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**Microstructure of Investment and Employment Dynamics:
Stylized Facts of Factor Adjustment Based on Listed Company Data**

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Microstructure of Investment and Employment Dynamics : Stylized facts of factor adjustment based on listed company data

Summary

1. Under the recent deflationary economy, Japanese corporate factor adjustment behavior (decisions regarding the amount and timing of capital and labor input) is changing from one that assumes expansion in scale to one which considers both expansion and contraction with wider variety, reflecting differences in business environment and history of adjustment path. In order to understand the dynamics of aggregate investment and employment, it is essential to explore the microstructure regarding investment and employment as a set of factor adjustment behavior. This study investigates the histories and results of Japanese corporate factor adjustments in the domestic market since the 1980s and extracts the stylized facts.

2. We divided the time span since the 1980s into three phases (Phase I: FY1980-86, Phase II: FY1987-93 and Phase III: FY1994-2000) and surveyed the changes in factor adjustment patterns based on aggregate corporate statistical data. Along with a growth setback of both capital and labor in Phase III from the macroeconomic perspective, evolving diversity between industries was apparent as indicated below. First, inter-industry correlation of factor adjustment declined broadly in Phase III for both capital and labor in manufacturing industries, and for capital in non-manufacturing industries. Secondly, a positive correlation between the capital growth rate and labor growth rate in each industry was observed throughout the three phases, though significance evidently declined in Phase III. Thirdly, regarding the structure of the inter-industry correlation of capital spending, the clearly-delineated propagation process from manufacturing to non-manufacturing industries seen in Phase I had weakened considerably by Phase III after passing through the so-called “unanimous” type investment boom in Phase II.

3. In order to investigate the microstructure of capital and labor growth setback and diversity seen in the aggregate data, we examined the characteristics of factor adjustment behavior at the corporate level based on longitudinal data of approximately 1,400 companies listed continuously since FY1980 (henceforth “common firms”). The net growth rate of capacity dropped to near zero in Phase III and the downward momentum continued in gross positive contribution (sum of contribution of firms with positive net investment), which expresses potential for capacity expansion. Employment trends indicate that, while the net growth rate in Phase III was persistently negative, gross positive contribution does not necessarily decline tied to temporary employment.

4. The inter-company distribution of the net growth rate of capacity viewed every five years indicates that the center of the distribution remained in the negative zone since FY1995 and, in terms of the distribution configuration, the right-hand tail, which expresses the abundance of growth drivers, narrowed greatly, indicating that the conditions of capacity in Phase III were almost as stagnant as those of employment. Meanwhile, the distribution of return on investment (rate of return on tangible assets minus interest cost), helped by a drop in interest cost, did not change that greatly, which suggests that the growth setback of capital in Phase III should be attributed to change in investment behavior (response to return on investment). Calculating the threshold rate of return of capacity expansion under the appropriate hypotheses, it can be seen that, following a period of notably low threshold during the latter half of Phase II, Phase III shifted to a trend of increase and, especially in FY1999 and 2000, the threshold reached the highest level since the early 1980s. Comparing this to the threshold of employment increase, though the trend is generally similar, the correlation between the two was not as strong in Phase III as it

had been earlier and that there was a far more cautious attitude toward capacity than employment in FY1999 and 2000.

5. Decomposing the net growth rate of capacity by industry indicates that the gross positive contribution dropped broadly overall in Phase III while the gross negative contribution became more discernable in virtually all industries. Observing the correlation between capacity and employment by phase in terms of gross contribution, the correlation of positive contribution gradually declined while the correlation of negative contribution became noticeably higher in Phase III. In summary, while decrease factors in Phase III are similar for both capacity and employment, the differences in increase factors between capacity and employment are greater. In addition, when the gross positive contribution of capacity is decomposed into industry factors and individual company (idiosyncratic) factors, individual company factors have recently come to explain virtually everything, as in the case of employment.

6. Analyzing the history of factor adjustment path of the common firms in each phase since the 1980s on the two axes of capacity and employment, 90% of the firms can be grouped into six major types: sustained growth, quasi-sustained growth (capacity only), quasi-sustained growth (employment only), growth setback, early contraction, and Heisei boom. Of these, the growth setback type (increase in capacity or both capacity and employment in Phase I and II and contraction in both in Phase III) accounts for 28%, the largest share, of the number of companies. Especially in manufacturing industries, this category includes leading firms in Japan, indicating the extent to which downsizing has prevailed in the domestic market since Phase III. Meanwhile, although high-profit, high-growth firms in each of the industries are listed among the sustained growth type that are expected to drive the growth of aggregate investment (on the same path as growth setback type firms through Phase II but with expansion in both capacity and employment

continuing in Phase III), the share by number of companies is small accounting for only 8% and there are comparatively few capital-intensive companies among them. Companies of the capital-intensive type that also steadily expanded in scale during Phase III are of the quasi-sustained growth type that expanded only in capacity (21% in the share by number of companies); however, their performance is generally equivalent to the growth setback type and they may be unable to sustain capacity expansion in the future.

7. Regarding the importance of non-common firms (newly listed or delisted in or after FY1981) in the gross positive contribution of capacity for all listed companies, the share of non-common firms is steadily expanding but its impact is small compared to employment. By industry, those with a notably large positive contribution compared to the common firms are mainly retail industries, services industries and other labor-intensive industries that actively use temporary and part-time employment.

8. Thus, in the factor adjustment behavior of Japanese firms, diversity is becoming significant at both the industry and company level and factors in the expansion of capacity and employment are becoming more idiosyncratic. In addition, based on listed common firm data, we confirmed that the potential for capacity expansion is limited given the increasingly cautious attitude toward expansion in scale and the establishment of downsizing trends, especially among manufacturing industries. Meanwhile, trends among newly listed companies indicate latent growth potential and the existence of entrepreneurial capabilities in non-manufacturing industries and it is hoped that the contribution will expand in the future, especially in employment. When considering introducing some macroeconomic policy to stimulate investment, it is important to target indirect, medium- to long-term effects taking into consideration the need for business reorganization among manufacturing industries and for business expansion among non-manufacturing industries.

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Introduction¹

As it becomes increasingly difficult to anticipate a macroeconomic environment of constantly increasing growth and as competition intensifies within the deflationary economy, corporate factor adjustment behavior² (decisions regarding the amount and timing of capital³ and labor input) is also changing from one that assumes expansion in scale to one which considers both expansion and contraction with wider variety, reflecting differences in business environment and history of adjustment path. In order to understand the dynamics of aggregate investment and employment, it is essential to explore the microstructure regarding investment and employment as a set of factor adjustment behavior. This study investigates the histories and results of Japanese corporate factor adjustments in the domestic market since the 1980s and extracts the stylized facts.⁴

This study uses two techniques to explore factor adjustment behavior under a deflationary economy. The first is micro-data econometrics, which sheds light on gross flows of investment and employment at the individual level⁵ without offsetting the dynamics in both expansion and contraction by aggregation. The importance of micro-data analysis is today widely recognized even by macroeconomic researchers due to the relevance of microeconomic heterogeneity to aggregate dynamics and there have been many empirical studies regarding employment, investment, productivity and the like.⁶ The second

technique is the dual approach⁷, which considers investment and employment as one set of adjustment behavior. The dual approach is effective for describing actual corporate behavior in which it is difficult to adjust capacity and employment independently.

The study is organized as follows. In Chapter I, we survey changes in factor adjustment patterns at the industry level based on aggregate corporate data as an introduction to micro-data analysis and verify evolving growth setback and heterogeneity during the latter half of the 1990s. In Chapters II and III, we examine factor adjustment at the corporate level based on longitudinal data of 1,400 firms listed continuously since FY1980 (“common firms”). In Chapter II, we first analyze the microstructure of capacity and employment growth setback and heterogeneity from various angles using the dual approach. By focusing on gross flows and transitions in distribution at the corporate level, we discuss interesting problems such as differences and interactions between capacity and employment in adjustment patterns. In Chapter III, we conduct analyses that focus on the history of factor adjustment paths. It is possible to roughly group some 90% of the common firms into six patterns of adjustment paths since FY1980 and this taxonomy provides a new understanding of downsizing trends in the manufacturing sector and other characteristics of factor adjustment. We also review the trends among newly listed companies, which we were unable to treat in the analyses of common firms, based on data for all listed firms. Finally, in the Concluding remarks we discuss macroeconomic implications and the results of the analyses of common firms.

¹ In the preparation of this study, Takahashi was primarily in charge of Chapter I and Nakamura was in charge of Chapters II and III as well as the Concluding Remarks.

² Factor adjustment is a generic term for capital stock (capacity) adjustments, labor (employment) adjustments and other adjustments of input to optimize production. Though also used for adjustments of raw materials, energy and so forth, it is used in this study only for adjustments of capital stock and labor.

³ “Capital” in this study refers to real capital stock.

⁴ Refer to Nakamura (2000), p.5, footnote 1, for the significance of focusing on the period from FY1980 onward.

⁵ “Individual” is a generic term for firms, establishments, households and so forth. This study considers only firms.

⁶ Refer to Haltiwanger (1997, 2000) for a survey of research in the U.S., where establishment-level data is well organized and there have been more empirical studies based on micro-data analyses than in Japan. This study is similar in theme and methodology to those of Tanaka (2000) and Nakamura (2000, 2001).

⁷ “Dual approach” is a term coined by the authors. While there are relatively few examples of micro-data analysis based on this approach, Sakellaris (2001), for example, carried out detailed fact-finding from a similar perspective regarding dynamic choices and their consequences at the time of lumpy adjustment in capacity and employment based on plant-level data of U.S. manufacturing industries.

I Trends in Aggregate Data since the 1980s

1. Three Phases since the 1980s and the Macroeconomic Environment

In this study, we analyze the changing mode of factor adjustment during the 21-year period since FY1980 through FY2000 divided into three phases of seven years each. This periodization is not only for convenience of statistical comparison but each phase has the further significance of corresponding to changes in the business cycle and macroeconomic environment and provides the basic framework to interpret the results of analyses throughout this study.

Phase I (FY1980-86) corresponds to a period of contraction (36 months, 2/80 – 2/83) in the ninth cycle, a period of expansion (28 months, 2/83 – 6/85) and recession (17 months, 6/85 – 11/86) in the tenth cycle. During the prolonged adjustment after the second oil shock and the so-called “strong yen recession”, the economy experienced its greatest stability of the three phases.

Phase II (FY1987-93) corresponds to a period of expansion (51 months, 11/86 – 2/91) and contraction (32 months, 2/91 – 10/93) in the eleventh cycle, during which the so-called bubble economy emerged and subsequently collapsed.

Phase III (FY1994-2000) corresponds to a period of expansion (43 months, 10/93 – 5/97) and contraction (20 months, 5/97 – 1/99) in the twelfth cycle and a period of expansion (21 months, 1/99 – 10/00) in the thirteenth cycle. Although this phase encompassed two periods of expansion, the growth rate was low overall, characterized by stagnant investment, rising unemployment and the emergence of structural deflation.

We will proceed with the analyses in the following sections with reference to the macroeconomic environment during these three phases.

2. Diversification in Factor Adjustment Patterns at the Industry Level

In this and the following sections, we review changes in factor adjustment at the industry level using the dual approach based on aggregate

corporate statistical data as an introduction to the micro-data analysis of Chapter II and provide evidence of capital and labor growth setback and evolving diversity in factor adjustment in the latter half of the 1990s.

We first confirmed the trend of the growth rate of the capital and labor¹ (against the previous year)² in large corporations capitalized at ¥1 billion or more³ (Fig. 1-1).

In Phase I, the growth rate of capital gradually dropped from 10% in FY1980 through 1983 and in FY1984-85, backed by the high-tech boom, rebounded somewhat, but declined again in FY1986 mainly due to the effects of the strong yen. The growth rate of labor remained generally stable at 2% until FY1985, falling subsequently below 1% in FY1986.

In Phase II, the growth rate of capital surged from FY1988, exceeding 13% at maximum in FY1991, the highest of all three phases. Along with the demise of the Heisei boom, however, it plunged to around 2% in FY1993. The growth rate of labor also increased beginning in FY1988, peaking at near 6% in FY1990 and then dropping again below 1% by FY1993.

In Phase III, the slowdown continued for both capital and labor. Though the growth rate of capital, having hit bottom in FY1994, rose somewhat in FY1995-97 reflecting economic expansion, it remained negative for three years in succession beginning in FY1998. The growth rate of labor was even more severe, negative for four straight years beginning in FY1997.

¹ “Capital” and “labor” are used in this study to indicate theoretical concepts or aggregate statistics while “capacity” and “employment” indicate individual company figures or behavior. In the analyses, capital (capacity) is considered to be the book value of tangible fixed assets (excluding land) and labor (employment) is considered to be the number of employees.

² When calculating growth rates (against the previous year), the major discontinuity caused by the privatization of publicly-held corporations has been adjusted.

³ In regards to time-series data of small- and medium-sized firms (capital from ¥10 million up to ¥100 million), the impact of the discontinuity that followed the creation of the minimum capital system, etc. is great.

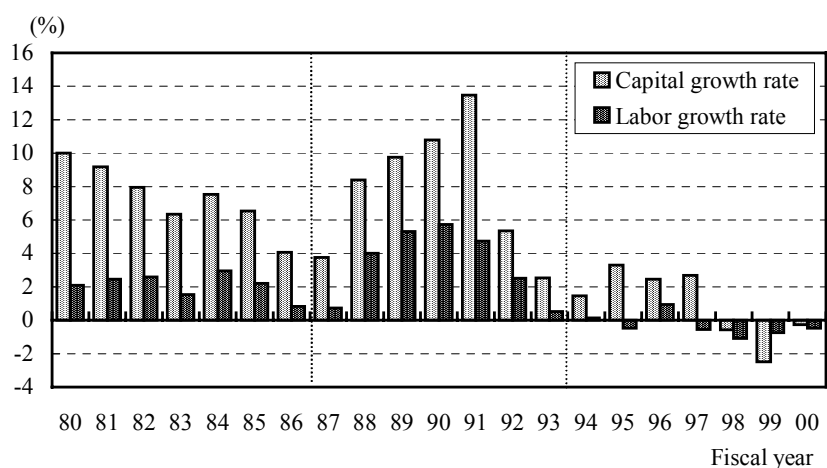


Fig. 1-1 Aggregate Transitions in Capital and Labor Growth Rates

- Notes:* 1. The major discontinuity due to public corporation privatization has been adjusted.
 2. Based on tangible fixed assets (ex-land) at the end of the term for capital and number of employees at the end of the term for employment (likewise below). Refer to the text for details.

Source: Prepared based on the Quarterly Report on Financial Statements Statistics of Corporations, Ministry of Finance. Total of large corporations.

We next verified the changes in factor adjustment patterns from the perspective of inter-industry comovement. Specifically, we assessed the similarity of the patterns of capital and labor input in each industry during the three phases by the size of the correlation coefficient (i.e., comovement) with the reference pattern of the total sum of all industries based on industry-specific time-series data⁴ of corporate statistics (quarterly, actual amount). If we find a significantly positive correlation with the reference pattern in many industries, it will indicate similarity of factor adjustment patterns and, if we do not, it will indicate heterogeneity.

Figure 1-2a shows the arithmetic mean of the correlation coefficient with the reference pattern calculated for capital and labor adjustment patterns in 35 industries. Though the correlation coefficient of capital was stable and high at about 0.8 in Phases I and II, it declined broadly to 0.3 in Phase III. The correlation coefficient of labor, which was originally low, was

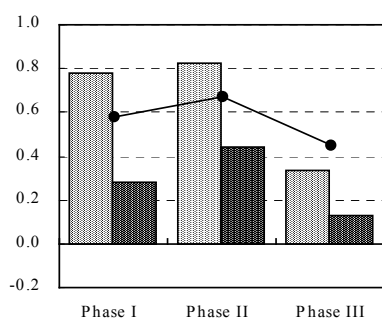
0.3 in Phase I, climbed to 0.4 in Phase II, then dropped to 0.1 in Phase III. In other words, the heterogeneity in both capital and labor adjustment tended to become pronounced during Phase III. Furthermore, calculating the average correlation coefficient for the 18 manufacturing and 17 non-manufacturing industries respectively (Figs. 1-2b, 2c), the direction of change in the case of manufacturing is the same as for the average of all industries, though the drop in the correlation coefficient in Phase III appears even more conspicuously in both capital and labor. In the case of non-manufacturing, there was downward momentum in the correlation coefficient of capital and that of labor also declined in Phase III, though the drop was narrower for both than in the manufacturing industries.

Thus, in order to clarify the background of the changes in inter-industry comovement, we calculated the same correlation coefficient for time-series data of sales⁵ (quarterly, actual amount seasonally-adjusted) as a proxy variable for the business environment, and compared it with the correlation coefficients for capital and labor in terms of their time-series changes. If a

⁴ A total of 35 industries, 18 manufacturing and 17 non-manufacturing industries, from among the 37 categories of the classification of Financial Statements Statistics of Corporations statistics are analyzed in this chapter with agriculture, forestry, fisheries and aquaculture industries, which are of lesser importance, consolidated.

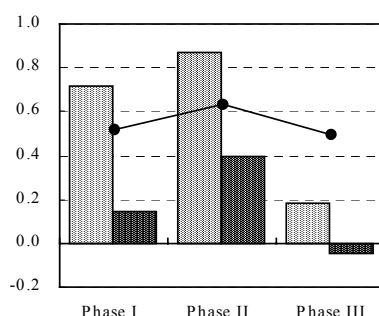
⁵ Sales are an important precondition, at least in terms of business practice, when companies decide the scale of capacity and employment.

Fig. 1-2a All industries



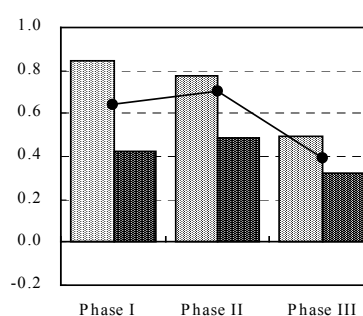
	Phase I	Phase II	Phase III
Capital	0.78	0.82	0.33
Labor	0.28	0.44	0.13
Sales	0.58	0.67	0.45

Fig. 1-2b Manufacturing industries



	Phase I	Phase II	Phase III
Capital	0.72	0.87	0.18
Labor	0.14	0.39	-0.05
Sales	0.52	0.63	0.50

Fig. 1-2c Non-manufacturing industries



	Phase I	Phase II	Phase III
Capital	0.85	0.78	0.49
Labor	0.42	0.48	0.32
Sales	0.64	0.70	0.39

Comovement of capital
 Comovement of labor
 Comovement of sales

Fig. 1-2 Transitions by Phase of Inter-Industry Comovement of Capital, Labor and Sales

Note: The correlation coefficients of quarterly time-series data (sales only seasonally adjusted) of capital, labor and sales for the 18 manufacturing and 17 non-manufacturing industries to the total of all industries were calculated and the arithmetic means are shown.

Source: Prepared based on Financial Statements Statistics of Corporations, Ministry of Finance. The total of all sizes.

significant change occurred in the average correlation coefficient for either capital or labor and it was a change similar to that of the average correlation coefficient for sales, we can say that a change in the business environment was the primary cause of the change in comovement of factor adjustment. If it was obviously different from a change of the average correlation coefficient for sales, a change in the response of each industry to the business environment was the primary cause. Taking these points into consideration, first we focus on manufacturing industries (Fig. 1-2b). The correlation coefficient for sales changed little throughout the three phases and there was no prominent drop in Phase III as in the case of capital and labor. Consequently, changes in the factor adjustment patterns of manufacturing industries in Phase III were likely caused by changes in the response to the business environment (factor adjustment behavior) rather than changes in the business environment itself. On the other hand, the conditions of non-manufacturing industries (Fig. 1-2c) indicate that the correlation coefficient of sales was correspondingly low in Phase III and similar to the

changes of the correlation coefficients of capital and labor. Therefore, changes in the business environment probably played a major role in changes in the factor adjustment patterns of non-manufacturing industries, including as well the decline in the correlation in Phase III.

The analyses heretofore have looked at the correlation of short-term changes on a quarterly basis with capital and labor viewed independently. To complement those, next we analyze capital and labor as a set of factor adjustment and provide evidence of growth setback and heterogeneity based on medium-term trends.

We examine the relationship between industries that play a considerable role in capital growth and those that play a considerable role in labor growth by expressing the medium-term growth rate⁶ of capital and labor of each industry in each of the three phases in scatter diagrams. For example, as indicated in the conceptual diagram of Fig. 1-3, if an upward sloping relation-

⁶ The figures for the first quarter and the final quarter of each phase are compared and annualized figures are used for the growth rate. As in Fig. 1-1, the effect due to privatization has been adjusted.

ship (positive correlation) in inter-industry factor adjustment is recognized to be significant, it means that the more an industry expands (contracts) capital, the more it also expands (contracts) labor. In other words, it is possible to reduce differences in inter-industry factor adjustment patterns to the axis of expansion and contraction in scale. On the other hand, if a downward sloping relationship (negative correlation) is recognized as significant in inter-industry factor adjustment patterns, it means that the more an industry expands (contracts) capital, the more it also contracts (expands) labor. In other words, the axis of substitution of capital and labor is the focal point in differences in inter-industry factor adjustment patterns. In some cases there may be no significant correlation in inter-industry factor adjustment patterns. That means that the axis in which differences between industries is the focal point as in the two cases described above does not exist, that is, that factor adjustment patterns are diversifying in a manner different from that of Fig. 1-2.

The conditions of distribution of industry-specific data taking this into account indicate that, in Phase I, a significant upward sloping relationship is apparent⁷, suggesting that the expansion and contraction axis is the focal point for differences in inter-industry factor adjustment patterns (Fig. 1-4a) The inclination of the regression line is 0.8 and, in industries in which the capital growth rate is 1 percentage point higher than the average, that means that the labor growth rate is statistically expected to be 0.8 percentage points higher than the average. When factor adjustment patterns are divided into four types by the increase and decrease of capital and labor (refer to conceptual diagram Fig. 1-3), 23 industries, about 70% of the total, belonged to the scale expansion type in which both capital and labor expanded. Electrical equipment, precision equipment and transport equipment had double-digit capital growth rates, expanding with broad divergence from the schedule suggested by the regression line and showing their role in driving growth at this time in terms of capital.

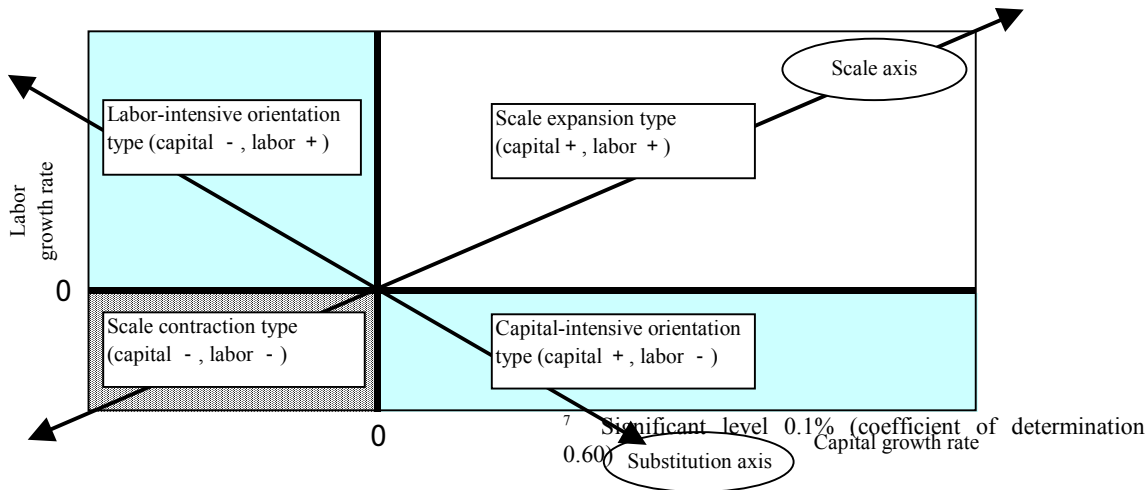


Fig. 1-3 Conceptual Diagram

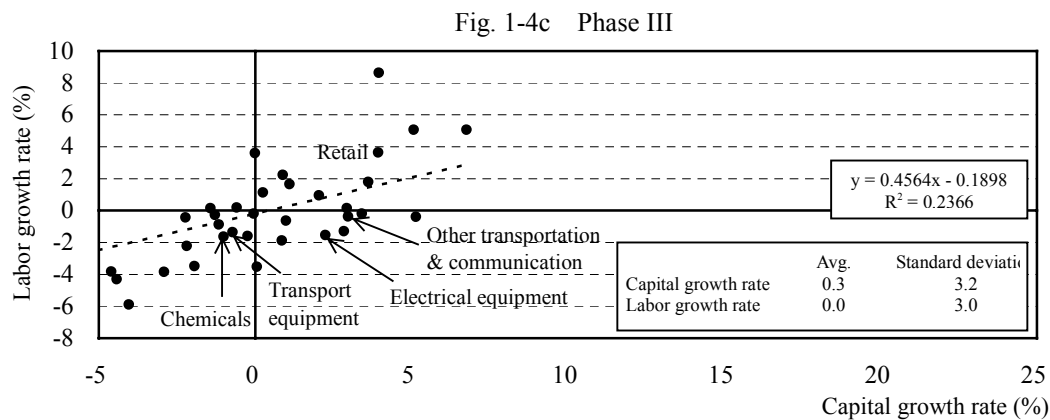
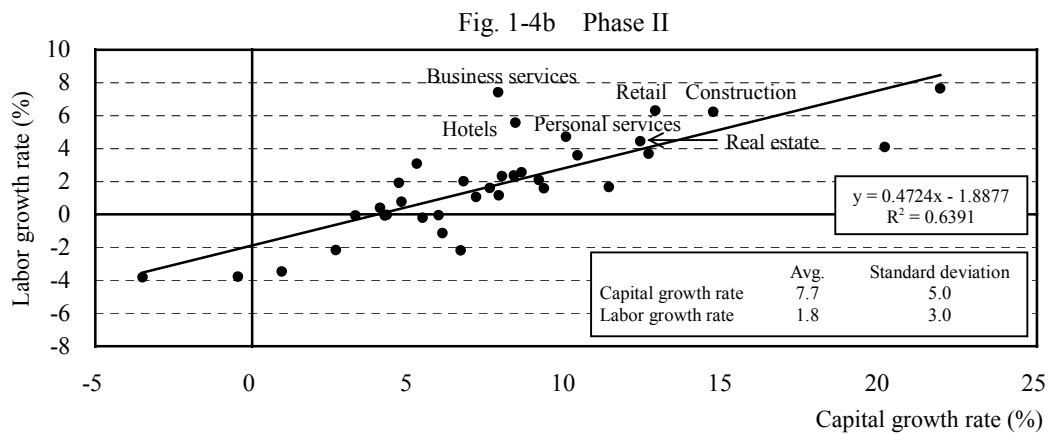
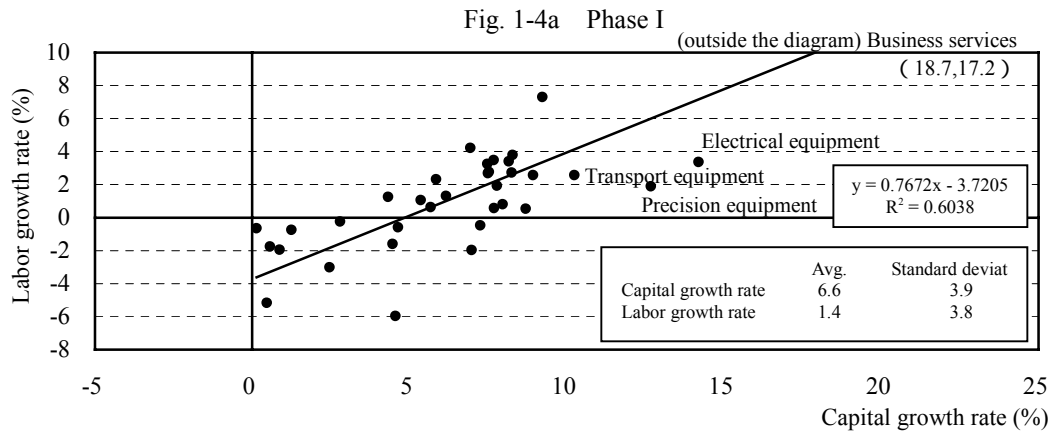


Fig. 1-4 Distribution and Correlation of Capital and Labor Growth Rates by Industry in Each Phase

- Notes:*
1. Distribution charts indicate the annual average growth rates of capital and labor for 18 manufacturing industries and 17 non-manufacturing industries in each phase. The major discontinuity of public corporation privatization has been adjusted.
 2. Regression lines are the results of regressing the labor growth rate against the capital growth rate. The dotted line used in Phase III expresses low significance.

Source: Prepared based on the Quarterly Report on Financial Statements Statistics of Corporations. The total of all sizes.

A significant upward sloping relationship in distribution is also evident in Phase II (Fig. 1-4b).⁸ On the other hand, the inclination of the regression line is 0.5, smaller than the value of 0.8 of Phase I. The expansion of the capital growth rate and the contraction of the capital growth rate were more dispersed compared to Phase I. Of the four types, 24 industries indicated the scale expansion type of factor adjustment pattern, much the same as in Phase I. Service, retail, construction and other industries indicated a high labor growth rate diverging from the schedule suggested by the regression line and it is possible to see the remnants of an economic environment led by vigorous domestic demand.

In Phase III, though there is an upward sloping regression line, given the strict criteria, it can no longer be considered a significant relationship.⁹ It is thought that differences in inter-industry factor adjustment patterns assumed a diversified form in which the scale axis and the substitution axis are intermingled with each other (Fig. 1-4c). The average of capital and labor growth rates were essentially zero for all industries. In terms of the four types, 13 industries, including chemicals and transport equipment, were of the scale-contraction type with a decrease in both capital and labor (0 industries in Phase I, and 2 in Phase II).

3. Changes in Inter-Industry Propagation Structure of Investment

In this section, we analyze the inter-industry comovement or propagation structure, including leading and lagging relationships, with the focus on investment.

Quarterly time-series data of the total of all industries as the benchmark, we calculated the correlation coefficient of simultaneous time-series data of each industry and also the correlation coefficient when shifted one quarter ahead and behind. This method is based on that of Hornstein (2000), who analyzed the conditions of inter-industry comovement for various aggregate statistics. We then defined industries as “leading

industries” if the correlation with a one-quarter lead was highest, “lagging industries” if the correlation with a one-quarter lag was highest and “simultaneous industries” if the simultaneous correlation was the highest. If the correlation coefficient was less than 0.5¹⁰ in each case, industries were classified as “low-correlation industries”¹¹ Such definitions basically assumed that all industry and individual data have a positive correlation. However, if a negative correlation is found, it is deemed to be a “low-correlation industry.” Figure 1-5 indicates the conditions of the correlation of each industry based on this method for the three phases. The numbers displayed in the lower right-hand corner indicate the number of relevant industries and, among them, the names of the industries are displayed individually if either the investment is significantly large or considered qualitatively important regarding comovement.¹²

Analyzing changes in the inter-industry propagation structure of investment with the definitions as set out above, there is a distinctive structure that propagates from manufacturing industries to non-manufacturing industries in Phase I. Among leading industries are seven manufacturing industries including electrical equipment and general equipment while there are no relevant non-manufacturing industries. Meanwhile, simultaneous and lagging industries are mainly non-manufacturing industries, with a smaller proportion of manufacturing industries that have a strong relationship to consumers such as foods. This appears to be consistent with the macroeconomic situation at the time, with exports of high-tech industries creating transition points in the business climate and domestic demand following behind.

⁸ Significant level 0.1% (coefficient of determination 0.64)

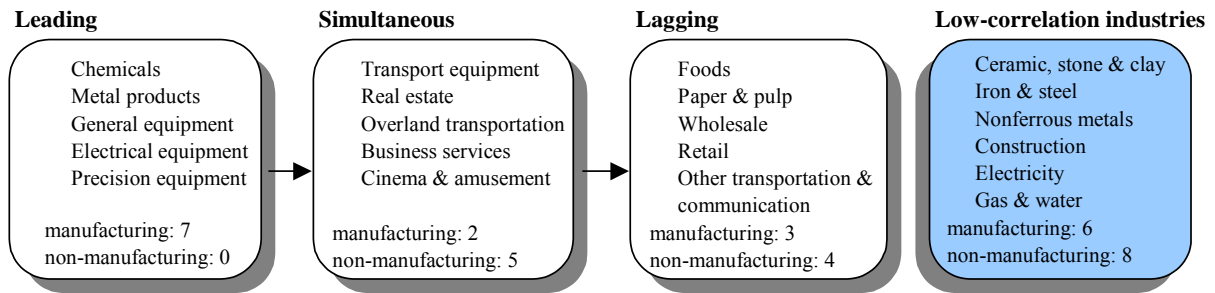
⁹ Significant level 0.1% (coefficient of determination 0.24)

¹⁰ Corresponds generally to a threshold value with a significance level of 0.1%.

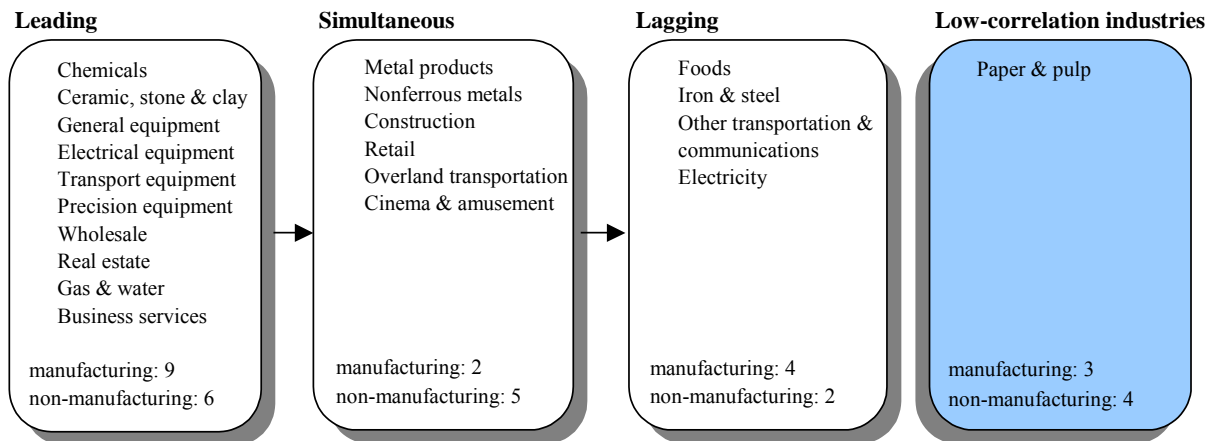
¹¹ Since industries with a negative correlation to the total amount of all industries all had a correlation coefficient of less than 0.5 in terms of the absolute value, they were classified as “low-correlation” industries.

¹² There were 11 manufacturing industries and 10 non-manufacturing industries with names listed separately.

Phase I (2nd Qtr 1980 – 1st Qtr 1987)



Phase II (2nd Qtr 1987 – 1st Qtr 1994)



Phase III (2nd Qtr 1994 – 1st Qtr 2001)

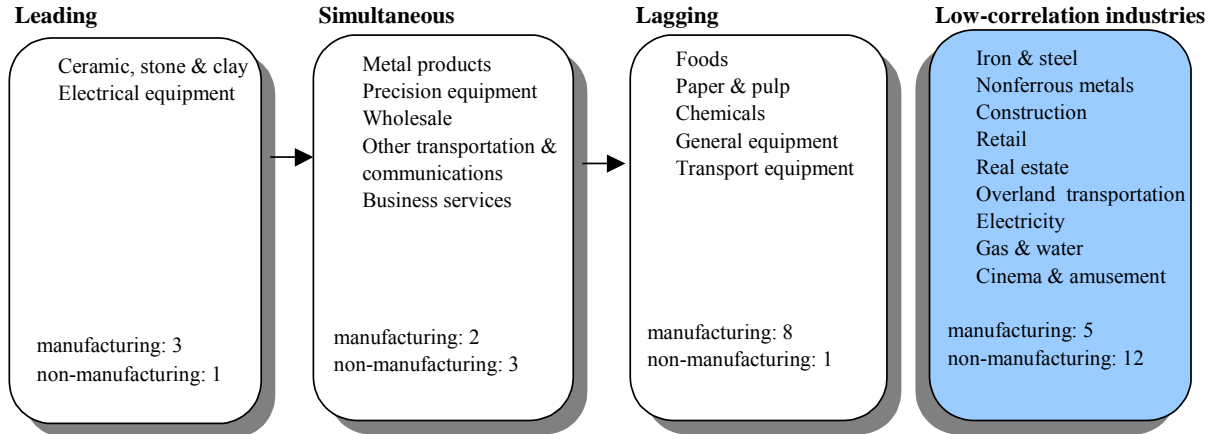


Fig. 1-5 Inter-Industry Propagation Structure of Investment and Its Changes

- Notes:*
- In order to comprehend the correlation including leading and lagging relationships, the correlation coefficients of quarterly time-series (seasonally adjusted) data of the investments of the 18 manufacturing industries and 17 non-manufacturing industries to the total of all industries were calculated for the three cases, including the addition of one quarter of lead and lag. Industries were classified as low correlation industries if the maximum absolute value is less than 0.5 and as industries with a significant correlation if the maximum value was 0.5 or more. Since the absolute values of correlation coefficients of industries indicating a negative correlation were all less than 0.5, the industries were classified as low-correlation industries.
 - The figures at the lower right express the number of relevant industries and, of these, industries with a large share in investment or qualitative importance in the propagation process (manufacturing industries: 11, non-manufacturing industries: 10) are listed by name (= manufacturing industry, = non-manufacturing industry).

Source: Prepared based on the Quarterly Report on Financial Statements Statistics of Corporations. The total of all sizes.

In Phase II, there were seven low-correlation industries, the smallest number in all three phases, that did not correspond to leading, simultaneous or lagging industries and the only major industry was paper & pulp. Another characteristic at this time was the appearance of non-manufacturing industries among the leading industries and, rather than propagation, this reflects a unanimous type dynamic structure tied to vigorous domestic demand.

In Phase III, in contrast to Phase II, 17 industries, about half, corresponded to low-correlation industries, the most in any of the three phases. In a breakdown, there were five low-correlation manufacturing industries, not a particularly large number compared to Phase II, but the propagation structure changed greatly among industries with a significant correlation. Leading industries declined to only three including electrical equipment, while there was a considerable increase in lagging industries to eight, reflecting the conditions of weak growth drivers other than IT-related industries in terms

o f i n

vestment. On the other hand, in non-manufacturing industries, 12 industries including retail, which had until then been a typical correlated industry, amounting to 70% non-manufacturing total, corresponded to low-correlation industries. Thus, the clearly-defined process of propagation seen in Phase I from manufacturing industries to non-manufacturing industries, through the unanimous type boom in Phase II, weakened considerably by Phase III.

In this chapter, we reviewed changes in factor adjustment patterns at the industry level based on aggregate corporate data. We confirmed the evolving trends of diversity in Phase III, under the circumstances of capital and labor growth setback, in which inter-industry co-movement declined while industries that played a role in growth were divided by capital and labor. In the following chapter, we will empirically clarify the microstructure of growth setback and heterogeneity in capacity and employment based on longitudinal data of firms listed continuously since FY1980 (“common firms”).

II. Microstructure of Investment and Employment Dynamics

1. The Significance and Methods of Micro-Data Econometrics Based on Corporate Data

In this and the following chapter, we investigate factor adjustment behavior at the corporate level using the technique of micro-data econometrics based on longitudinal data. As stated in the Introduction, micro-data analysis enables the underlying gross microeconomic changes to be identified without offsetting them by aggregation. Assume, for example, that, at the beginning of the term, all companies have the same scale of tangible fixed assets. If at that time we aggregate both the case in which no firms changed their assets and the case in which half of the companies doubled assets while the other half disposed of all of their assets, then the growth rate of tangible fixed assets is zero in both cases and it is impossible to distinguish between them. Though this may be an extreme case, generally speaking, the greater the heterogeneity between individuals (the stronger the tendency to deviate from the average) the more important the technique of micro-data econometrics for analyzing the dynamics of the real economy). Actually, according to research in the U.S., it has been pointed out that employment, capital stock, production, productivity and other indices in manufacturing industries have tremendous heterogeneity even if detailed industry properties are controlled.¹ In addition, analyses of the ROA of listed companies in Japan have shown that the disparities between firms can largely be explained by disparities between firms within the same industry.² Thus, micro-data analysis is indispensable in precisely analyzing the factor adjustment behavior in Phase III when the trend toward constantly increasing growth and uniformity had weakened.

The “individual data” used for analysis in this paper are the non-consolidated financial data of listed firms based on securities reports. The primary subjects of analysis are 1,418 firms (981

manufacturing firms and 437 non-manufacturing firms), excluding financial and insurance industries, with stock listed continuously from FY1980 through FY2000 in the first or second section of the Tokyo, Osaka or Nagoya Stock Exchanges (henceforth called “common firms”). In the U.S., there is a publicly available database³ containing establishment-level longitudinal data of manufacturing industries, so most of the empirical studies based on micro-data focus on establishments as the analytical unit. However, in Japan, firm-level data are often used in such analyses due to differences in accessibility to establishment-level data. The reason for focusing on continuously listed firms in this study is because we are interested in the history of factor adjustment path, and continuous data are required for the analysis period in question (FY1980 and later). Since this study does not make comparisons with preceding studies and results, detailed explanations of the relative advantages and disadvantages due to differences in data characteristics are omitted.⁴ However, when interpreting the analysis results below, it is necessary to consider the following two points.

First, micro-data analyses focusing on employment generally consider the effects of the startup and shutdown (or entry and exit) of business establishments (or firms). However, when listed firms are the subject of analysis as in this study, only the expansion and contraction of firms that remain in business are considered. Secondly, listed firms are not necessarily typical of firms in Japan. Likewise, continuously listed firms (common firms) are not necessarily typical of listed firms. In this sense, sample bias does exist to some extent, but is not crucial. A general characteristic of common firms is that many of them have a long history, are large in scale, and are manufacturing firms.⁵ The differences between common firms and all listed firms will be analyzed further in Chapter III, Section 3.

³ Referred to as the Longitudinal Research Database (LRD).

⁴ Tanaka (2000), who also used non-consolidated data of listed companies like in this study, gives a general examination of the sample bias problems on pp. 17-18.

⁵ Supporting evidence will be given from time to time to show that the problem of sample bias and the properties of the common firms do not have a particularly large impact on the results of the analyses of this study.

¹ Refer to Haltiwanger (1997, 2000).

² Refer to Nakamura (2001).

In preparation for the analyses, this section explains the data used and the key concepts. The listed company data used in the study (non-consolidated account settlements) was taken from the Corporate Financial Data Bank of the Development Bank of Japan, and certain adjustments have been made to enable comparison of figures in the case of irregular settlements and mergers before and after (normalized data). In regard to differences in settlement month, all common firms are analyzed as balanced panel data by treating the data of firms other than those with March settlements as data of the fiscal year in which the end of the settlement period falls.

In the financial data, the book value of tangible fixed assets (excluding land) is used as the concept of “capital stock” or “capacity.” The book value is the balance after deducting the cumulative depreciation amount in terms of accounting from the historical cost and, in principle, it can also be considered as the net capital stock based on historical cost. To ensure consistency with the concept of capital stock in economics, reassessment on a current cost basis as well as adjustment of the difference between depreciation cost recognized in accounting and physical depletion are needed. This study, however, is a simple fact-finding study and the book value is probably a more practical yardstick used in the decision-making processes of business operations. Therefore, the analyses are provisionally carried out without making special adjustments.

As the concepts of “labor” or “employment,” we used the total number of employees, which is equal to the “number of employees as of the end of the term” plus the “number of temporary, contract and other personnel” and, following Tanaka (2000), we considered the former to be regular employment and the latter to be temporary employment. This assumption raises various points of controversy, such as the ambiguity of the definition of “number of temporary, contract and other personnel” and of the borderline with the “number of employees as of the end of the term”⁶. In addition, “number of temporary, contract and other personnel” is measured as the

average during the term, not as of the end of the term, and is provided only when it exceeds a certain number. However, as labor demand has shifted in recent years to temporary, part-time and other non-regular labor, the loss caused by their elimination would probably be greater. As with capital stock, adjustments for the sake of consistency with the concept of labor in economics are not carried out in this study.

Next, as flow variables corresponding to the concepts of capital and labor as stock variables, in the case of capital, the difference in book value at the beginning and end of the term of tangible fixed assets is referred to as “net increase in capacity (namely, net investment)” and, in the case of labor, the difference in total employees at the beginning and end of the term is referred to as “net increase in employment.”⁷ What corresponds to “investment” or “capital expenditure” in the usual sense is the concept of gross investment with the depreciation (capital depletion) portion added to net increase in capacity. In this study, however, the focus is solely on the net increase in capacity from the perspective of the dual approach, which treats investment and employment constantly in parallel. A negative net increase in capacity means that gross investment does not exceed the depreciation amount, and a positive figure indicates that gross investment does exceed the depreciation amount. The ratio of net increase in capacity to the book value of tangible fixed assets (excluding land) at the beginning of the term⁸ is referred to as “net growth rate of capacity” and the ratio of net increase in employment to the total number of employees at the beginning of the term⁹ is referred to as the “net growth rate of employment.”

The terms “job creation” for the gross positive contribution made by a group of individuals that increased employment and “job destruction” for the gross negative contribution (absolute value) made by a group of individuals that decreased employment have become established in the field of labor economics in which micro-data

⁶ For example, it is thought that both firms that include regular part-time workers among employees at the end of the term and firms that include them among temporary and part-time employees can exist concurrently.

⁷ It is also possible to obtain negative values for either; however, the term “net increase” is used whether positive or negative.

⁸ I.e., it corresponds to the growth rate of the book value of tangible fixed assets (excluding land).

⁹ I.e., it corresponds to the growth rate of total employees.

analysis techniques are most frequently applied.¹⁰ The rates derived by dividing the number of jobs created and those destroyed by the number of employees at the beginning of the term are referred to, respectively, as the job creation rate and the job destruction rate and the figure derived by subtracting the job destruction rate from the job creation rate corresponds to the net growth rate of employment defined above. However, there is no appropriate established terminology for capital stock or capacity. Therefore, in this study, the concept corresponding to creation rate is referred to as “gross positive contribution rate” regardless of whether it is capacity or employment and the concept corresponding to the destruction rate is referred to as the “gross negative contribution rate.” To reiterate, the gross negative contribution is calculated by the *absolute value* of the sum total decrease (and therefore the sign is always positive), and the net growth rate is derived by *subtracting* the gross negative contribution from the gross positive contribution. Since the gross positive contribution rate expresses the margin of increase of the net growth rate when the gross negative contribution rate decreases, it serves as an index indicating the potential for increase in capacity or employment, in other words, the latent vitality of the economy or the industry.¹¹

In addition, following preceding studies, the sum of the gross positive contribution rate and

the gross negative contribution rate (the size of the fluctuation in both the direction of increase and decrease) is referred to as the “reallocation rate” and the value derived by subtracting the absolute net growth rate from the reallocation rate is referred to as the “excess reallocation rate.” The latter is called the excess reallocation rate because the shift of resources that are absolutely essential for realizing the net increase or decrease is a shift across the border of the population. This is considered to be the “minimum reallocation” and is based on the idea that a shift within the population is that portion that exceeds the minimum.¹²

The various concepts defined in this section and the symbols that correspond to them are summarized in Table 2-1. Details of how to use and interpret those concepts will be explained as required.

2. Weakening Potential for Capacity Expansion

In this section, we confirm the sample characteristics of the common firms while observing the transitions in the basic figures relating to factor adjustments since FY1980.

Figure 2-1 shows the transitions of the gross investment rate (ratio of gross investment to the book value of tangible fixed assets (excluding land) at the beginning of the term) based on the

Table 2-1 Concepts Used in Micro-Data Analysis and Notation in this Study

	Capacity	Employment	Remarks
Gross positive contribution rate	<i>KCR</i>	<i>LCR</i>	In relation to employment, generally referred to as the job creation rate
Gross negative contribution rate	<i>KDR</i>	<i>LDR</i>	In relation to employment, generally referred to as the job destruction rate
Net growth rate	<i>KNCR</i>	<i>LNCR</i>	$NCR = CR - DR$
Reallocation rate	<i>KGRR</i>	<i>LGRR</i>	$GRR = CR + DR$
Excess reallocation rate	<i>KERR</i>	<i>LERR</i>	$ERR = GRR - NCR $

Note: “Capacity” means the book value of tangible fixed assets (ex-land) and “employment” means all employees including temporary, contract, etc.

¹⁰ Refer, for example, to Davis et al. (1996).

¹¹ Discussions here tacitly assume that the gross positive contribution rate and the gross negative contribution rate are mutually independent. However, this assumption is not strictly true (an individual defeated in competition with an individual that made a gross positive contribution made a gross negative contribution).

¹² Excess reallocation rate is close in a sense to the original meaning of the word “reallocation” and it is probably possible to consider it as reallocation defined in the narrow

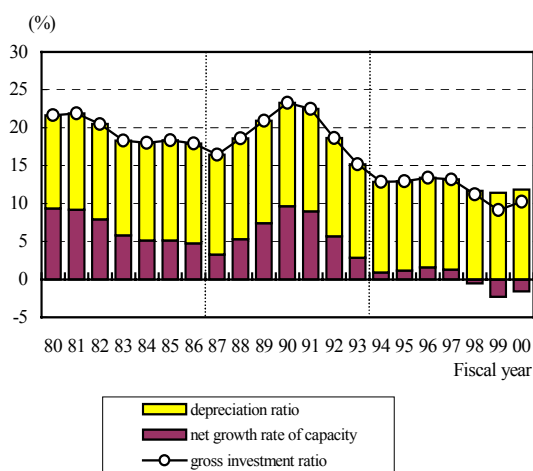


Fig. 2-1 Transitions in the Gross Investment Ratio of Common Firms

aggregate statistics of the common firms along with decomposition to depreciation portion and net investment.¹³ The gross investment rate was high, exceeding 20% during the first half of Phase I and in the middle of Phase II. It then fell rapidly during the latter half of Phase II, and remained low at around 10% in Phase III. Though the depreciation ratio (ratio of depreciation to the book value of tangible fixed assets (excluding land) at the beginning of the term) was similar to the gross investment rate regarding the direction of changes, the range of fluctuation was narrow, from a maximum of 13% to a minimum of 11%, and stable. If the amount of depreciation is considered to be equivalent to replacement investment, replacement investment can be interpreted to have been carried out in a stable manner. Meanwhile, the portion for the net growth rate of capacity, namely the gross investment rate excluding depreciation, fluctuated greatly and explains the majority of gross investment dynamics. The net growth rate of capacity was virtually zero in Phase III in particular, and was negative for three straight years beginning in FY1998. Comparing the transitions in the net growth rate of capacity

sense.

¹³ By definition, “gross investment = net investment + capital depletion” is always true; here, however, it is assumed that it is possible to consider physical capital depletion and depreciation expenses in accounting terms to be equal.

of the common firms with the tangible fixed asset (excluding land) growth rate of the large corporations based on the corporate statistics of Chapter I (Fig. 1-1), they show a similar trend, though there are some differences such as the latter peaked at a higher level in Phase II. In regard to the representativeness of large corporations, the common firms are a sample with limited bias.

When the net growth rate of capacity for each firm is calculated, positive and negative firms are tabulated separately and the contribution rate (gross positive or gross negative contribution rate) of each is determined, three general characteristics emerge (Fig. 2-2). First, the gross negative contribution rate was extremely small through Phase II compared to the size of the gross positive contribution. Virtually all of the changes in the net growth rate of capacity can be explained by the change of the gross positive contribution rate. Secondly, in the midst of the downward trend in the gross positive contribution rate continuing from Phase II, in Phase III, with the size of the gross negative contribution rate overtaking that of the gross positive contribution rate, the phase of recovery in the net growth rate of capacity in FY1995-97, in particular, is explained primarily by the decline in the gross negative contribution rate. Thirdly, transitions in the gross positive contribution rate in Phase III were weaker than that of the number

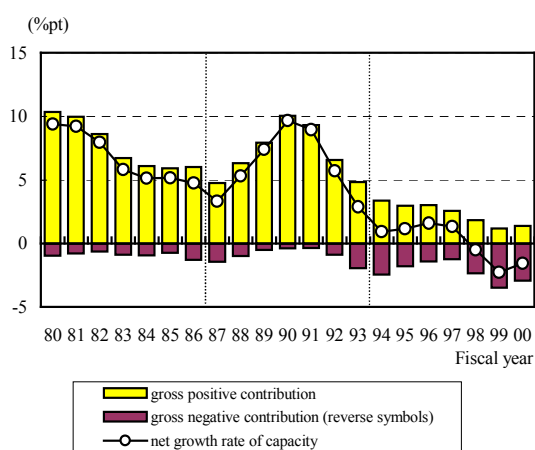


Fig. 2-2 Decomposition of the Net Growth Rate of Capacity by Gross Flows

of increasing firms, suggesting a weakening in the potential for increase in investment due to the decline in major driving forces.

Next, in order to view these characteristics from a different angle, we made estimates using the simple linear regression equations given below based on time-series data of gross positive contribution rate, gross negative contribution rate and net growth rate of capacity while referring to the employment analysis examples of Foote (1997) and Higuchi and Shinpo (1998).

$$KCR_t = \alpha + \beta KNCR_t \quad (1)$$

$$KDR_t = \gamma + \delta KNCR_t \quad (2)$$

The relationships $\alpha = \gamma$ and $\beta = 1 + \delta$ are always binding since $KNCR \equiv KCR - KDR$.

The results of estimations by Equations (1) and (2) for each of the three phases are given in Table 2-2. The estimated value of coefficient β of net growth rate of capacity $KNCR$ when gross positive contribution rate KCR is the dependent variable gradually decreases from a level near 1 in Phase I to 0.8 in Phase II and to 0.5 in Phase III, while the estimated value of coefficient δ of net growth rate of capacity $KNCR$ when gross negative contribution KDR is the dependent variable was not significant in Phase I but gradually increased in magnitude (increase in the absolute value) to -0.2 in Phase II and to -0.5 in Phase III. This is consistent with the rough observations of Fig. 2-2 and, if the estimated results are interpreted to be caused by net growth rate of capacity on gross contribution rates¹⁴, then it turns out that the gross positive contribution rate (rather

than gross negative contribution rate) clearly responded more sensitively (had greater elasticity) to the net growth rate of capacity in Phase I. However, this tendency weakened with the passage of time and the gross positive contribution and gross negative contribution demonstrated approximately the same degree of elasticity in Phase III. In other words, if the fluctuations in net growth rate of capacity are considered to reflect changes in the business climate (or, to be the proxy variable for shock in the macroeconomy), then in the past, company groups that increased their capacity responded sensitively to the business climate and varied the rate of increase while company groups that reduced capacity did not do so. However, in Phase III, both company groups increasing and decreasing capacity responded in the same manner to the business climate though not as sensitively as company groups that increased capacity had previously done. In summary, Japanese corporations now no longer naturally increase capacity to the extent that they previously did in times of good business and, conversely, show little resistance to flexibly reducing capacity if business is poor, even if it is not a so-called structural recession. The estimated value of the constant term was 1.2 in Phase I and somewhat larger, 2.3, in both Phase II and Phase III. These figures suggest the anticipated average gross positive and gross negative contribution rates in the event that the net growth rate of capacity is zero in the economy overall (macroeconomic environment in a neutral state), that is, they indicate the vigor of structural reallocation.

Table 2-2 Relationship between Gross Contribution Rates and the Net Growth Rate of Capacity (time series)

	Phase I	Phase II	Phase III
Constant term (common)	1.17(4.02)	2.26(10.7)	2.28(17.0)
Coefficient of Equation (1)	0.959(23.2)	0.786(24.8)	0.518(5.55)
Coefficient of Equation (2)	- 0.041(0.99)	- 0.214(6.73)	- 0.482(5.17)

Note: 1. The figures are estimated values (figures in parentheses are t values).
2. The data unit used in estimation is % point.

¹⁴ Estimation Equations (1) and (2) do not mean a one-way causal relationship from explanatory variable to dependent variable.

We will proceed next with a similar analysis of employment. First, in regard to the transitions in the net growth rate of employment (Fig. 2-3), though it has an overall high correlation with the net growth rate of capacity, we see an early cautious stance toward expansion¹⁵, falling into the negative range in FY1986 and 87 and remaining in the negative in FY1993 and during Phase III. However, focusing on the transitions in gross positive contribution, which expresses potential for increase, there is no downward trend as seen in capacity and, though the level is lower in Phase III than in Phases I and II, the difference is not as extreme as with capacity. When decomposing this into regular and temporary employment (Fig. 2-4), we confirmed that the gross positive contribution rate in Phase III, in particular, was largely supported by temporary employment. Focusing on the relationship between the gross positive and gross negative contribution rate, it is difficult to identify characteristics that are as clearly defined as in the

case of capacity. However, changes of the gross positive contribution rate were not that great, with the exception of Phase II, and it appears that the changes of gross negative contribution rate generally explain the changes of net growth rate.

Thus, as in the case of capacity, we made estimates using the simple linear regression equations given below based on time-series data of gross positive contribution rate, gross negative contribution rate and net growth rate of capacity for all three phases.

$$LCR_t = \alpha + \beta LNCR_t \quad (3)$$

$$LDR_t = \gamma + \delta LNCR_t \quad (4)$$

The relationships $\alpha = \gamma$ and $\beta = 1 + \delta$ are always binding since $LNCR \equiv LCR - LDR$.

The results are given in Table 2-3. First, the estimated value of coefficient β of net growth rate of employment $LNCR$ when gross positive

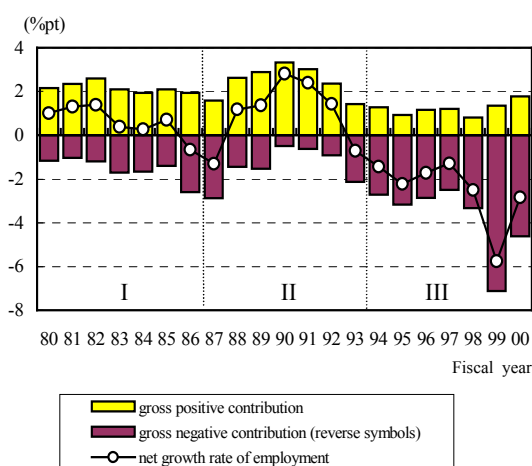


Fig. 2-3 Decomposition of the Net Growth Rate of Employment by Gross Flows

Note: Gross flows of permanent and temporary employment are identified and tabulated separately and, since there are firms that are increasing one while decreasing the other, the sum of the positive (negative) contribution in permanent employment and temporary employment does not coincide with the positive (negative) contribution in Fig. 2-3.

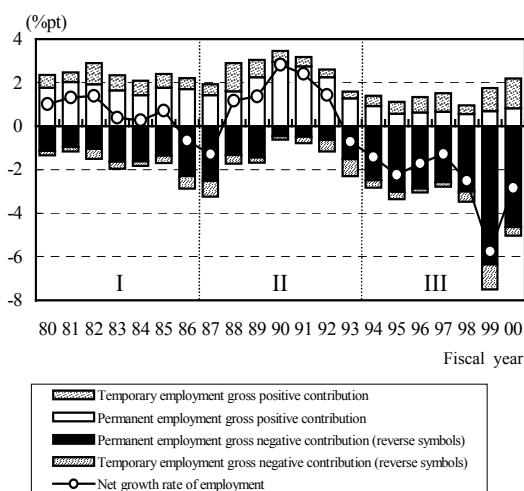


Fig. 2-4 Decomposition of the Net Growth Rate of Employment by Gross Flows and Status

dent variable but a two-way interpretation is possible.

¹⁵ This point is evidently expressed in the differences between the level of the net growth rate of capacity in FY1986 and 87 and the level of the net growth rate of capacity in FY1993 and later when the net growth rate of

employment again shifted to a reduction.

Table 2-3 Relationship between Gross Contribution Rates and the Net Growth Rate of Employment (time series)

	Phase I	Phase II	Phase III
Constant term (common)	1.99(27.0)	1.99(18.5)	1.10(4.29)
Coefficient of Equation (3)	0.273(3.38)	0.454(7.31)	- 0.048(0.55)
Coefficient of Equation (4)	- 0.727(9.00)	- 0.546(8.80)	- 1.048(11.9)

Notes: 1. The figures are estimated values (figures in parentheses are t values).
2. The data unit used in estimation is % point.

contribution rate *LCR* is the dependent variable was smaller than the counterpart in the case of capacity, 0.3 in Phase I and 0.5 in Phase II, and was not significant in Phase III, while the estimated value of coefficient δ of net growth rate of employment rate *LNCR* when gross negative contribution rate *LDR* is the dependent variable was constantly larger than the estimated value of coefficient β in terms of absolute value and became -1.0 in Phase III. In other words, in the case of employment, the gross negative contribution rate (rather than gross positive contribution rate) constantly responded sensitively to the business climate, varied greatly and exerted the major influence on the net growth rate of employment¹⁶ and that, in Phase III, the effect of the gross negative contribution rate in the case of capacity rose generally to the same level as the gross positive contribution rate, approaching the situations seen in employment flow. The existence of labor hoarding, which is the tendency to avoid dismissal at all costs even during recessionary periods based on the lifelong employment system, has been pointed in the case of Japanese corporations. However, the empirical

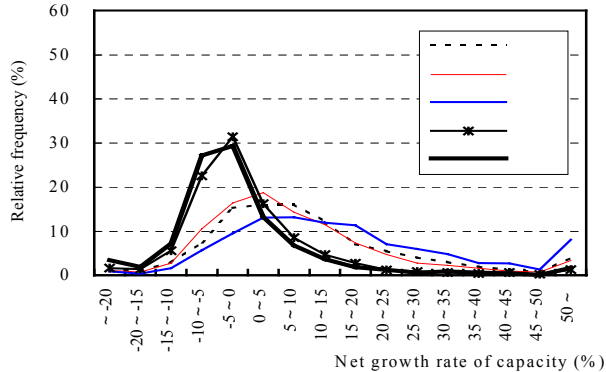
evidence of this section for listed firms suggests that there has been rather flexible adjustment behavior in employment since the 1980s in line with the business situation. In addition, capacity increased steadily like an inviolable rule up to the early 1990s, but such special treatment has recently become unsustainable and the adjustment behavior is gradually shifting toward flexible reductions.

3. Changes in Inter-Company Distribution and the Rising Threshold Level

In this section, we will explore changes in corporate behavior behind the aggregate data, focusing on the inter-company distribution of factor adjustment rates and return on investment as a basic approach to micro-data analysis that ranks with the perspective of gross flow.

First, in order to survey inter-company distribution and changes in the net growth rate of capacity, the relative frequency distribution chart tabulated at intervals of 5 percentage points for fiscal years 1980, 85, 90, 95 and 2000 (Fig. 2-5) shows that there were considerable changes in the period up to FY1990 and from FY1995 onward. Specifically, the center of the distribution (interval of highest frequency) made a major shift into the negative region from FY1995, and the configuration of the Net growth rate of capacity (%) that the relative frequency of the area of highest frequency rose from around 10% to 30% and the number of intervals with a relative frequency of 5% or higher (expressing the width of the zone with comparatively thick distribution) also decreased from 6-8 intervals to 5, demonstrating a general tendency to concentrate near the center. Comparing this to the relative frequency distribution chart of the net growth rate of employ-

¹⁶ These results are similar to those of preceding researches in the U.S. such as Davis et al. (1996) and Foote (1997). However, in the estimates of Higuchi and Shinpo (1998) using data of establishments continuously in business in the Survey of Employment Trends of the Ministry of Health, Labor and Welfare, the results show that it is the job creation rate that is more strongly affected by business conditions (to use the symbols used in this study: $\beta = 0.54$, $\delta = -0.46$). However, considering that there is only a small difference between the absolute values of β and δ in the study of Higuchi and Shinpo, and that the estimates for the same estimation period of FY1986-95 applied to the data of this study, namely $\beta = 0.45$ and $\delta = -0.55$ are close to those of Higuchi and Shinpo (1998), it is thought that the differences in results between Higuchi and Shinpo and this study are largely due to differences in the estimation period.



	FY80	FY85	FY90	FY95	FY00
Average	9.7	8.0	17.0	-0.2	-1.6
Median	6.8	4.8	12.4	-2.4	-3.6
Standard deviation	15.6	14.5	20.8	9.4	10.4
interval	5 ~ 10	0 ~ 5	5 ~ 10	-5 ~ 0	-5 ~ 0
Relative frequency of highest frequency interval	16.1	18.7	13.1	31.5	29.3
No. of intervals of 5%+	7	6	8	5	5

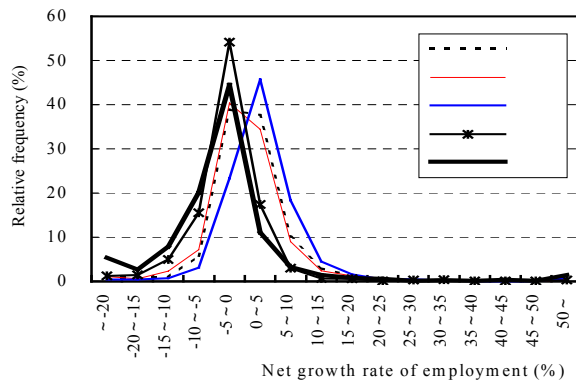
Fig. 2-5 Relative Frequency Distribution of the Net Growth Rate of Capacity

- Notes:
1. The basic statistics are calculated with the 20 upper and lower outliers in each year eliminated from the population.
 2. The number of intervals of 5%+ means the number of intervals with a relative frequency of 5% or more.

FY80
FY85
FY90

ment (Fig. 2-6), the interval of highest frequency in the case of employment, with the exception of FY1990, was consistently -5 to 0% and, though there was a slight shift to the left in the overall distribution, the magnitude was smaller than that of the net growth rate of capacity. In addition, the configuration of the distribution indicates that the relative frequency of highest frequency was about 40% even in FY1980 when it was at its lowest level and there was a maximum of four intervals with a relative frequency of 5% or more. Thus, the degree of concentration near the center was higher overall than with the net growth rate of capacity. However, the structural changes seen in the case of net investment were not apparent. The trends of greater restraint in investment and employment in the 1990s occurred in common. It is worth noting, however, that, in terms of the position and configuration of the distribution in the 1980s, the adjustment patterns of net investment, which showed considerable potential for expansion in the 1980s, rapidly came to exhibit resemblance to the employment situation in the 1990s.

In order to analyze this point further, we now focus on changes in the return on investment (tangible asset profit rate less standard in-



	FY80	FY85	FY90	FY95	FY00
Average	0.8	0.3	2.7	-2.6	-3.8
Median	0.3	0.0	2.2	-2.2	-3.5
Standard deviation	4.6	5.0	4.7	4.5	8.6
interval	-5 ~ 0	-5 ~ 0	0 ~ 5	-5 ~ 0	-5 ~ 0
Relative frequency of highest frequency interval	38.9	40.3	45.7	54.2	44.4
No. of intervals of 5%+	4	4	3	3	4

Fig. 2-6 Relative Frequency Distribution of the Net Growth Rate of Employment

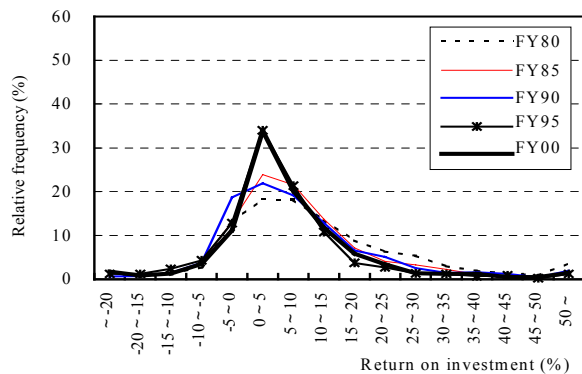
- Notes:
1. The basic statistics are calculated with the 20 upper and lower outliers in each year eliminated from the population.
 2. The number of intervals of 5%+ means the number of intervals with a relative frequency of 5% or more.

terest cost¹⁷). Theoretically, investment are determined by the discounted present value of the current and future cash flows generated by implementing a project, that is, primarily by the relationship of the expected profit rate and discount rate.¹⁸ The concept of return on investment for empirical analyses below is composed of the realized profit rate and loan interest rate. This concept does not correspond completely to the theory in the strict sense, but is expected to have a strong correlation with investment. Actually, the aggregate data shows a stable relationship between investment and its profitability (namely, return on investment).¹⁹ The following can be pointed out based on the inter-company distribution of this return on investment using a relative frequency distribution chart tabulated at intervals of 5 percentage points for fiscal years 1980, 85, 90, 95 and 2000 in the same manner as factor adjustment ratios (Fig. 2-7). First, the center of

¹⁷ Defined as tangible asset profitability rate = operating profit/loss / average (tangible fixed assets + inventory assets) at the beginning and end of the term, standard interest cost = average loan contract interest rate of domestic bank (new loans, total).

¹⁸ It is a famous theorem that these factors can be summarized in just one variable referred to as Tobin's q under certain conditions (in other words, q is the sufficient statistic of investment).

¹⁹ For example, the Development Bank of Japan (2001), p.13



	FY80	FY85	FY90	FY95	FY00
Average	11.4	8.0	8.0	5.5	6.6
Median	8.4	6.3	5.5	4.2	4.6
Standard deviation	13.8	10.7	11.3	9.2	9.8
interval	0 ~ 5	0 ~ 5	0 ~ 5	0 ~ 5	0 ~ 5
Relative frequency of highest frequency interval	18.3	23.9	21.9	34.0	33.9
No. of intervals of 5%+	7	5	6	4	5

Fig. 2-7 Relative Frequency Distribution of the Return on Investment

- Notes:
1. The basic statistics are calculated with the 20 upper and lower outliers in each year eliminated from the population.
 2. The number of intervals of 5%+ means the number of intervals with a relative frequency of 5% or more.

the distribution (interval of highest frequency) is consistently in the range of 0-5% and there is no substantial change in the position of the distribution. Although there has clearly been downward momentum in the tangible asset profit rate since FY1980, the decline in the interest rate has offset this. In regard to the configuration of the distribution, the number of intervals with a relative frequency of 5% or more declined somewhat after FY1995 and, though more gradual than the net growth rate of capacity, the tendency toward concentration in the center is clearly becoming stronger. However, seen from the perspective of investment fundamentals or investment environment, the conditions of return on investment during the late 1990s would have been unlikely to cause a large change in the distribution of the net growth rate of capacity.

In other words, the response of firms to the level of return on investment, namely a change in investment behavior, is thought to have had a background effect on the stagnation in the net growth rate of capacity in the latter half of the 1990s. Accordingly, in order to examine the changes in investment behavior, we prepared a framework as follows. Suppose that companies

actually do confront discrete decision-making such as whether to increase or decrease the capacity (whether to expand or contract the scale of their tangible fixed assets excluding land). Figure 2-8 compares the relative frequency distribution of return on investment of the group of firms with a positive net growth rate of capacity (positive net investment) in FY2000 (439 firms) and the group of firms with a negative net growth rate of capacity (negative net investment, 979 firms). As theoretically anticipated, the group of companies with positive net investment had a higher return on investment (distribution is positioned on the right-hand side) overall than the group of companies with negative net investment, and so we can identify the critical value of return on investment where the relative frequency of the former exceeds that of the latter (intersection of distribution curves).²⁰ This critical rate of return, even if it happened to be the result of an ideally controlled experiment regarding the same company, corresponds to the threshold of the

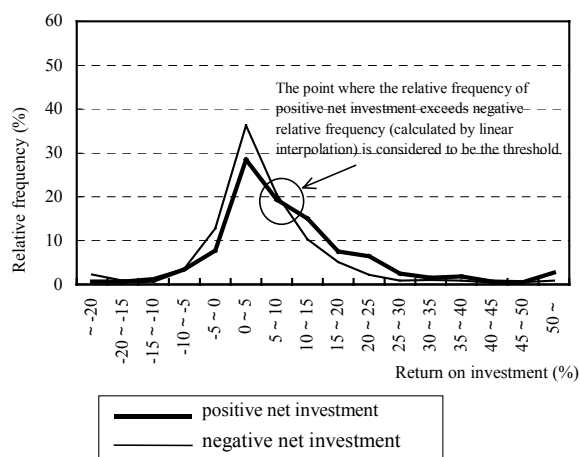


Fig. 2-8 Comparison of the Distribution of the Return on Investment Relating to Increase and Decrease in Capacity (FY2000)

discrete decision-making whether to expand or contract the capacity and is a parameter that expresses investment behavior characteristics (the severity of standards of whether or not to adopt

²⁰ It is possible that more than one point could emerge depending on the conditions of distribution and the way of defining the interval (width of the notch); however, no such cases existed in the analyses below.

investment projects). Below, we assume that a similar threshold derived from the distribution of actual values of different companies is a parameter that expresses the average investment behavior characteristics of the population (common firms). We then derive the threshold for each fiscal year by the linear interpolation method from relative frequency distribution charts with an interval of 5 percentage points. Specifically, if $(\alpha - 5, \alpha]$ is the interval immediately prior to the interval in which the distribution intersects, x is the relative frequency difference (absolute value) between companies with positive net investment and companies with negative net investment, $(\alpha, \alpha + 5)$ is the interval immediately after the interval in which the distribution intersects and y is the relative frequency difference (absolute value), then threshold θ can be determined using the following equation

$$\theta = \frac{(\alpha - 2.5)y + (\alpha + 2.5)x}{x + y}$$

$$= \frac{\alpha + 2.5(x - y)}{x + y}$$

$\alpha - 2.5$ and $\alpha + 2.5$ represent the median values of $(\alpha - 5, \alpha]$ and $(\alpha, \alpha + 5]$, respectively.

We organized the changes in decision-making standards of the common firms and the effect on the actual investment level based on threshold value θ thus derived and the changes of the net growth rate of capacity based on aggregate data for each period (Fig. 2-9). First, θ in Phase I remains broadly constant until FY1984, assuming that the irregularities of FY1981 and 82 are leveled, and then drops in FY1985 and 86, which corresponds to the so-called strong yen recession. During this time, the net growth rate of capacity declined broadly in FY1980-84 but did not drop in FY1985 and 86 in spite of adverse economic conditions. In other words, during the strong yen recession the net growth rate of capacity was maintained under relaxed (or lowered) investment decision-making standards. In Phase II, the good business climate encouraged firms to restore θ to its original level until FY1988, nevertheless the net growth rate of capacity rose. To sum up, changes in investment

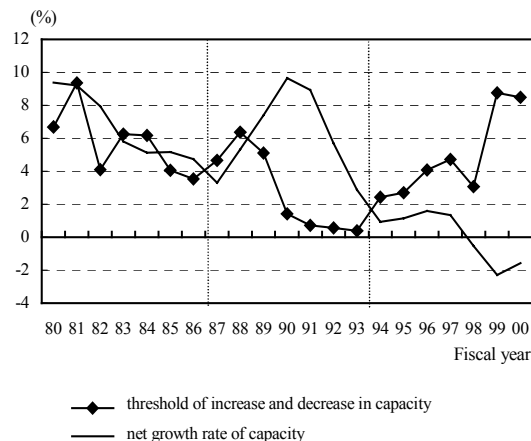


Fig. 2-9 Changes in the Threshold Relating to Increase and Decrease in Capacity and the Net Growth Rate of Capacity

behavior during the strong yen recession and following recovery suggest that there was a tendency towards smoothing investment in spite of the business fluctuations. However, θ declined sharply to around 0% and the net growth rate of capacity reached a high peak and then dropped rapidly in the latter half of Phase II. The fact that θ approached zero suggests that there would be an expansion in scale if the tangible asset profit rate exceeds the loan interest rate even by the slightest margin. In other words, the risk premium required of investment was extremely small²¹ as the Heisei boom continued its unprecedented expansion. As a result, the net growth rate of capacity, which should have shifted earlier to a decline given the level of θ in Phase I, remained high until about FY1991, possibly making subsequent adjustments more severe. In Phase III, in FY1994-97 θ rose to a level similar to that in Phase I and the net growth rate of capacity slumped in spite of economic expansion. In addition, although θ was at the same or lower than in Phase I, the net growth rate of capacity was far below its level in Phase I and, therefore, there was a decrease in investment projects that would satisfy the threshold, thus exacerbating the decline of the net growth rate of capacity. After the disturbance to the financial system and concerns about a deflationary spiral in FY1998, θ tended to rise more strongly in FY1999 and 2000. This was likely due to the increase in the risk premium for fixed asset holdings resulting from the more severe market assessment of firms with

²¹ The discussion in this section assumes regulated interest rates in which loan interest does not reflect individual company or investment project risk. This assumption is also thought to be approximately appropriate even in Phase III.

deteriorated capital efficiency and financial ratio.

In regard to employment, though it is difficult to define an appropriate profitability index corresponding to return on investment, we can calculate threshold λ for the net growth rate of employment using the same return on investment for a comparison with capacity and observe the transitions (Fig. 2-10, 11). In Phase I, both capacity threshold θ and employment threshold λ were similar both in level and trends. After entering Phase II, however, λ rose conspicuously above θ and exceeded its own level of the early 1980s in the phase during which θ reverted to its original level after dropping in FY1987 and 88 and during the strong yen recession. Thus, in the period of expansion during the Heisei boom, firms were more reluctant to expand employment than capacity. However, λ did decline broadly in the same manner as θ from FY1989 onward and, like capacity, the risk premium became extremely small. In Phase III, the correlation between θ and λ was weaker than in Phase I and II and there were years, for example, during which the two moved in different directions. First, in the process of upward revision of θ in FY1994-97, initially (FY1994-95) λ rose faster than θ and then declined in FY1996 and 97. In addition, with the exception of FY1981, λ consistently exceeded θ every year until FY1998 and the remarkable rise of θ above λ in FY1999 and 2000 was a major feature of Phase III. Although employment behavior was generally severe in Phase III, the threshold level remained within the scope of experience of FY1980 onward, while certain aspects of investment behavior were conspicuously different from those of Phases I and II.

Combining this point with the observations of inter-company distribution, the investment behavior of the common firms underwent a major transformation in the latter half of the 1990s, and its relationship with employment began to exhibit entirely new characteristics.

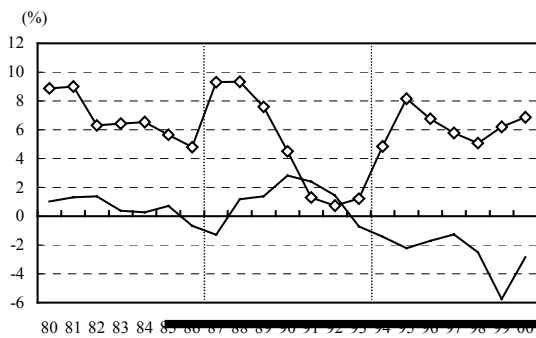


Fig. 2-10 Changes in the Threshold Relating to Increase and Decrease in Employment and the Net Growth Rate of Employment

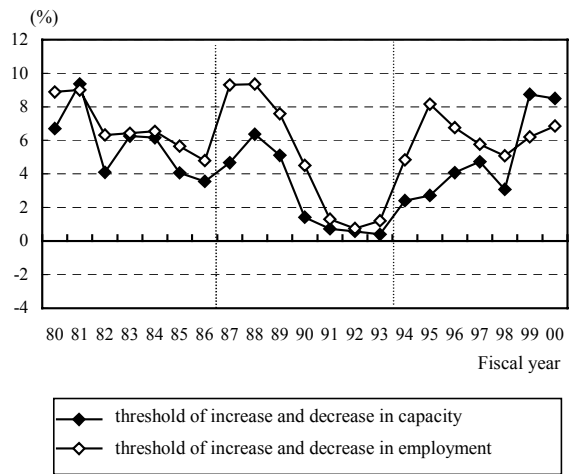


Fig. 2-11 Comparison of Thresholds of Changes in Capacity and Employment

4. Growing Heterogeneity in Capacity and Employment Increase Factors

In this section, we conduct further analyses of the gross flow of capacity and employment observed in Section 2 by industry along with the factor decomposition of aggregate trends, and discuss the background of capital and labor growth setbacks in Phase III, particularly changes in adjustment patterns of capacity.

We will start by explaining the methods of calculating the gross positive contribution rate, gross negative contribution rate, net growth rate and excess reallocation rate by industry. In this section, we group common firms into 20 industries (manufacturing: 13, non-manufacturing: 7) according to the primary business category and tabulate the medium-term factor adjustment amount in Phases I, II and III calculated by firm and the sign of the amount of change (increase or decrease) for each of the seven-year periods. Specifically, KNC_{ij} as the net increase in capacity of Firm i affiliated with Industry j , LNC_{ij} as the net increase in employment, K_{ij} as capital stock or capacity (book value of tangible fixed assets, excluding land, at the end of the term) and L_{ij} as labor input or employment (total number of employees at the end of the term including temporary, contract, etc.) are defined as follows (Arabic numerals express fiscal year and Roman numerals express phase)

$$\begin{aligned}
 KNC_{ij} \text{ I} &\equiv K_{ij86} - K_{ij79}, & LNC_{ij} \text{ I} &\equiv L_{ij86} - L_{ij79} \\
 KNC_{ij} \text{ II} &\equiv K_{ij93} - K_{ij86}, & LNC_{ij} \text{ II} &\equiv L_{ij93} - L_{ij86} \\
 KNC_{ij} \text{ III} &\equiv K_{ij00} - K_{ij93}, & LNC_{ij} \text{ III} &\equiv L_{ij00} - L_{ij93}
 \end{aligned}$$

Fig. 2-10 Changes in the Threshold Relating to Increase and Decrease in Employment and the Net Growth Rate of Employment

Then $KCR_j I$, which is the gross positive contribution rate of the capital stock of Industry j in Phase I, for example, as well as gross negative contribution rate $KDR_j I$, net growth rate $KNCR_j I$ and excess reallocation rate $KERR_j I$ are calculated as follows.

$$KCR_j I \equiv \frac{\sum_{i, KNC_{ij} I > 0} KNC_{ij} I}{\sum_i K_{ij79}}$$

$$KDR_j I \equiv \frac{\sum_{i, KNC_{ij} I < 0} |KNC_{ij} I|}{\sum_i K_{ij79}}$$

$$KNCR_j I \equiv \frac{\sum_i KNC_{ij} I}{\sum_i K_{ij79}}$$

$$KERR_j I \equiv KCR_j I + KDR_j I - |KNCR_j I|$$

As can be seen based on these equations, the definitions of the various rates in this section are cumulative values for seven-year periods. It is also possible to define the rates for Phases II and III in the same manner. Based on the factor adjustment ratio of each industry in each phase defined above, the following points are noted (Fig. 2-12; capacity on the left, employment on the right). First, in regard to capacity trends, as can also be surmised from the gross flow analyses of aggregate time-series data in Section 2 of this chapter (Fig. 2-2), the gross negative contribution rate was extremely small compared to the size of the gross positive contribution rate through Phase II and the level of the net growth rate of capacity of each industry was basically determined by the gross positive contribution rate. Iron and steel as well as the wholesale industry in Phase I are exceptions. In Phase III, the gross positive contribution rate decreased in 19 industries compared to Phase I and in all industries compared to Phase II, while the gross negative contribution rate rose in all industries compared to both Phases I and II. As a result, the

gross positive contribution and gross negative contribution essentially offset one another in Phase III. In addition, the excess reallocation rate in Phase III increased in 18 industries compared to Phase I and in 19 industries compared to Phase II and so the focus of capacity adjustments in Phase III seemed to shift from industry growth to intra-industry reallocation.

We thus applied the following regression analysis conducted in Section 2 of this chapter to industry-specific cross-sectional data in each phase (the subscript j expresses industry).

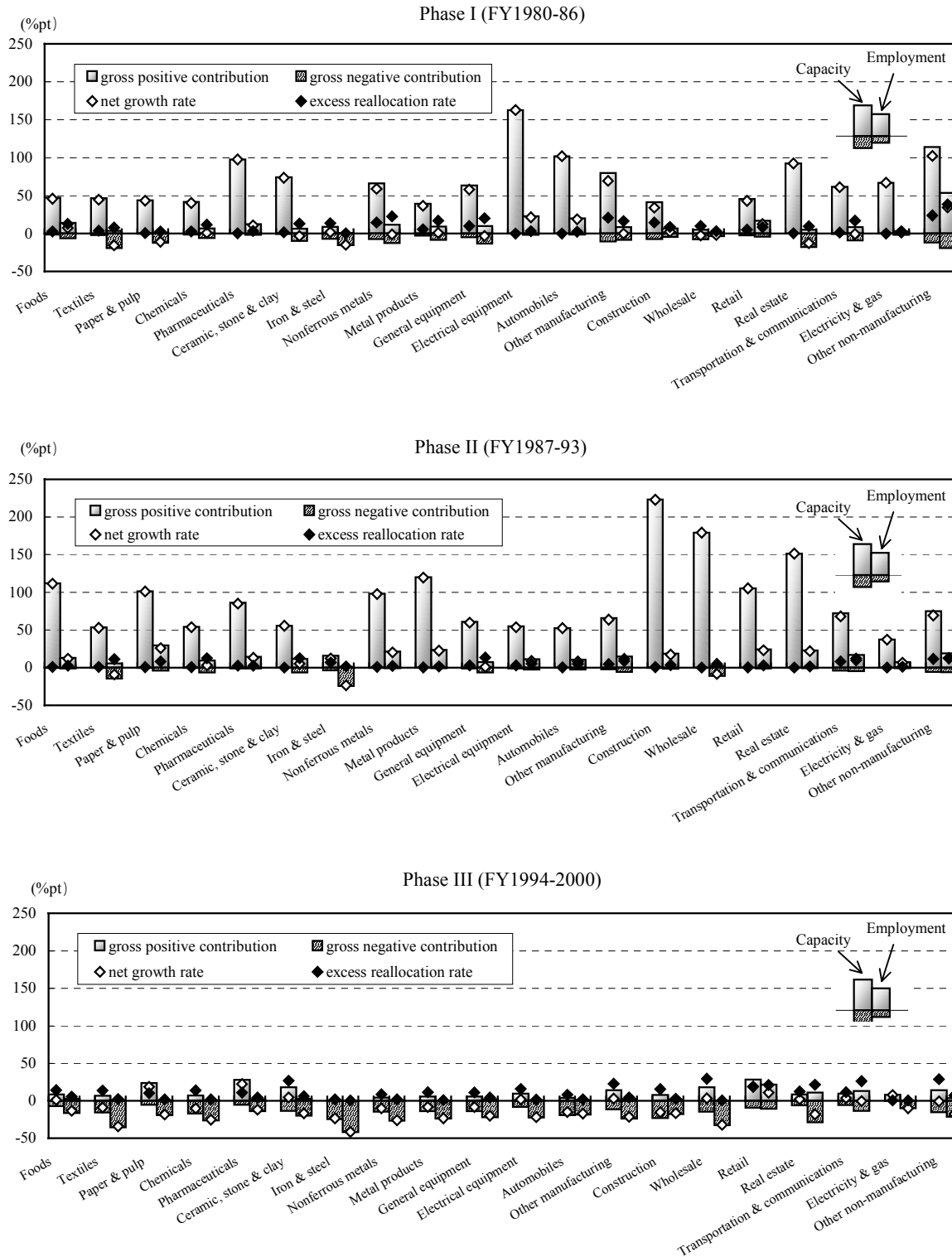


Fig. 2-12 Decomposition of the Industry-Specific Factor Adjustment Rates by Gross Flows
left side: net growth rate of capacity, right side: net growth rate of employment,
7-year cumulative growth rate

Table 2-4 Relationship between Gross Contribution Rates and the Net Growth Rate of Capacity (cross-section by industry)

$$KCR_j = \alpha + \beta KNCR_j \quad (5)$$

$$KDR_j = \gamma + \delta KNCR_j \quad (6)$$

	Phase I	Phase II	Phase III
Constant term (common)	5.13(3.12)	2.09(3.02)	11.9(14.0)
Coefficient β of Equation (5)	0.972(42.3)	0.989(144)	0.582(8.06)
Coefficient δ of Equation (6)	- 0.028(1.23)	- 0.011(1.63)	- 0.418(5.80)

Notes: 1. The figures are estimated values (figures in parentheses are t values).
2. The data unit used in estimation is % point.

The relationships $\alpha = \gamma$ and $\beta = 1 + \delta$ are always binding since $KNCR \equiv KCR - KDR$.

The results of the estimation are shown in Table 2-4. Estimated value β was essentially 1 in both Phases I and II, reflecting the dominance of the gross positive contribution in the trend of the net growth rate of capacity. Alternatively, if the equations are interpreted to be the effect of net growth rate of capacity on gross contribution rates with the idea that the net growth rate of each industry is a semi-macro shock (industry-level shock), then virtually all aspects of the behavior of firms that expanded their capacity can be explained by the trend of the relevant industry (semi-macro shock), and the behavior of firms that reduced their capacity was due almost entirely to idiosyncratic factors unrelated to the trend of the relevant industry. In addition, the estimated value of the constant term was 5.1 in Phase I, thereafter dropping to 2.1 in Phase II, suggesting that the movements of structural intra-industry reallocation were small in Phase II, namely that the tendency toward unanimous scale expansion was strong.²² Meanwhile, in Phase III, the estimated value of β dropped broadly to 0.6 and, though somewhat larger than the absolute value of δ , the effect of the gross

positive and gross negative contribution rate gradually equalized, suggesting the decline in industry factors with respect to capacity-expanding firms and the rise of industry factors with respect to capacity-contracting firms. In addition, the estimated value of the constant term in Phase III was the largest through the three phases at 11.9 while significance also increased broadly, providing further evidence that the focus of capacity adjustments shifted from industry growth to intra-industry reallocation.

We next carried out a similar analysis of the conditions of employment adjustment in comparison with capacity adjustments. As indicated in Fig. 2-11, one clear characteristic during all three phases is that the gross positive contribution rate was lower than the case of capacity in a majority of the industries while the gross negative contribution rate was higher and that overall, there was greater restraint compared to the case of capacity. The change from Phase II to Phase III was not as extreme as in the case of capacity, although in manufacturing industries in Phase III, the gross positive contribution rate decreased to near zero in almost all industries and, ignoring the steady intra-industry reallocation, downsizing came to play the major role. To confirm this, we carried out an estimation using the same equation as for capacity (subscript j expresses industry).

$$LCR_j = \alpha + \beta LNCR_j \quad (7)$$

$$LDR_j = \gamma + \delta LNCR_j \quad (8)$$

The relationships $\alpha = \gamma$ and $\beta = 1 + \delta$ are always binding since $LNCR \equiv LCR - LDR$.

The results of the estimation are shown in Table 2-5. Estimated value β was 0.8 in Phase I,

²² Since, as indicated previously, the estimated value of the constant term corresponds to the average anticipated gross positive and gross negative contribution rates when the net growth rate of capacity is zero, the entire picture of inter-company reallocation is considered to be comprehended when using time-series data, while inter-company reallocation within the same industry is comprehended in the case of cross-sectional data by industry.

0.6 in Phase II and 0.4 in Phase III and was consistently lower than value β in the case of capacity (Table 2-4) and progressively declined. Namely, amid the broad trends that gross positive contribution was replaced by gross negative contribution as the dominant force as well as the decline of industry factors in the case of firms that were expanding employment and rise of industry factors in the case of firms that were reducing employment, the momentum of scale expansion weakened overall compared to capacity. However, since the changes from Phase II to Phase III were not as drastic as those of capacity, it is also true that the conditions of capacity and employment converged in a relative sense. The estimated value of the constant term was essentially constant during all three phases and phenomena such as the tendency toward unanimous expansion in Phase II as with capacity and the intensification of intra-industry reallocation in Phase III were not observed.

Furthermore, focusing on the relationship between capacity adjustment and employment adjustment, the transitions in the correlation coefficient between capacity and employment for

(Table 2-6) show that the correlation for the net growth rate was essentially constant throughout all three phases. However, the correlation coefficient for the gross positive contribution rate decreased from one phase to the next while the correlation coefficient for the gross negative contribution rate rose conspicuously in Phase III and exceeded that for the gross positive contribution rate. In other words, gross flows based on micro-data indicate that the tendency for industries with a large positive contribution to capacity to differ from those of employment, and for industries with a large negative contribution for capacity to coincide with those of employment, became stronger in Phase III. This is closely related to the fact that idiosyncratic factors unrelated to industry trends (semi-macro shock) came to play the key role in the case of increase factors and that the industry trends became dominant in the case of decrease factors.

To wrap up this section, we decompose gross contribution rates into the industry factor and the individual company (idiosyncratic) factor as follows and observe year-by-year transitions.

We first decompose the net increase in ca-

Table 2-5 Relationship between Gross Contribution Rates and the Net Growth Rate of Employment (cross-section by industry)

	Phase I	Phase II	Phase III
Constant term (common)	9.17(7.07)	8.89(10.9)	10.2(6.28)
Coefficient β of Equation (7)	0.822(7.87)	0.587(10.8)	0.359(4.82)
Coefficient δ of Equation (8)	- 0.179(1.71)	- 0.413(7.60)	- 0.641(8.61)

- Notes: 1. The figures are estimated values (figures in parentheses are t values).
2. The data unit used in estimation is % point.

Table 2-6 Correlation Coefficients of the Factor Adjustment Rates by Industry (capacity to employment)

Net growth rate			Gross positive contribution rate			Gross negative contribution rate		
Phase I	Phase II	Phase III	Phase I	Phase II	Phase III	Phase I	Phase II	Phase III
0.594	0.427	0.621	0.610	0.404	0.401	0.327	0.367	0.578

the net growth rate and gross contribution rates capacity $KNCijt = Kijt - Kijt-1$ and net increase in

employment $LNC_{ij} = L_{ijt} - L_{ijt-1}$ of Firm i affiliated with Industry j into the industry factor (1st term) and the individual company factor (2nd term) as indicated in the following equations (the overline expresses weighted average).

$$KNC_{ijt} = \overline{KNCR}_{jt} \times K_{ijt-1} + (KNC_{ijt} - \overline{KNCR}_{jt} \times K_{ijt-1})$$

$$LNC_{ijt} = \overline{LNCR}_{jt} \times L_{ijt-1} + (LNC_{ijt} - \overline{LNCR}_{jt} \times L_{ijt-1})$$

\overline{KNCR}_{jt} and \overline{LNCR}_{jt} express the average values of Industry j (based on weighted average) respectively.

Next, we decompose the net increase in capacity of the entire population tabulated by gross flows into the industry factor (1st term) and the individual company factor (2nd factor) using the following equations (indicated only for the case of capacity).

Factor decomposition of the portion of increase

$$\sum_{i,j,KNC_{ijt}>0} KNC_{ijt} =$$

$$\sum_{i,j,\overline{KNCR}_{jt}>0} (\overline{KNCR}_{jt} \times K_{ijt-1}) \dots\dots\dots \text{Industry factor}$$

$$+ (\sum_{i,j,KNC_{ijt}>0} KNC_{ijt} - \sum_{i,j,\overline{KNCR}_{jt}>0} (\overline{KNCR}_{jt} \times K_{ijt-1}))$$

\dots\dots\dots Individual company (idiosyncratic) factor

Factor decomposition of the portion of decrease

$$\sum_{i,j,KNC_{ijt}<0} KNC_{ijt} =$$

$$\sum_{i,j,\overline{KNCR}_{jt}<0} (\overline{KNCR}_{jt} \times K_{ijt-1}) \dots\dots\dots \text{Industry factor}$$

$$+ (\sum_{i,j,KNC_{ijt}<0} KNC_{ijt} - \sum_{i,j,\overline{KNCR}_{jt}<0} (\overline{KNCR}_{jt} \times K_{ijt-1}))$$

\dots\dots\dots Individual company (idiosyncratic) factor

Finally, we obtain contribution rates by dividing the industry factor and individual company factor defined above by the stock amount at the beginning of the term (end of the previous term) for the entire population.

Figure 2-13 shows the transitions in the gross contribution rates decomposed into the in-

dustry factor and the individual company factor by this procedure; the size of the gross contribution prior to decomposition coincides with Figs. 2-2 and 2-3 by definition. Based on the transitions in the net growth rate of capacity, we find that the industry factor explains the majority of the gross positive contribution and the individual company factor explains the majority of the gross negative contribution through Phase II. In Phase III, however, the industry factor weakens in the gross positive contribution while the importance of the individual company factor increases. This tendency is especially strong from FY1998 while, conversely, the industry factor becomes dominant in the gross negative contribution. These are all consistent with the results of regression analysis based on Equations (5) and (6). Meanwhile, in regard to transitions in the net growth rate of employment, the individual company factor in the gross positive contribution from Phase I is greater than capacity and, in FY1986 and 87, in particular, the majority of the gross positive contribution is explained by the individual company factor, though the industry factor was dominant for a time during the Heisei boom. From FY1993, however, the individual company factor again explains the majority of the gross positive contribution. In contrast to the gross positive contribution, the importance of the industry factor in gross negative contribution was greater than capacity from the early 1980s and the individual company factor was dominant for a time during the Heisei boom. However, the industry factor again played the most important role in Phase III.

In light of the fact that the individual company factor in the gross positive contribution of capacity increased in importance and the overall situation that the capacity adjustment gradually approached that of employment adjustment in Phase III, it is necessary for gaining an insight on future trends of aggregate investment to understand the diverse paths of factor adjustment behavior followed by individual firms and to comprehend their fundamental characteristics, correlation with business performance and the like. We will address such issues in the next chapter.

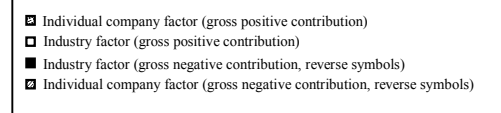
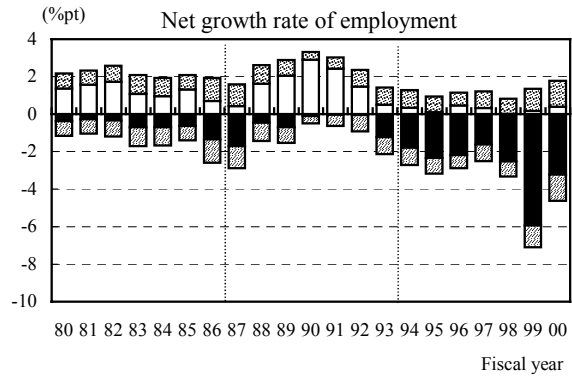
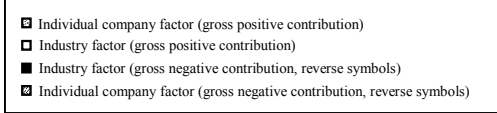
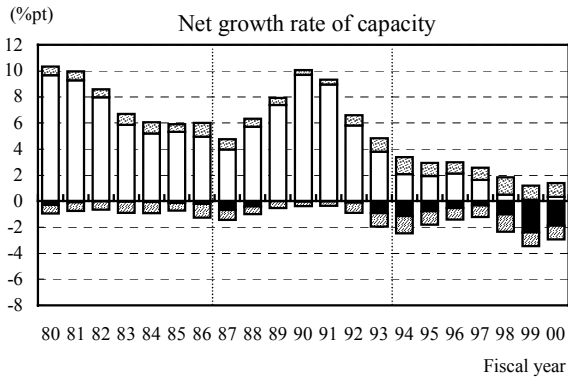


Fig. 2-13 Factor Decomposition of the Net Growth Rate of Capacity and Employment into Industry Factor and Individual Company Factor (by Gross Flows)

III. Factor Adjustment Behavior of Listed Firms from the Perspective of Adjustment Path Analysis

1. Concept of Adjustment Path Analysis and Six Major Categories

There are two possible approaches to deriving implications regarding movements of the overall population based on micro-data. The first is what we have worked with in the previous chapter, namely to investigate gross flows and inter-company distribution for each year (phase) and their time-series changes. With this approach, however, it is difficult to shed light on dynamic aspects such as the effect of past factor adjustment behavior on that in the subsequent years (phases) through the stock adjustment mechanism.

Generally, the impact of the results of past factor adjustment behavior on the future increases as unforeseen changes in the macroeconomic environment as well as the irreversibility of capacity and employment increase. We must therefore analyze dynamic aspects in order to precisely comprehend the conditions of Japanese firms, which experienced the emergence and collapse of the bubble economy, and the capacity and employment of which have little mobility. In this chapter, we carry out analyses using the simple second approach, that is, the history of factor adjustment path followed by companies.

Since an analysis of the factor adjustment behavior of each company which varies with the flow of time involves an enormous number of paths, some means for simplifying or stylizing is required for the sake of efficiency. In this study, the factor adjustment paths are stylized as follows.¹ First, as in the analyses so far, the period from FY1980 through FY2000 is divided into three phases, namely, Phase I (FY1980-86), Phase II (FY1987-93) and Phase III (FY1994-2000). The factor adjustment behavior in each phase is then classified into the four types below

taking into account whether capacity and employment were increased or decreased during the seven-year period.² The four types are A (= increase capacity and increase employment), B (= increase capacity and decrease employment), C (= decrease capacity and increase employment) and D (= decrease capacity and decrease employment) (Fig. 3-1).³ Thus, the number of factor adjustment paths throughout the three phases is four to the power of 3, or 64 types. From the perspective of the share by number of firms and the similarity of behavioral changes, the 64 types of factor adjustment paths were reduced to 6 typical patterns (plus those that cannot be classified in any of them), as described below.

What to use in order to determine a typical pattern is a conceptual problem based primarily on the purpose of the analysis. However, this is meaningless unless we appropriately understand the basic facts regarding changes in adjustment behavior. To prepare for the reduction, we therefore reviewed the characteristics and changes in adjustment behavior in each of the phases from the perspective of the share by number of firms (Fig. 3-2).

Forty-four percent of the adjustment behavior of Phase I was of the scale expansion type (A) with expansions of both capacity and employment, 43% was of the quasi-scale expansion type with expansion of either capacity or em-

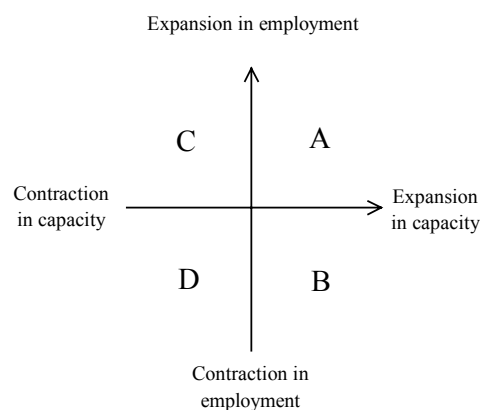


Fig. 3-1 Conceptual Diagram of Factor Adjustment Patterns

¹ Unlike gross flow analyses, there are probably few examples of the analysis of adjustment paths in the field of micro-data analysis and so there was no established, dependable method for stylizing.

² For example, comparing the balance at the end of FY1986 and at the end of FY1979 in Phase I.

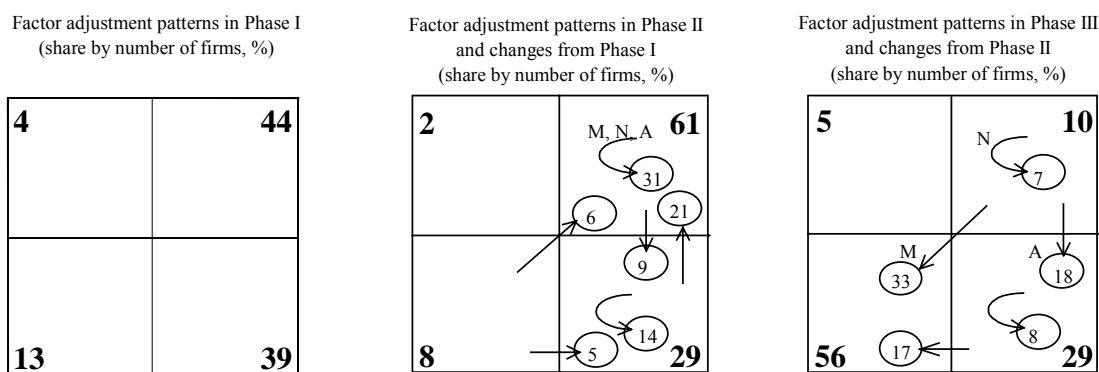


Fig. 3-2 Long-Term Transitions in Factor Adjustment Patterns of Common Firms

- Notes: 1. Phase I (FY1980-86), Phase II (FY1987-93), Phase III (FY1994-2000)
 2. The abbreviations M, N and A indicate the movements, respectively, of the total of manufacturing industries, the total of non-manufacturing industries and the total of all industries.
 3. Movements with a ratio of less than 5% are not shown.

ployment (B+C), both of essentially equal scale, with 13% of the scale contraction type with contraction of both (D). The characteristic differences between capacity and employment are that, in regard to capacity, scale expansion (A+B) accounted for the majority at 83%, while, in regard to employment, contraction (B+D), at 52%, barely exceeded half. There was no great difference in these characteristics when the population was divided into manufacturing and non-manufacturing; however, the tendency toward expansion of scale was stronger among manufacturing industries during this period (A–D: manufacturing: 35, non-manufacturing: 25).

Sixty-one percent of adjustment behavior during Phase II was scale expansion type (A), almost twice as much as the quasi-scale expansion (B+C), indicating a strong tendency overall toward expansion. In regard to capacity, the scale expansion type (A+B) reached a level of 90% and, even in the case of employment, the scale expansion (A+C) type, at 63%, was well over half. In terms of the changes from Phase I, of the 61% scale expansion type (A), 31%, about half of the companies, were type A in Phase I, while 21% shifted from B and 3% from C. Meanwhile, 6% shifted all the way from the scale contraction type (D) in Phase I to type A. Though there were

no great differences in these changes when the population was divided into manufacturing and non-manufacturing, the tendency toward scale expansion was stronger among non-manufacturing industries (A–D: manufacturing: 50, non-manufacturing: 60).

Regarding adjustment behavior in Phase III, the scale expansion type (A) declined to a mere 10% while the scale contraction type (D), at 56%, accounted for the majority. In addition, with the quasi-scale expansion type (B+C) at essentially the same level as in Phase I (34%), there is a conspicuous trend toward contraction differing from Phase II. In regard to capacity, the scale expansion type (A+B) accounted for 39% and, in regard to employment, the scale expansion type (A+C) dropped to a mere 15%. In terms of changes from Phase II, 33%, or more than half, of the 61% of the scale expansion type (A) in Phase II fell abruptly to type D. Following that, 18% shifted to B while 7% remained in A during Phase III. In addition, companies mainly in manufacturing industries that moved from B to scale contraction (D) increased to 17% and the tendency toward scale contraction was more notable among manufacturing industries (D–A: manufacturing: 51, non-manufacturing: 34).

Next we examine the approach of reducing the 64 types of factor adjustment paths throughout the three phases into six major categories taking these basic facts into account. Given the

³ Level growth is classified as a decrease.

characteristics of each phase, the key point in elucidating the dynamic aspects of the factor adjustment behavior of Japanese corporations is probably the difference between firms that did not alter their tendency to maintain and expand scale in spite of the adverse conditions resulting from the collapse of the bubble economy during Phase III and firms that shifted to scale contraction. Thus, of those firms that ranked as type A or B in both Phases I and II (75% of the common firms), those firms in which the adjustment pattern in Phase III was not type D (33%) and those that become type D in Phase III (42%) are categorized, respectively, as type 1 and type 2. Type 1 firms are then further segmented into firms that expanded both capacity and employment in Phase III as sustained-growth type 1a (8%), firms that expanded only capacity as quasi-sustained growth type 1b (21%) and firms that expanded only employment as quasi-sustained growth type 1c (4%). Type 2 was likewise segmented into firms that expanded both capacity and employment in Phase II but abruptly shifted to contraction in Phase III as growth setback type 2a (28%) and those that expanded capacity in Phase II while shifting to contraction in employment as early contraction type 2b (14%). Besides these, firms that could not be classified as either type 1 or type 2, namely those were positioned as C or D in Phase I or Phase II (at least capacity contraction), accounted for 25% of the common firms. Firms among them that were C or D in Phase I and then shifted to A or B in Phase II (15%) were positioned as type 3, the sixth type, regardless of the conditions in Phase III (Heisei boom type). The 10% balance is considered to be simply "other."

2. Downsizing as Established Trend Among Common Firms

In this section, we classify the factor adjustment paths of common firms based on the six major types defined in the foregoing section and highlight each type focusing on the major aggregate indicators of business performance, various shares by industry⁴ and so forth, and look at the

⁴ The industry classification is based on the same 20 industrial categories (manufacturing: 13, non-manufacturing: 7) as Chapter II, Section 4.

implications for aggregate investment trends (Tables 3-1 to 3-3).

Type 1a: Sustained growth

Firms associated with this type make up the second smallest group of the six types, consisting of 7.8% in the share by number of firms. The share by number of firms by industry shows that the weight of non-manufacturing industries (9.2%) was somewhat greater than that of manufacturing industries (7.1%), exceeding 20% in the case of pharmaceuticals and retail. Based on the 64 individual paths, A-A-A at 4.2% accounts for more than half, followed by B-A-A (1.8%). Other paths associated with this type include A-B-A and B-B-A.

The average growth rate of sustained growth firms from FY1980 through FY2000 was the highest of the six types not only in capacity (tangible fixed assets excluding land) and employment (total number of employees) but also in sales and profit. Furthermore, ROA (return on assets) in FY2000 was 7.0%, far higher than the average 4.3% for all types, and, looking at the individual firms, many are leading high-profit high-growth firms in their respective industries.⁵ These results naturally indicate the desirable movement of resource allocation.

The distribution in FY2000 indicates that sustained growth type firms clearly had a higher share of employment and profit than the ratio based on the number of firms while in terms of capacity and sales, the ratio was essentially the same as that based on the number of firms, thus demonstrating a relatively strong labor-intensive characteristic. Based on industries excluding electricity & gas, which have a strong effect on the shares of each type, the share of capacity increases somewhat, though there is no change in the general tendency. The labor-intensive character of type 1a probably reflects the properties of the retail industry, which alone is associated with this type at the industry level. Even with retail excluded, however, the general tendency

⁵ Since this study does not discuss the relative superiority of individual firms, we refrain from naming specific firms. We referred to the lineup of individual firms in assessing each type of factor adjustment path, however, we make no ungrounded assertions other than the lineup of individual firms.

remains unchanged.

Table 3-1 Industry-Specific Shares by the Number of Firms of the 6 Major Types of Factor Adjustment Patterns

6 major types	All industries							
	manufacturing industries							
		Foods	Textiles	Paper & pulp	Chemicals	Pharmaceuticals	Ceramic, stone & clay	
1a Sustained-growth	7.8	7.1	5.7	4.2	-	8.7	21.2	14.6
1b Quasi-sustained growth (capacity only)	21.2	19.5	27.3	19.7	34.8	19.4	39.4	25.0
1c Quasi-sustained growth (employment only)	4.2	3.5	6.8	2.8	-	2.9	-	2.1
2a Growth setback	28.1	30.3	25.0	12.7	39.1	39.8	12.1	20.8
2b Early contraction	13.8	16.4	6.8	26.8	17.4	15.5	6.1	18.8
3 Heisei boom	14.6	12.0	18.2	18.3	4.3	6.8	6.1	12.5
Others	10.4	11.2	10.2	15.5	4.3	6.8	15.2	6.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

6 major types	Iron & steel	Nonferrous metals	Metal products	General equipment	Electrical equipment	Automobiles	Other manufacturing
1a Sustained-growth	3.8	2.9	2.1	6.5	6.3	11.1	7.4
1b Quasi-sustained growth (capacity only)	9.6	20.6	16.7	11.5	23.4	18.1	17.3
1c Quasi-sustained growth (employment only)	1.9	5.9	2.1	5.5	1.6	4.2	2.5
2a Growth setback	15.4	35.3	45.8	29.5	32.0	45.8	33.3
2b Early contraction	36.5	8.8	14.6	19.0	12.5	16.7	12.3
3 Heisei boom	25.0	11.8	16.7	17.0	0.8	-	16.0
Others	7.7	14.7	2.1	11.0	23.4	4.2	11.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

6 major types	Non-manufacturing industries							
	Construction	Wholesale	Retail	Real estate	Transportation & communications	Electricity & gas	Other non-manufacturing	
1a Sustained-growth	9.2	4.2	4.8	24.5	10.5	11.2	16.7	5.9
1b Quasi-sustained growth (capacity only)	24.9	18.5	21.7	12.2	47.4	34.7	61.1	17.6
1c Quasi-sustained growth (employment only)	5.7	7.6	3.6	10.2	5.3	4.1	-	5.9
2a Growth setback	23.3	31.1	24.1	34.7	15.8	12.2	11.1	21.6
2b Early contraction	7.8	5.0	7.2	2.0	10.5	10.2	11.1	13.7
3 Heisei boom	20.4	28.6	31.3	12.2	5.3	13.3	-	17.6
Others	8.7	5.0	7.2	4.1	5.3	14.3	-	17.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3-2a Business Performance Indices Tabulated by the 6 Major types of Factor Adjustment Patterns (the total of all industries)

6 major types	Share by each item, FY2000 (%)					Average growth rate, FY1980-2000 (annual rate, %)				ROA, FY2000 (%)
	No. of firms	Capacity	Employment	Sales	Profit	Capacity	Employment	Sales	Profit	
1a Sustained-growth	7.8	6.4	16.2	8.6	12.8	7.9	4.0	5.7	5.7	7.0
1b Quasi-sustained growth (capacity only)	21.2	54.9	26.6	29.4	37.8	5.1	-0.3	2.7	3.6	4.4
1c Quasi-sustained growth (employment only)	4.2	1.3	4.5	2.9	3.4	7.4	2.4	4.7	4.1	4.4
2a Growth setback	28.1	18.1	31.4	27.9	28.0	4.9	-0.2	3.6	2.0	4.2
2b Early contraction	13.8	11.1	9.3	10.6	7.9	3.3	-2.6	1.1	-0.6	3.3
3 Heisei boom	14.6	5.1	8.0	16.3	5.8	0.0	-2.2	-0.3	-2.6	2.7
Others	10.4	3.1	4.1	4.2	4.2	-0.1	-2.8	0.6	-3.6	4.8
Total	100.0	100.0	100.0	100.0	100.0	4.3	-0.3	2.2	1.7	4.3

Table 3-2b Business Performance Indices Tabulated by the 6 Major Types of Factor Adjustment Patterns (excluding electricity & gas)

6 major types	Share by each item, FY2000 (%)					Average growth rate, FY1980-2000 (annual rate, %)				ROA, FY2000 (%)
	No. of firms	Capacity	Employment	Sales	Profit	Capacity	Employment	Sales	Profit	
1a Sustained-growth	7.6	10.7	16.9	9.1	15.7	7.9	4.1	5.7	5.7	7.0
1b Quasi-sustained growth (capacity only)	20.6	33.2	24.0	26.1	27.0	6.5	-0.3	2.5	2.4	4.1
1c Quasi-sustained growth (employment only)	4.2	2.2	4.7	3.1	4.1	7.4	2.4	4.7	4.1	4.4
2a Growth setback	28.4	29.6	32.5	29.3	33.8	5.0	-0.2	3.6	2.0	4.2
2b Early contraction	13.8	10.5	9.2	10.6	7.0	2.6	-2.7	0.9	-1.7	3.0
3 Heisei boom	14.8	8.6	8.4	17.3	7.2	0.0	-2.2	-0.3	-2.6	2.7
Others	10.6	5.2	4.3	4.5	5.2	-0.1	-2.8	0.6	-3.6	4.8
Total	100.0	100.0	100.0	100.0	100.0	4.2	-0.3	2.1	1.1	4.1

Table 3-2c Business Performance Indices Tabulated by the 6 Major Types of Factor Adjustment Patterns (excluding retail)

6 major types	Share by each item, FY2000 (%)					Average growth rate, FY1980-2000 (annual rate, %)				ROA, FY2000 (%)
	No. of firms	Capacity	Employment	Sales	Profit	Capacity	Employment	Sales	Profit	
1a Sustained-growth	7.2	5.3	12.2	6.8	11.4	7.7	3.7	5.8	6.0	7.4
1b Quasi-sustained growth (capacity only)	21.5	56.2	29.4	30.7	38.8	5.1	-0.3	2.7	3.6	4.4
1c Quasi-sustained growth (employment only)	3.9	1.3	4.1	2.7	3.4	7.6	2.1	4.7	4.2	4.5
2a Growth setback	27.9	18.0	32.6	28.0	28.2	4.9	-0.2	3.6	2.1	4.3
2b Early contraction	14.2	11.3	10.2	11.0	8.1	3.3	-2.6	1.1	-0.6	3.3
3 Heisei boom	14.7	4.8	7.1	16.3	5.8	-0.3	-2.7	-0.4	-2.6	2.8
Others	10.7	3.1	4.5	4.4	4.4	-0.1	-2.9	0.6	-3.6	4.8
Total	100.0	100.0	100.0	100.0	100.0	4.2	-0.5	2.1	1.7	4.3

- Notes:*
1. In calculation of shares, capacity means tangible fixed assets excluding land, employment means total number of employees and profit means operating profit.
 2. In regard to the average growth rate figures, the 21-year average through the end of FY2001 with the end of FY1979 as the standard is used for capacity and employment, and the 21-year average until FY2001 with FY1979 as the standard is used for sales and profit.
 3. ROA = (operating profit/interest dividends received)/average total assets at the beginning and end of the term; based on weighted average

Table 3-3 Definition of the 6 Major Types of Factor Adjustment Patterns and Correspondence to the 64 Individual Paths Along with Business Performance Indices

6 major types and their definitions		Relevant paths (based on all 64 individual paths)			Share by each item, FY2000 (%)					Avg. growth rate, FY1980-FY2000 (annual rate, %)				ROA, FY2000 (%)		
		Phase I	Phase II	Phase III	No. of firms	capacity	employment	sales	profit	capacity	employment	sales	profit	all industries	excluding electricity & gas	excluding retail
1a	Sustained-growth	A	A	A	4.2	4.0	12.5	5.1	9.8	9.6	5.2	6.9	7.1	8.1	8.2	8.8
	I A or B	B	A	A	1.8	0.6	1.5	1.7	0.9	7.3	1.7	4.6	2.6	3.5	3.5	3.8
	II A or B	A	B	A	0.9	0.6	1.6	1.3	1.3	5.4	1.6	4.7	3.3	8.0	8.0	8.8
	III A	B	B	A	0.9	1.2	0.5	0.5	0.9	5.8	-0.1	2.9	2.5	4.0	4.0	4.0
1b	Quasi-sustained growth (capacity only)	A	A	B	8.4	26.2	14.9	13.4	21.4	5.2	0.7	4.7	4.5	5.0	4.9	5.0
	I A or B	B	A	B	6.4	20.4	5.3	6.3	11.0	4.8	-0.7	3.2	3.7	4.2	3.3	4.2
	II A or B	B	B	B	3.9	2.8	3.9	5.0	2.6	4.8	-2.2	0.1	0.4	3.6	3.6	3.6
	III B	A	B	B	2.5	5.5	2.5	4.7	2.8	5.8	-1.0	1.5	2.0	3.4	3.0	3.4
1c	Quasi-sustained growth (employment only)	A	A	C	1.9	1.0	3.5	2.2	2.3	8.1	3.7	5.5	4.5	4.1	4.1	4.1
	A or B	B	A	C	1.2	0.2	0.5	0.4	0.7	6.3	1.3	3.6	6.0	7.7	7.7	7.7
	A or B	B	B	C	0.6	0.0	0.1	0.1	0.0	4.1	-1.2	3.0	-0.4	2.9	2.9	2.9
	C	A	B	C	0.5	0.1	0.5	0.3	0.3	5.3	-1.8	2.3	0.1	3.5	3.5	3.5
2a	Growth setback	A	A	D	16.8	12.4	23.2	21.1	20.2	5.6	0.3	4.2	2.0	4.1	4.1	4.1
	A or B	B	A	D	11.4	5.7	8.2	6.8	7.8	3.7	-1.2	2.0	2.2	4.6	4.6	4.7
	A	(only 2 relevant individual paths)														
	D															
2b	Early contraction	B	B	D	8.9	6.1	6.9	8.3	4.4	2.4	-3.0	0.6	-2.0	2.8	2.7	2.8
	A or B	A	B	D	4.9	5.0	2.3	2.3	3.5	4.6	-1.2	3.1	2.2	4.6	4.3	4.6
	B	(only 2 relevant individual paths)														
	D															
3	Heisei boom	D	B	D	3.0	2.9	2.2	8.5	2.3	-1.3	-4.4	-0.6	-4.4	2.6	2.6	2.6
	C or D	D	A	D	3.0	0.5	1.2	1.3	1.0	0.6	-2.7	-1.5	-1.4	3.6	3.6	3.6
	A or B	(13 other individual paths omitted)														
	All															
Other		A	D	D	1.8	0.2	0.9	0.6	0.1	2.4	-1.1	3.2	-7.2	2.3	2.3	2.3
		B	D	D	1.7	0.6	0.7	0.9	0.9	-0.4	-5.0	-0.2	-1.0	4.8	4.8	4.8
		(20 other individual paths omitted)														

- Notes:
1. In regard to the relevant paths (based on all 64 individual paths), there were only 53 paths with an actual record among the common firms.
 2. In calculation of shares, capacity means tangible fixed assets excluding land, employment means total number of employees and profit means operating profit.
 3. In regard to the average growth rate figures, the 21-year average through the end of FY2001 with the end of FY1979 as the standard is used for capacity and employment, and the 21-year average until FY2001 with FY1979 as the standard is used for sales and profit.
 4. ROA = (operating profit/interest dividends received)/average total assets at the beginning and end of the term; based on weighted average

Type 1b: Quasi-sustained growth (capacity only)

Firms of this type make up the second largest group of the six categories in the share by number of firms. The industry-specific tabulation indicates that the share by number of firms of non-manufacturing industries (24.9%) was somewhat greater than that of manufacturing industries (19.5%), while those of electricity & gas exceed 60%. Based on all 64 individual paths, A-A-B was 8.4% and B-A-B was 6.4% and these two paths account for the majority of this type. In addition, paths B-B-B and A-B-B are also associated with this type.

Average growth rates from FY1980 through FY2000 of firms of the quasi-sustained growth type that maintained growth only in capacity indicate that employment was negative, albeit only slightly. The growth rate of capacity was also less than that of firms of the quasi-sustained growth type for employment only, and similar to that of growth setback type firms. That is, even though these firms expanded capacity throughout the three phases, they are characterized by slow expansion or gradual and stable adjustments. In addition, the average growth rates for sales and profit were both positive, though they ranked no higher than fourth among the six types and ROA in FY2000 was 4.4%, essentially the same as the average of 4.3% for all types, indicating that the quasi-sustained growth type for capacity showed mediocre performance.

Shares in FY2000 indicate that, based on the number of firms, they ranked second, following the growth setback type, while accounting for a high 55% of capacity, 29% of sales and 38% of profit, the highest figures of the six types. These firms are characterized by large scale and a capital intensive character even among listed firms. Even though this characteristic and especially the high share for capacity are strongly dependent on the fact that most of the firms affiliated with the electricity & gas industries are classified as this type, the basic orientation remains unchanged even if electricity & gas firms are excluded. Industries in which the pattern of total industry values is associated with this type include, among manufacturing industries, foods, paper & pulp, pharmaceuticals, ceramic, stone & clay and electrical equipment and, among

non-manufacturing industries, real estate, transportation & communication and electricity & gas.

Type 1c: Quasi-sustained growth (employment only)

Firms associated with this type are the fewest of the six types, consisting of 4.2% in the share by number of firms. The industry-specific tabulation indicates that the share by number of firms in non-manufacturing industries (5.7%) was greater than that of manufacturing industries (3.5%), exceeding 10% in the case of retail. Based on all 64 individual paths, A-A-C accounts for 1.9% and B-A-C for 1.2%, these two accounting for the majority of this type. In addition, paths B-B-C and A-B-C are also associated with this type.

In regard to the average growth rates of firms of the quasi-sustained growth type that maintained growth only in employment from FY1980 through FY2000, though it is probably natural that the growth rate of employment would be second only to the sustained growth type (only the sustained growth and this type were positive), it is noteworthy that this type also surpassed the quasi-sustained growth type for capacity only in the growth rate of capacity and was at a level approaching that of the sustained-growth type. In terms of performance, ROA in FY2000 was 4.4%, the same level as the quasi-sustained growth type for capacity only, while exceeding the quasi-sustained growth type for capacity only in the average growth rate for sales and profit.

In regard to the shares in FY2000, though employment alone slightly exceeded the share by number of firms, capacity, sales and profit all dropped below the share by number of firms, showing that firms of this type are relatively labor intensive and small in scale for a listed company. There were no firms in which the pattern of total industry values was associated with this type.

Type 2a: Growth setback

Firms of this type, which accounted for 28.1% in the share by number of firms, were the most numerous of any of the six types. The industry-

specific tabulation indicates that the share by number of firms of manufacturing industries (30.3%) was somewhat greater than that of non-manufacturing industries (23.3%) and almost half of automobiles and metal products related firms were associated with this type. Based on all 64 individual paths, only two paths were associated with this type, A-A-D, which accounted for 16.8%, and B-A-D, which accounted for 11.4%, the highest and second highest ranking shares among all individual paths, which can be considered a typical pattern for Japanese firms.

In regard to the average growth rates of firms of the growth setback type from FY1980 through FY2000, capacity grew by about 5% while employment declined slightly, indicating similar conditions to those of the quasi-sustained growth type that maintained growth only in capacity. In addition, ROA in FY2000 was 4.2%, slightly below the quasi-sustained growth type (4.4% for both types in capacity and employment) and, though the growth rate of profit was smaller somewhat, the growth rate of sales exceeded that of the quasi-sustained growth type (capacity only). In terms of performance, there are no essential disparities between the growth setback type and the quasi-sustained growth type (especially the quasi-sustained growth type for capacity only), and many of the growth setback firms are considered corporate leaders in Japan, especially in manufacturing industries.

Firms associated with the growth setback and quasi-sustained growth (capacity only) types make up about 50% of the share by number of firms and are thought to reflect an image of the average Japanese firm through Phase II. It is interesting to note, however, that these company groups (in spite of similarities in performance) were dissimilar in their response in Phase III, some with a tendency toward increasing capacity and others shifting to a contraction in scale.

Shares in FY2000 indicate that employment, sales and profit were at about the same level as the shares by number of firms and even capacity, the only small figure, was at a level ranking with the share by number of companies when electricity & gas were excluded. Therefore, overall, they approach the average configuration of listed companies. Industries in which the pattern of total industry values is associated with this type

include, among manufacturing industries, chemicals, nonferrous metals, metal products, general equipment and automobiles and, among non-manufacturing industries, construction.

Type 2b: Early contraction

Firms of this type accounted for 13.8% in the share by number of firms. The industry-specific tabulation indicates that the share by number of firms of manufacturing industries (16.4%) was considerably greater than that of non-manufacturing industries (7.8%) and those of iron & steel, textiles and other industries in which demand is in a structural trend toward contraction are conspicuously high. Among all 64 individual paths, B-B-D (8.9%) and A-B-D (4.9%) are the only two paths that are associated with this type.

The average growth rates of firms of the early contraction type from FY1980 through FY2000 indicate that, though capacity showed positive growth, this type ranked the fifth smallest among the six types while employment showed negative growth, the most restrained of all six types. The growth rate for sales was narrowly positive but that of profit was negative and, together with ROA in FY2000, all ranked fifth among the six types. Though the factor adjustment patterns themselves of the early contraction type do not appear to differ greatly from those of the growth setback type, the business conditions for this group of companies were harsher than those for the average Japanese corporations of the growth setback and quasi-sustained growth (capacity only) types.

Shares in FY2000 indicate that capacity, employment, sales and profit all dropped slightly below the share by number of companies. Firms in which the pattern of total industry values is associated with this type are textiles and iron & steel.

Type 3: Heisei boom

Firms of this type account for 14.6% of the distribution by number of firms. The industry-specific tabulation indicates, contrary to the early contraction type, that the share by number of firms of manufacturing industries (12.0%) was

surpassed in large measure by non-manufacturing industries (20.4%) and those of wholesale, construction and iron & steel were notably high. Based on all 64 individual paths, D-B-D and D-A-D both posted large ratios of 3% and, besides these, a diversity of other paths also existed, including C-A-D, D-A-B, D-B-B, C-A-B, D-A-A, D-A-C, C-B-D, C-B-B, D-B-A, D-B-C, C-A-A, C-A-C and C-B-C.

The average growth rates of firms of the Heisei boom type from FY1980 through FY2000 indicate that the growth rate of capacity leveled off, the most restrained among the six types, while that of employment was negative, ranking fifth among the six types. The growth rate of sales and profit were both negative and, together with ROA in FY2000, all faced the most severe conditions of all six types. The Heisei boom type of firms, though experiencing the same severe conditions as the early contraction type in business performance, expanded in scale more cautiously in Phase I and shifted to a more aggressive stance in Phase II.

Shares in FY2000 indicate that capacity, employment and profit all dropped below the share by number of firms while only sales exceeded the share by number of firms. This strongly reflects the characteristic of the wholesale industry in which the pattern of total industry value is associated with this type.

Firms not corresponding to any of the six types

Firms that do not correspond to any of the six types account for about 10% of the share by number of firms. Relatively common paths among them show the characteristic of shifting to clearly-defined contraction in scale from Phase II onward like A-D-D (1.8%) and B-D-D (1.7%). The average growth rates of firms of this type from FY1980 through FY2000 indicate that they are relatively close to the Heisei boom type and are thought to have suffered severe business conditions on a par with the early contraction and the Heisei boom types. There are no industries in which the pattern of total industry values is associated with this type.

Sub-conclusion: Characteristics and interpre-

tation of the six types

To conclude this section, we again summarize the implications of the analyses of the six types relating to future trends in the dynamics of aggregate investment. First, in regard to type 1a, the sustained growth type, although it includes high-profit high-growth firms that play leading roles in their respective industries, there are few capital-intensive firms among them, so they cannot be expected to drive aggregate investment. In addition, many of the groups of firms that stimulated investment were divided in Phase III between type 1b, quasi-sustained growth type that maintained growth only in capacity (expansion of capacity also in Phase III), and type 2a, the growth setback type (contraction of capacity in Phase III). There are no disparities between the two types in terms of performance, and leading Japanese firms, especially in manufacturing industries, were also included in type 2a. This suggests that downsizing has become an established trend in the domestic market since Phase III and that the sustainability of future capacity expansion by type 1b firms is uncertain. Going forward, therefore, common firms are very unlikely to drive aggregate investment.

How should we respond to this reality? Companies with good performance tend to have optimized their activities in a broad sense. The fact that companies with relatively good performance exist not only in type 1a but also in types 1b, 1c and 2a suggests that the optimal selection of investments and other factor inputs resulting from profit-earning opportunities (business opportunities), retained resources, risk and so forth can be diverse (not only expansions in scale). From the perspective of macroeconomic policy, given the strong hope for expansion in capacity and employment in the corporate sector, the expansion of capacity is increasingly considered to be indispensable for revitalizing the corporate sector (including so-called improvement in competitiveness). However, before arguing about the need for introducing some macroeconomic policy to stimulate investment, we must closely examine the following points based on the microeconomic reality that the optimal selection of a company does not necessarily mean expansion in capacity: (1) expansion of capacity is the effect,

rather than the cause, of revitalization of the corporate sector and so regardless of investment, it is important to consider why the corporate sector has not been revitalized and (2) to what extent externalities (technology spill-overs, etc.) result from expansion of capacity.

3. Trends Among Newly Listed Companies

From Chapter II through the foregoing section, we have analyzed factor adjustment behavior

expand the targets of analysis to all listed firms in order to address this issue, and survey trends in factor adjustment of newly listed firms mainly in non-manufacturing industries.

We first confirm the positioning of non-common firms among listed firms (Fig. 3-3). The time-series transitions in the number of listed firms as the result of newly listed and delisted firms⁶ indicate that there was a total of 1,577 listed firms as of FY1979. There were 1,845 newly listed firms during the subsequent 21

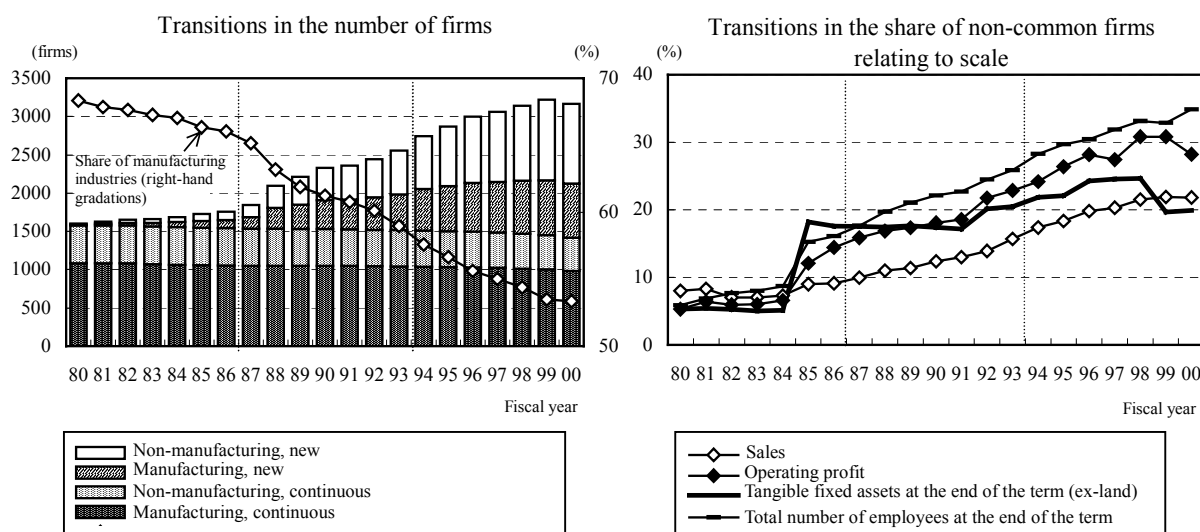


Fig. 3-3 Transitions in the Status of Non-Common Firms in All Listed Firms

- Notes:
1. In regard to the transitions in number of firms, “continuous” coincides with the 1,418 common firms, which, as of FY2000, had been listed continuously since FY1980 and “new” represents 1,749 firms, which, as of FY2000, had been listed continuously since FY1981 or later. However, since all of them are counted among the number of companies recorded in the Corporate Financial Data Bank, they do not strictly coincide with the number of listed firms in each year and an increase in “new” becomes apparent in 1988 due to the commencement of recording of over-the-counter listed firms.
 2. In regard to the share of non-common firms relating to scale, the discontinuity resulting from the recording of privatized firms (generally the year prior to listing) is apparent in FY1985 (NTT, JT), FY1992 (East Japan Railway), FY1994 (West Japan Railway) and FY1996 (Central Japan Railway) and the impact of the conversion of NTT to a holding company in FY1999 is especially strongly expressed in the movements of tangible fixed assets.

focusing solely on firms that have been continuously listed since FY1980. However, as stated in Chapter II, Section 1, listed firms are not always typical firms of Japan and continuously listed firms are not always typical of listed firms. In recent years in particular, trends among non-manufacturing industries, which are increasing their presence both in number of companies and in shares by capacity and employment, have not been sufficiently understood. In this section, we

years as well as 255 delisted firms⁷, giving a total

⁶ Due to the dependence on the Corporate Financial Data Bank at the Development Bank of Japan, strictly speaking, it is not the number of listed firms but transitions in “the number of firms that released financial statements in Securities Reports as the result of listing.” In spite of this, however, the time of “new listing” in the explanations below is considered to be the time of appearance in the Data Bank and the time of “delisting” is considered to be the time of removal from the Data Bank.

⁷ Including 94 firms newly listed in or after FY1980.

of 3,167 listed firms as of FY2000, about 2.2 times the 1,418 common firms. Some 60% of firms newly listed since FY1980 were in non-manufacturing industries and the ratio of firms in non-manufacturing industries to total listed firms rose from 31% in FY1979 to 47% in FY2000 (31% of common firms). Meanwhile, since newly listed firms are small in scale on average compared to continuously listed firms⁸, the share by number of firms of non-common firms as of FY2000 was 55%, though the ratio of tangible fixed assets (excluding land), sales and so forth was no more than about 20%. Since the ratio was 30% for operating profit and 35% for the number of employees, profits and labor intensiveness of non-common firms tended to be large given their size. We analyzed the factor adjustment patterns of non-common firms with continuous data available during Phase III (FY1994-2000) and confirmed the degree of relative growth potential of newly listed companies. According to Fig. 3-4, sustained growth type companies that expanded both capacity and employment in Phase III accounted for no more than 10% of common firms while the ratio of the same type to the population of non-common firms exceeded one-third (33%).

To what degree then can we expect changes to occur in the transitions of factor adjustment rates that have been analyzed thus far if the horizon is broadened to include non-common firms? Fig. 3-5 indicates the transitions in net growth rate of capacity and net growth rate of employment according to the tabulations of all listed firms for which a comparison with the previous year is possible⁹ and the contribution of common and non-common firms to that by the degree of increase and decrease¹⁰. The net growth rate of capacity first shows that, although the net growth rate of capacity tended to remain below that of common firms (refer to Fig. 2-2) through Phase II and to exceed it in Phase III, the difference is small in both cases and, in recent years, the gen-

eral tendency is similar, with the level dropping notably in FY1998 and shifting into the negative thereafter. Still, looking only at the moves of the gross positive contribution, excluding the effects of restrained investment by delisted or privatized businesses, within the context of the abrupt drop in the gross positive contribution of common firms in recent years, there has been a relative increase in the presence of non-common firms and the ratio of the non-common firms to the gross positive contribution of all listed firms rose from 4% in the early 1980s to as high as 43%.

Next, transitions in the net growth rate of employment indicate that, though not dominating the group, a clear difference from common firms has emerged in recent years. The net growth rate of employment based on common firms dropped to -5.8% in FY1999 but to only -4.3% in the case of all listed firms and, though negative in FY2000, the extent of the decline was the smallest since FY1993 (the second most severe year for common firms after FY1999). The ratio of the non-common firms to the gross positive contribution of all listed firms also increased in importance to a level exceeding capacity and was at a level of about two-thirds from FY1998. Newly listed firms gradually increased in importance in both capacity and employment crea-

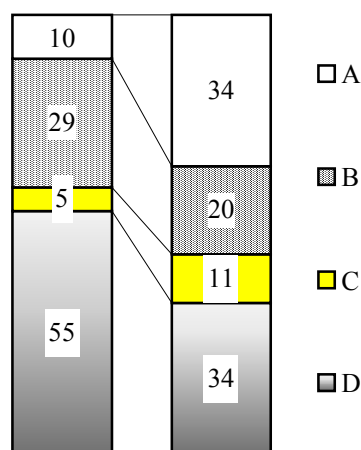


Fig. 3-4 Comparison of Factor Adjustment Patterns in Phase III (%)

(Left: common firms, right: non-common firms, for which continuous data was available for the period FY1994-2000)

tion in Phase III. However, due in part to the large ratio of firms in non-manufacturing indus-

⁸ The listing of very large firms as in the case of communications or railways, for example, through privatization and new entries is apparent as an exception.

⁹ In the simple tabulated values of listed firms, there is an increase if there are newly listed firms (decrease if there are delistings). Here, however, such fluctuations unrelated to the actual situation of the firm are excluded.

¹⁰ Excluding special factors arising from communication career regrouping.

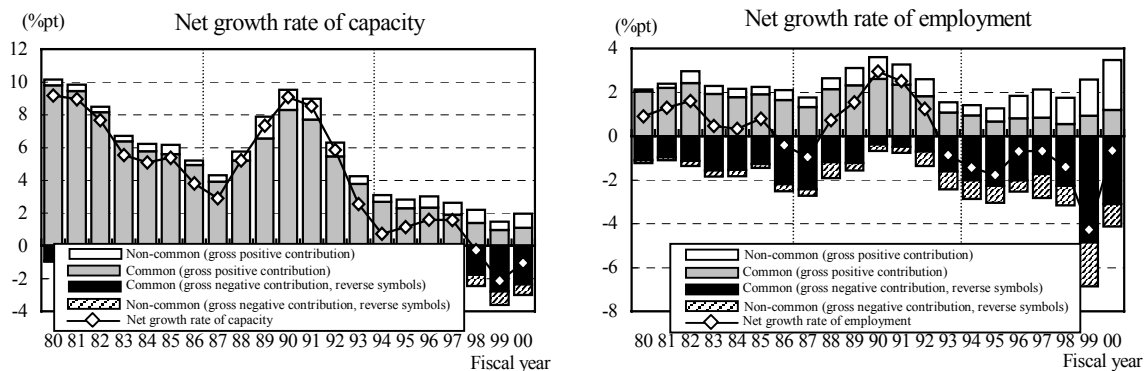


Fig. 3-5 Decomposition of the Contribution of Common and Non-Common Firms to the Factor Adjustment Rate of All Listed Firms

- Notes:
1. Produced with a tabulation of all data comparable to the previous year targeting all listed firms including over-the-counter and new markets (FY2000, about 3,200 firms). However, NTT in FY1999 (conversion to holding company) and KDDI in FY2000 (merger) were excluded from the tabulation because of the strong impact of the discontinuity.
 2. Non-common firms include firms newly listed in FY1981 or later as well as firms that were delisted due to merger, bankruptcy, etc.

tries, the contribution to employment was more prominent than that to capacity.

Accordingly, we tabulated all listed firms with continuous data available in Phase III (FY1994-2000)¹¹ and compared the contribution by industry of the factor adjustment rate with the case of common firms (Fig. 3-6). As expected, the large size of the gross positive contribution, especially in employment, in retail, real estate and other non-manufacturing industries (service,

etc.) is an obvious difference from common firms. Specifically, based on individual firms, the lineup of non-common firms among the top thirty firms with a large gross positive contribution in capacity and employment in Phase III¹² is as indicated in Table 3-4. In terms of capacity, there were no more than four non-common firms among the top thirty, while in terms of employment, there were 18, that is, more than half, and they are mainly in retail, restaurants, service and other industries that are labor-intensive and that actively employ temporary and part-time workers.

¹¹ Same as footnote 10.

¹² Based on all listed firms; however, the recently listed firms with continuous data unavailable in Phase III were included in the tabulation based only on the data subsequent to listing.

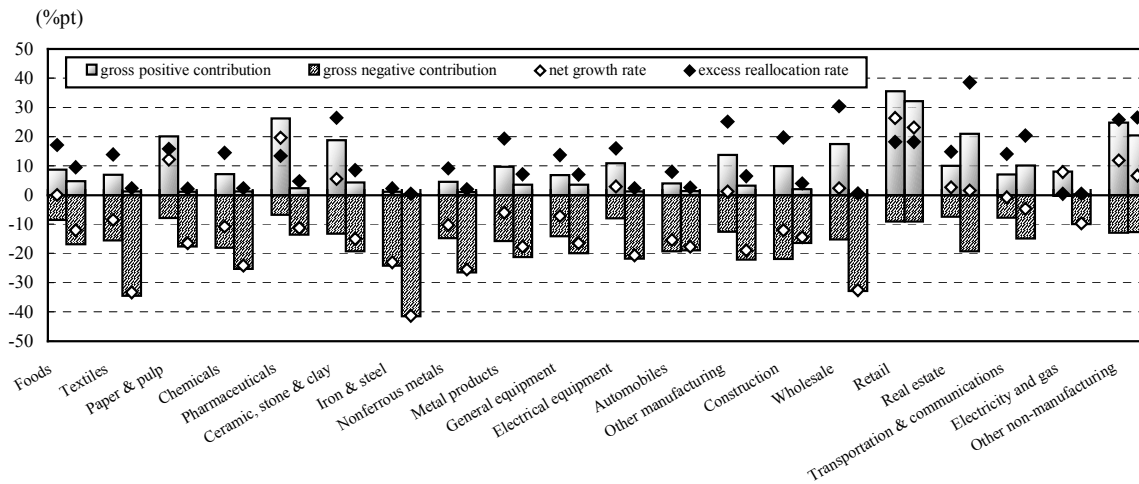
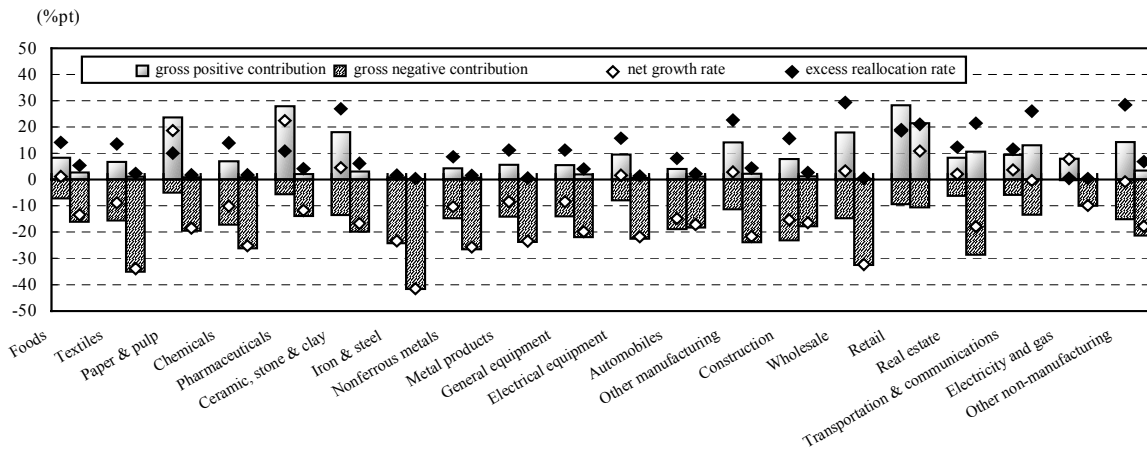


Fig. 3-6 Decomposition of the Industry-Specific Factor Adjustment rates by Gross Flows of All Listed Firms (Phase III = FY1994-2000)

Left side: net growth rate of capacity, right side: net growth rate of employment,
7-year cumulative growth rate

Note: Tabulation targeting all listed firms with continuous data available for the period FY1994-2000. NTT and KDDI were excluded for the reasons given above.



(Reference) Decomposition of the Industry-Specific Factor Adjustment Rates by Gross Flows of Common Firms (Phase III = FY1994-2000)

Left side: net growth rate of capacity, right side: net growth rate of employment,
7-year cumulative growth rate

Note: Though this is a repetition of Fig. 2-12, the gradations are different for comparison purposes.

Table 3-4 List of Non-Common Firms with Large Positive Contributions to Capacity and Employment Increase in Phase III

Capacity

Rank	Company Name	Industry
6	NTT DoCoMo	Communications
8	Oriental Land	Service
14	Japan Telecom	Communications
24	Ricoh Leasing Company	Service

Employment

Rank	Company Name	Industry
2	Nichii Gakkan Company	Service
4	Skylark	Restaurant
5	LIFE Corporation	Retail
6	BELLSYSTEM24	Service
7	N.I.C. Corporation	Service
11	Fast Retailing	Retail
14	Ten Allied	Restaurant
15	Yaoko	Retail
16	Yamada Denki	Retail
18	Aim Services	Service
19	Shimamura	Retail
21	Kuraya Sanseido	Wholesale
22	SMC	General machinery
23	Fuji	Retail
25	Heiwado	Retail
26	Jonathan's	Restaurant
28	Kohnan Shoji	Retail
30	Kojima	Retail

- Notes:* 1. The ranking by contribution was calculated by including also the newly listed firms after FY1994 in the tabulation.
 2. Only non-common firms were extracted and listed in the top 30 ranking by contribution. However, companies to which special factors are thought to apply, such as mergers, regroupings, etc., were excluded.

In this section, we examined the dynamism of Japanese corporations, which cannot be fully grasped by analyzing continuously listed companies, and showed that newly listed firms, especially in non-manufacturing industries, made a steady contribution especially in terms of employment in the latter half of the 1990s. Never-

theless, when retail, service and several other industries are excluded, there is no great change in the established trends of downsizing seen previously even if the scope is broadened to include newly listed firms, and even the contribution of retail and service industries was limited in terms of capacity.

Concluding Remarks

Given the fact that investment does not have the strength that it once had as a macroeconomic driving force as well as the increasing structural severity of the employment environment, the changes occurring in corporate behavior and their background are now of immense concern for macroeconomic policy. However, the economic environment is no longer marked by constant growth and, as corporate behavior becomes more heterogeneous, monitoring only a few industries and firms or focusing either on capacity or employment may lead to incorrect conclusions.

This study therefore analyzed the overall recent trends of capacity and employment adjustment behavior of Japanese firms, especially listed firms, based on the techniques of micro-data analysis, which focuses on gross flows at the level of individual firms along with the dual approach, which treats both capacity and employment as a single set of adjustment behavior. The various topics addressed in this study and their implications are given below.

1. The factor adjustment patterns at the industry level showed two-fold diversity, namely the decline of inter-industry comovement and divided growth-driving industries by capital and labor.
2. Factor adjustment behavior at the company level indicates that a prominent weakening of the potential for expansion has been more serious in capacity than in employment in recent years. The transitions in the threshold rate of return of capacity expansion suggest dramatic changes in investment behavior since the mid-1990s in terms of greater caution and a decline in the correlation to employment.
3. Capacity expansion behavior is no longer as sensitive to trends in the business climate (macro) and in industry (semi-macro) and the tendency toward domination by individual company (idiosyncratic) factors is becoming stronger. Meanwhile, trends in

the business environment and industry are gaining in importance in the behavior of capacity contraction. This suggests the establishment of downsizing trends in capacity as in employment overall.

4. Since the mid-1990s, there have been frequent cutbacks in capacity and employment in the domestic market by leading firms in Japan in terms of track record and scale especially in manufacturing industries, and diversification is evident in the optimal selection of factor input.
5. The trends in newly listed firms indicate the existence of latent growth potential and entrepreneurial strength in non-manufacturing industries which are expected to make greater contributions in the future, especially in employment.

Investment and employment do not represent a promise that firms will acquire profit-earning opportunities (business opportunities) but definitely generate costs on the other hand. This is the undeniable reality in business, though easily forgotten when the business climate remains favorable for a long time. The most important implication of this study is that the factor adjustment behavior of Japanese companies in the current deflationary economic environment has changed significantly in line with much greater awareness of this undeniable reality. When considering whether to introduce some macroeconomic policy to stimulate investment, taking these structural changes in corporate behavior into consideration, it is essential to remember that policies that target direct short-term effects could seriously distort optimal corporate behavior. It is thus preferable to aim for indirect medium- to long-term effects by creating an environment (by improving legal systems, regulations, consumption stimulation measures) that enables firms to easily pursue profit-earning opportunities, taking into consideration the needs of manufacturing industries for restructuring and the needs of non-manufacturing industries for business expansion.

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