (4) $\omega_{X,1}(\bar{\lambda_{s,1}} - \bar{\lambda_{X,1}})$

the exiter part. Autor et al. (2020) adopt this decomposition using U.S. data and demonstrate that between-components dominate in almost all industries. The decomposition results imply that models that assume a representative firm, as Karabarbounis and Neiman (2014), may not be suitable. Böckerman and Maliranta (2012) adopt a similar decomposition method using Finnish manufacturing plant-level data and also demonstrate that between-components dominate. This paper adopts this decomposition and compares the results with Böckerman and Maliranta (2012) and Autor et al. (2020).

The decomposition results are shown in Figure 3. During 1996–2006, when the Japanese overall labor share was declining, the second part, called the "between" part, is largest as in Autor et al. (2020) and Böckerman and Maliranta (2012). This means not all firms uniformly decrease their labor share during this period when the labor share was decreasing. By contrast, during the period 2007–2016, when the overall labor share was increasing, the "within part" dominates. The exit of high-labor-share firms and the entry of low-labor-share firms may cancel each other out over two periods.

To see if this change in overall labor share is a change in payroll or a change in value-added, we calculate the payroll and value-added shares of each labor-share decile by year as in Kehrig and Vincent (2018). The results are shown in Figures 4–7. Figures 4 and 5 show the cumulative value-added share for each labor-share decile. Figures 6 and 7 show the cumulative payroll share for each labor-share decile. Figures 4 and 6 show the difference between 1996 (left panel) and 2006 (right panel) and Figures 5 and

7 show the difference between 2007 (left panel) and 2016 (right panel). Although the payroll share of low-labor-share firms, shown in Figures 6 and 7, seems not to change during this period, the value-added share of low-labor-share firms, shown in Figure 4, increased between 1996 and 2006, as in the United States Kehrig and Vincent (2018). That suggests that the decline of labor share is caused by value-added, especially in low-labor-share firms, although labor input and/or price of labor seem relatively constant.

To see how large is the role of low-labor-share firms overall to the decline in labor share, we compare actual labor share with the labor share calculated from the sample consisting of firms above the lowest decile. The results are shown in Figure 8. The blue dotted line shows the change in labor share calculated using the sample excluding the lowest decile, the red line shows the change in labor share calculated using the whole sample. Unlike the result for the United States shown in Kehrig and Vincent (2018), the two moves are very similar. That suggests that the role of low-labor-share firms is not as strong as for the United States.

To investigate whether the company with a low labor share initially increased its value-added share, or the company with a large share of value-added decreased its labor share, we calculate the following two hypothetical labor shares, $\sum \omega_{i,initial}\lambda_{it}$ and $\sum \omega_{it}\lambda_{i,initial}$ with the actual overall labor share $\sum \omega_{it}\lambda_{it}$ (where ω is the value-added share and λ is the labor share) as in Kehrig and Vincent (2018). The first is the product of the initial value-added share and the labor share at each point in time and is called the "Big player" hypothetical change as in Kehrig and Vincent (2018) to take account

of the possibility that large firms can lower their labor share more than their smaller peers. The second is the product of the initial labor share and the value-added share at each point in time and is called the "Superstar" hypothetical change to take account of the possibility that the low-labor-share firms at the initial point increase their value-added share. The results are shown in Figure 9. Both the left panel and right panel show that the "Big player" hypothetical change is quite similar to the actual change. This is in stark contrast to the results for the United States in Kehrig and Vincent (2018). This suggests that the decline in overall labor share in Japan is due to initially large value-added share firms lowering their labor share.

3 Results and Conclusion

The results can be summarized as follows. The overall labor share in Japan declined until around 2006, but then rose during the recession in 2008 and then leveled off. Not all firms uniformly decreased their labor share during this first period. Japanese manufacturers are similar in the following points to U.S. manufacturers. First, the Japanese decline in overall labor share seems to be due to the contribution of some low-labor-share firms. Although the labor share of median firms does not rise during the period when the overall labor share was declining, the rate of decline in the labor share of the median firm was slower than the overall rate of decline. The value-added share of firms with a low labor share increased while their salary share did not increase when the overall labor share declined. Second, entry and exit are not important for the decline in

overall labor share, as in the United States. The differences causing the changes in the overall labor share between the United States and Japan are as follows. First, the role of firms with extremely low labor share, say within the first decile, is limited in Japan. Second, the change in actual labor share is very similar to $\sum \omega_{i,initial} \lambda_{it}$, the product of initial value-added share and labor share at the time, suggests that firms with a high value-added share are lowering their labor share in Japan.

The reason only some firms were contributing to the decline in overall Japanese labor share until 2006 is a direction for further research. Although Autor et al. (2020) suggest that firms with high markups and/or low fixed overhead labor costs will be low-labor-share firms, Adachi and Saito (2020) show there are smaller increases in markups relative to the U.S. until 2006. Acemoglu and Restrepo (2020) show that robot adoption at the industry level is associated with low labor share and employment in the United States. However, Adachi et al. (2020) show that robots and labor are complementary until 2017 in Japan.

Offshoring is another possible factor. If firms outsource their high labor-share activities to low-wage countries, the domestic labor share will decrease, even if markups are unchanged. Although Kiyota and Maruyama (2018) find that offshoring was associated with increasing demand for highly skilled labor in Japan, Adachi and Saito (2020) show that over half the decline in the overall decline in labor share in Japan can be explained by foreign factor augmentation. Therefore, offshoring may be the reason why only some firms were contributing to the decline in Japanese overall labor share.

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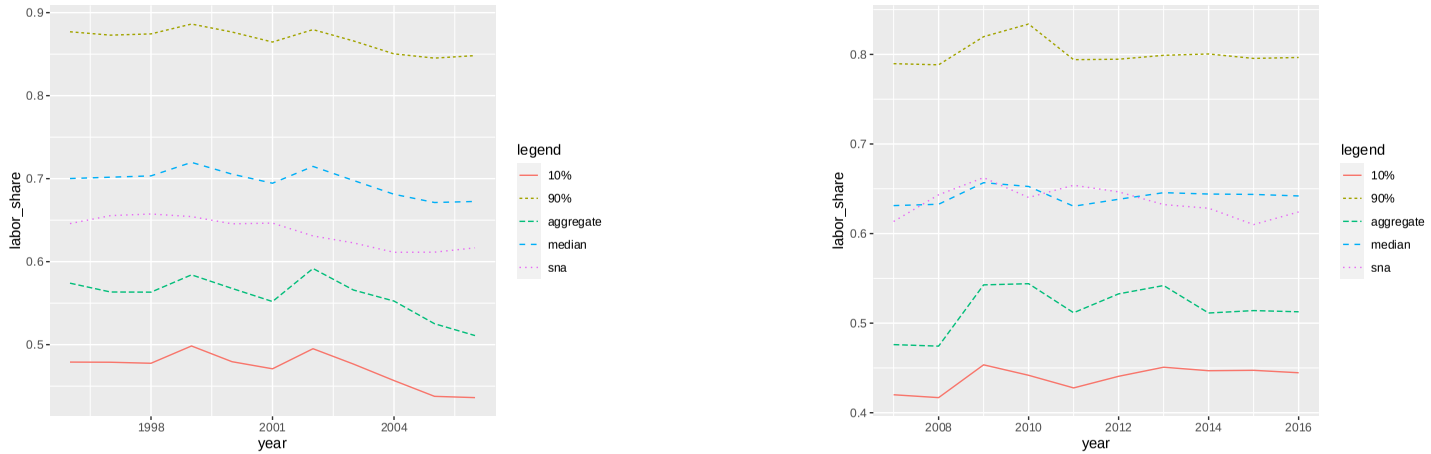
Figure 1: Overall and Firm-Level Labor Shares in the Japanese Manufacturing Sector

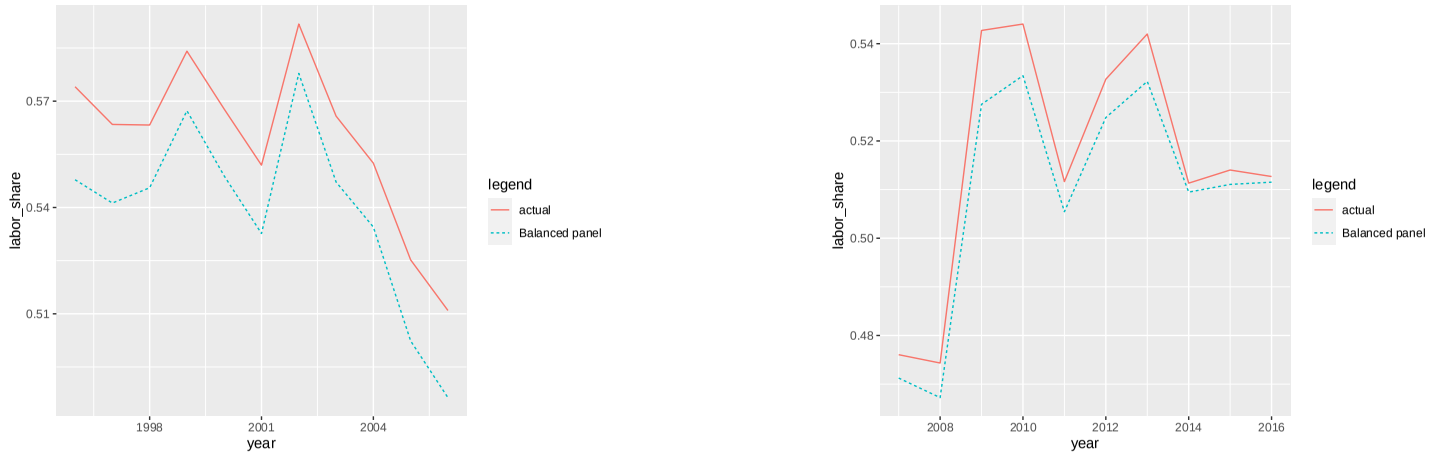


Notes:

(1) Sources: Basic Survey of Japanese Business Structure and Activities by METI (1995–2016).

(2) The left panel shows the results from the 1996–2006 sample and the right panel shows the results from the 2007–2016 sample.

Figure 2: Overall vs Survivors: 1996–2006



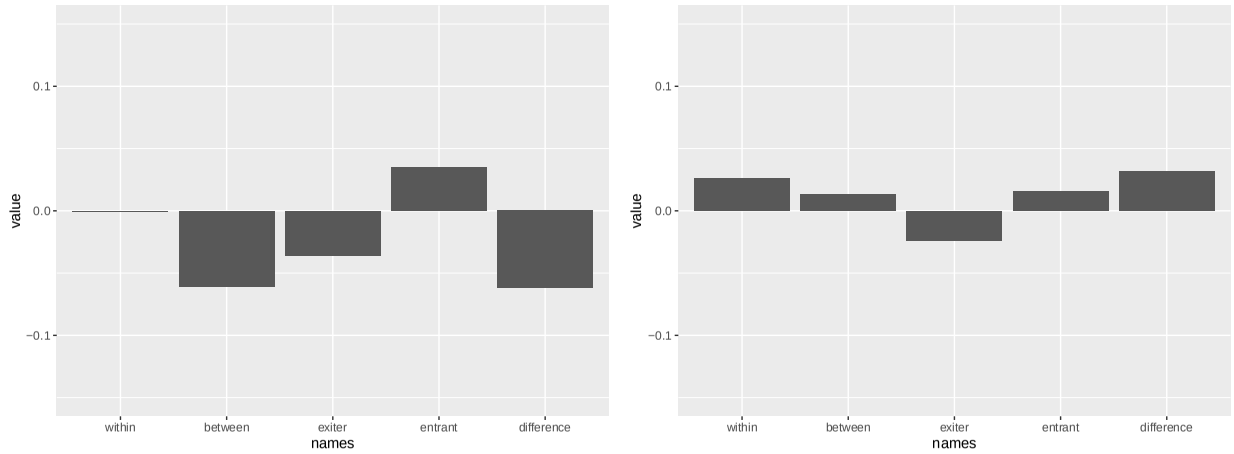
Notes:

(1) Sources: Basic Survey of Japanese Business Structure and Activities by METI (1996–2016).

(2) The left panel shows the results from the 1996–2006 sample and the right panel shows the results from the 2007–2016 sample.

(3) The blue dotted line shows the labor share calculated using the balanced panel.

Figure 3: The Decomposition Results



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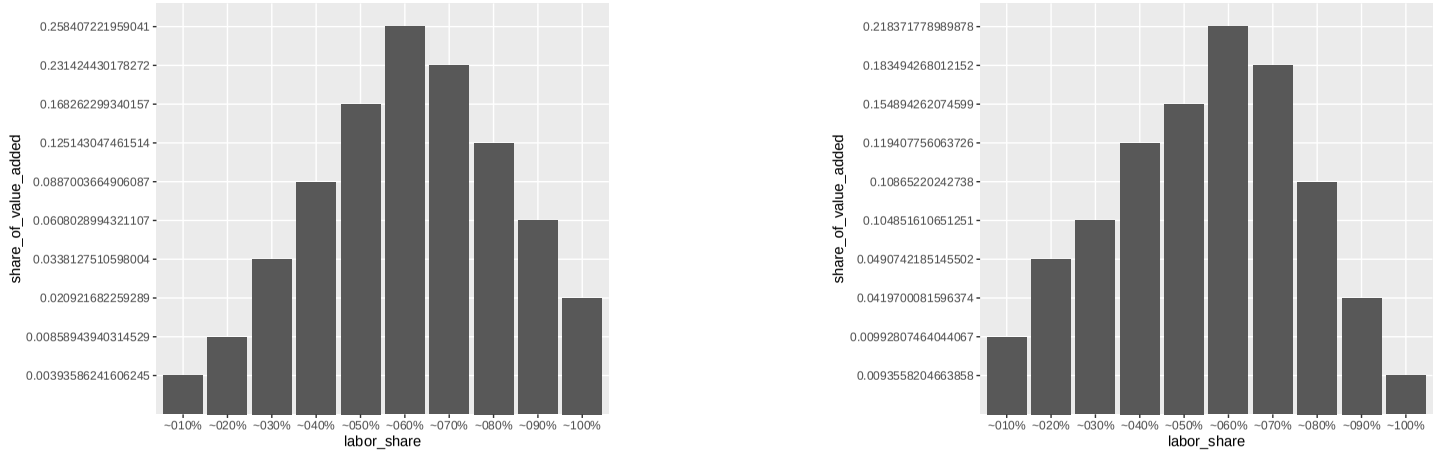
(1) Sources: Basic Survey of Japanese Business Structure and Activities by METI (1995–2016).

(2) The left panel shows the results from the 1996–2006 sample and the right panel shows the results from the 2007–2016 sample.

Figure 4: Value-added share of each labor-share decile: 1996 vs 2006



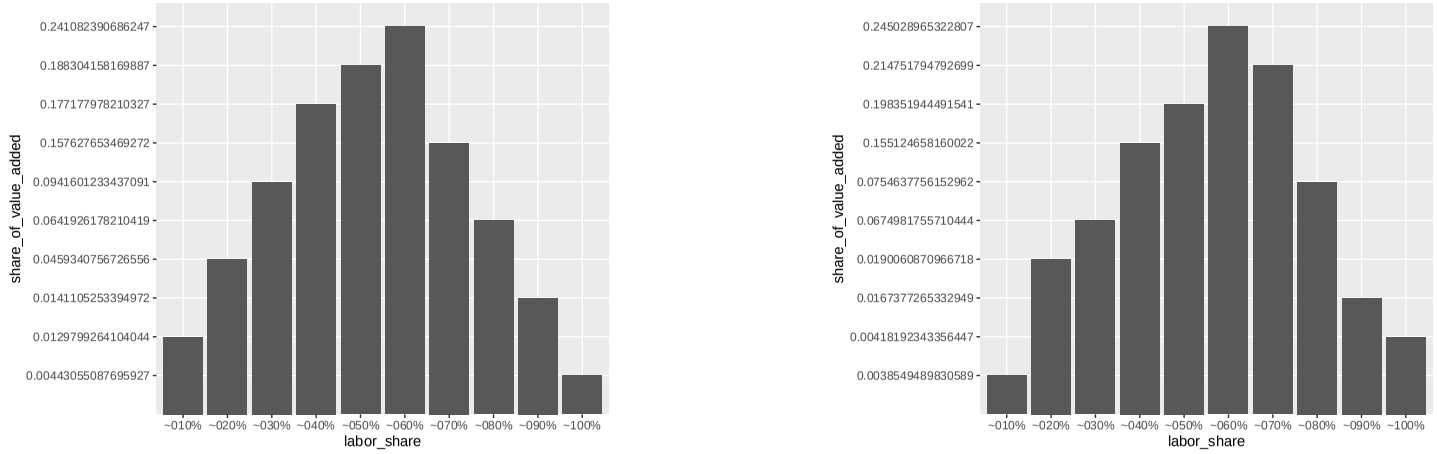
Notes:

(1) Sources: Basic Survey of Japanese Business Structure and Activities by METI (1995–2016).

(2) The left panel shows the results from the 1996 sample and the right panel shows the results from the 2006 sample.

(3) Each bar shows the value-added share of each labor-share decile.

Figure 5: Value-added share of each labor-share decile: 2007 vs 2016



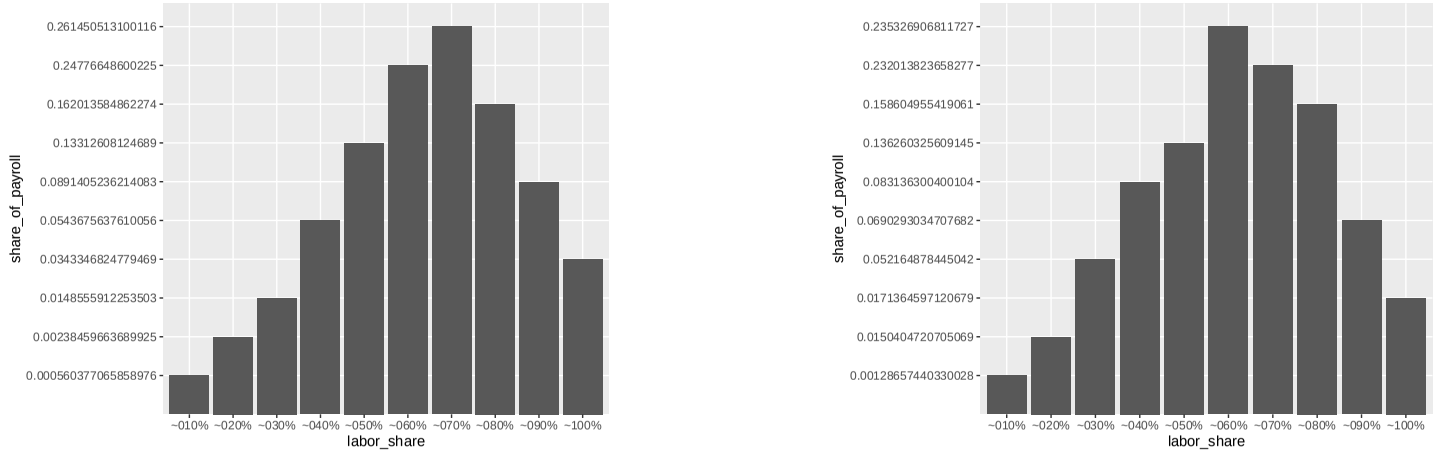
Notes:

(1) Sources: Basic Survey of Japanese Business Structure and Activities by METI (1995–2016).

(2) The left panel shows the results from the 2007 sample and the right panel shows the results from the 2016 sample.

(3) Each bar shows the value-added share of each labor-share decile.

Figure 6: Payroll share of each labor-share decile: 1996 vs 2006



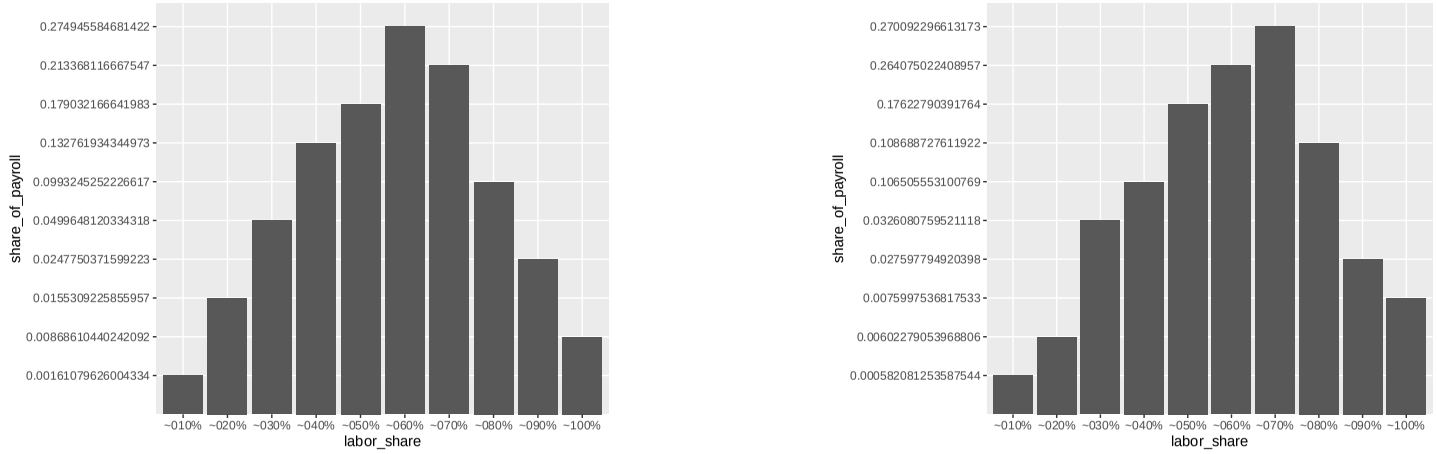
Notes:

(1) Sources: Basic Survey of Japanese Business Structure and Activities by METI (1996–2016).

(2) The left panel shows the results from the 2007 sample and the right panel shows the results from the 2016 sample.

(3) Each bar shows the payroll share of each labor-share decile.

Figure 7: Payroll share of each labor-share decile: 2007 vs 2016



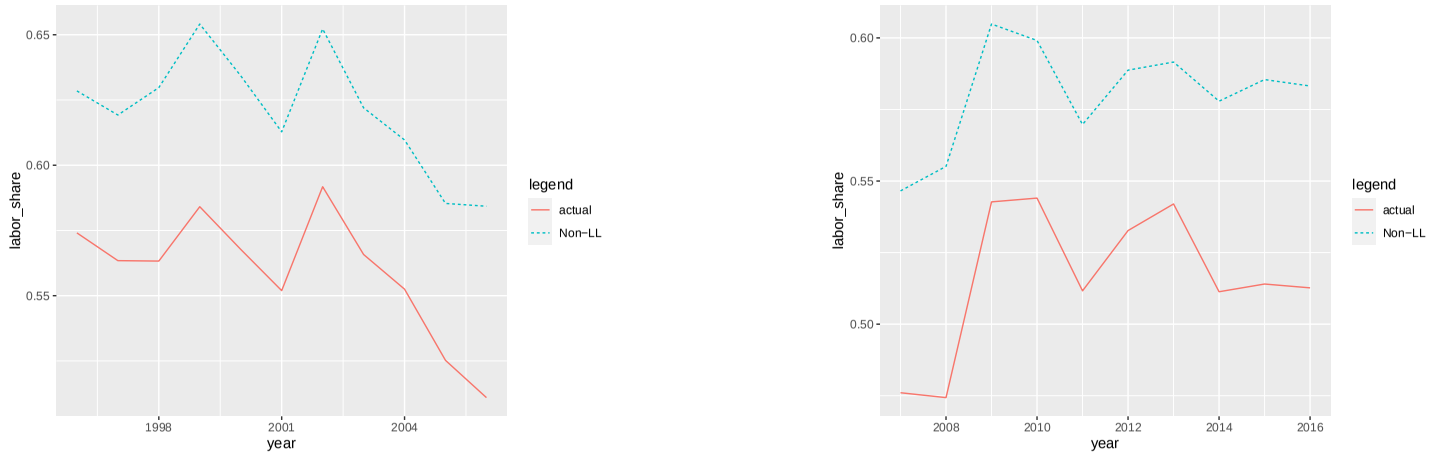
Notes:

(1) Sources: Basic Survey of Japanese Business Structure and Activities by METI (1995–2016).

(2) The left panel shows the results from the 2007 sample and the right panel shows the results from the 2016 sample.

(3) Each bar shows the payroll share of each labor-share decile.

Figure 8: Overall labor share vs labor share of firms without lowest decile



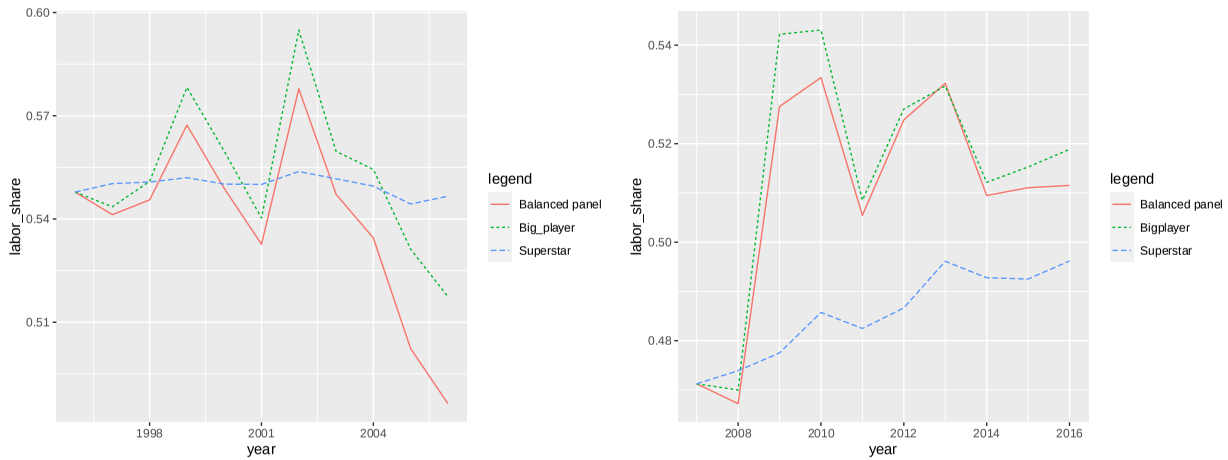
Notes:

(1) Sources: Basic Survey of Japanese Business Structure and Activities by METI (1996–2016).

(2) The left panel shows the results from the 1996–2006 sample and the right panel shows the results from the 2007–2016 sample.

(3) The blue dotted line shows the labor share calculated using the sample without the lowest decile.

Figure 9: "Big player" vs "Superstar"



Notes:

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(2) The left panel shows the results from the 2007 sample and the right panel shows the results from the 2016 sample.

(3) Blue dashed line shows the hypothetical labor share calculated as $\sum \omega_{it}\lambda_{i,initial}$. The red dotted line shows the hypothetical labor share calculated as $\sum \omega_{i,initial}\lambda_{it}$. (where ω is value-added share and λ is labor share).