Discussion Paper #99 - DF - 32

Entry, Exit, Job Creation, and Job Destruction
- An Analysis Based on the Micro-data of Japanese Manufacturing Industry -

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November 1999

Abstract

This paper conducts an analysis on entry, exit, job change in Japan in recent years, mainly using large sample of micro-data of "Census of Manufacturers" by the Ministry of International Trade and Industry. The results of this article reveal that the analytical results for start-ups / shutdowns and job creation/destruction in Japan are similar to those in foreign countries in some aspects, but some differences are also observed between Japan and foreign countries.

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October 1999

[Unfinished manuscript]

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1. Introduction

Due to the prolonged recession, a decline in the start-up rate and the increased unemployment rate, the creation of new ventures or job creation is an important policy issue in Japan. When establishing and implementing these policies, it is necessary to accurately analyse the actual situation of start-ups and job creation.

In the last few years, detailed analyses using the micro data of company or business establishment have been conducted on entry, exit, job creation and job destruction mainly in the U.S. and in major European countries. In Japan, however, studies of this kind have been scarce due to the limitations of data.

Under these circumstances, this paper conducts an analysis centering on fact-finding about entry, exit, job change in Japan in recent years, mainly using the micro data of "Census of Manufacturers" (1988, 1990 and 1993) by the Ministry of International Trade and Industry. [*1*2] Firstly, an analysis of manufacturing industries is made, and then differences between manufacturing industries and other industries, including non-manufacturing industries, are examined.

The results of this study reveal that the analytical results for start-ups/shutdowns and job creation/destruction in Japan are similar to those in foreign countries in some aspects, but some differences are also observed between Japan and foreign countries.

The composition of this paper is as follows. In Section 2, preceding studies are briefly surveyed. In Section 3, the data and analytical framework are explained. In Section 4, the trend in entry, exit, start-ups and shutdowns of business establishments for manufacturing industries in Japan is analyzed. In Section 5, the gross job creation/destruction of business establishment level is analyzed. In Section 6, the analytical results are briefly summed up and their policy implications are described.

2. Past Literature

(1) Entry and Exit

Concerning the entry and exit of companies, the traditional theory of industrial organization was mainly focused on the concentrated oligopolistic market, and implications and problems have been analyzed from the viewpoint of competition policy. Since around 1980, analyses have been extensively conducted from the viewpoint of "the new theory of industrial organization" based on game theory. In these analysis, "entry barriers", "behaviours to prevent entry", "excessive entry",

etc. are mainly covered. In many of the traditional empirical analyses of entry and exit, a regression analysis was made using economies of scale, capital intensity, advertising intensity, and other explanatory variables typically with cross industry aggregate data.[*3] Concerning strategic behaviors to prevent entry or strategic behaviors for exit, some empirical analyses were made of certain oligopolistic markets. However, no clear conclusions covering all industries have been obtained.

Analyses on entry, exit and growth of companies (or business establishments), using the micro data of individual companies or business establishments have been extensively conducted since the latter half of 1980s. Furthermore, analyses using the long-term longitudinal data in which individual companies or business establishments are closely followed have been also conducted. Through these studies, the dynamics of long-term transition of the market structure, such as *gross* entry or exit, patterns of postentry growth or decline, etc., are being clarified.[*4] In parallel with these studies, theoretical models aiming to explain the process of entry, growth and exit of companies have been presented. These are so-called "evolutionary growth theories" in which the process of entry, growth and exit in competitive industries is transformed into theoretical models by taking uncertainty, technology, learning, and other factors into consideration. These theories are developed in line with the notion of "creative destruction" advocated by J.A. Shumpeter.[*5]

Empirical analyses of this kind concerning entry or exit of companies using the micro data include Evans[1987a,b], Hall[1987], Dunne et al.[1988,1989a,b], Geroski[1991], Baldwin and Gorecki[1991], and others.[*6] The U.S. data has been most often used in these analyses, and some European country data and Canadian data have sometimes been used. Few analyses of this kind have been so far conducted in Japan.[*7]

Major findings of these studies in Western countries are as follows.

1) Both gross entry rate and gross exist rate are extremely high, and there is a high correlation between gross entry rate and gross exit rate on an industry basis (Dunne et al.[1988], Geroski [1991], etc.).

2) Survival rate of newly-entered companies or plants is low, and in particular, exit rate is high in the initial period (Geroski[1991], Baldwin and Gorecki[1991], Wagner[1994], etc.).

3) Probability of survival for companies or plants will grow as their size and age increases (Evans[1987], Dunne et al.[1989b], Baily et al.[1992], etc.).

4) If existing companies entered a certain market for diversification, their probability of exit is lower than that for newly-established companies (Dunne et al.[1988,1989a], etc.)[*8]

(2) Job creation and job destruction

Analyses of gross job creation and gross job destruction using the micro data include Dunne et al.[1989c], Davis and Haltiwanger[1990,1992], Blanchflower and Burgess[1996], and others. Representative literature at present is Davis et al.[1996]. In this literature, which is the recomposition of analyses made by Davis and Haltiwanger[1990,1992], etc., the actual conditions

of job creation and job destruction are analyzed in detail using the longitudinal data of business establishments for U.S. manufacturing industries.

In view of the close relationship between these papers and this paper, we would like to summarize various definitions used in their analysis. "Gross Job Creation" is defined to be the sum of increased jobs at plants which increased jobs and at jobs generated by new plants. "Gross Job Destruction" is defined to be the sum of decreased jobs at plants which decreased jobs and jobs lost at shut-down plants. "Net Employment Change" is the difference in employment between a time of "t" and a time of "t - 1". One of the characteristics of this analysis is that average employment volume of time "t" and a time "t - 1" is used as a denominator in a calculation of "rate" for gross job creation, etc.[*9] In addition, the "Gross Job Reallocation Rate" is defined as the total of the gross job creation rate and the gross job destruction rate.

The analysis covers the size of job creation or job destruction, the relationship with the economic cycle, differences by industry, the relationship with wage, trade and factor intensity (energy and capital), the relationship with productivity, and differences by the size or age of plants. Major results are as follows.

1) Gross job creation and job destruction rates are extremely large.

2) Job creation and job destruction tend to concentrate on plants which show wide employment change.

3) Job destruction rate shows higher cyclical change than job creation rate does. Sensitivity of job destruction to the economic cycle is higher for large-scale, old, diversified and high wage plants.

4) Annual job reallocation rate differs from industry to industry, and the rate ranges from 25% or more for wood, apparel, etc. and less than 15% for tobacco, chemical, petroleum, etc.

5) By size, the traditional idea that small companies create more jobs is wrong. Although small companies or plants show a large gross job creation rate, the net job creation rate is not large. Large-scale and matured plants or companies account for a majority of new job creation or job destruction in manufacturing industries.

6) Gross job reallocation rates significantly decrease as plant age and plant size grows.

7) The one-year-after survival rate of the existing employment stock significantly increases as employment size and plant age grows. Short-term survival rate of newly-created employment increases as employment volume grows.

8) Employment with higher wage rates lasts for a longer period.

9) The relationship between gross job turnover rate and trade exposure (import and export) is weak.

10) Gross job turnover rate tends to decline as capital intensity increases.

Based on the above results, Davis et al.[1996] doubted the effectiveness of targeted industrial policy, policies for the employment of certain type by small and medium-sized companies, trade restrictions and traditional macro economic stabilization policy., and emphasized the importance of a labor force which can flexibly respond to employment places or skills required.

In Japan, analyses of employment change at the business establishment level, using the micro data have just begun. Examples of these analyses include Kuwabara[1987], Genda [1994,1998] and Higuchi and Shinbo[1998] which are based on the micro data of "Survey on Employment Trends", and these analyses indicate the results as follows.

1) The smaller business establishments have large job creation and destruction.

2) There exist many business establishments which increase employment in a declining industry and decrease employment in a growing industry.

However, these samples are from business establishments that existed at the beginning. Job creation due to start-ups has not been analyzed, so far.

3. Data and analytical methods

Basic data used in the analysis in this paper are micro data (individual slip data) of the "Census of Manufacturers" conducted by the Ministry of International Trade and Industry for the three years of 1988, 1990 and 1993. Since the micro data for business establishments with 1-3 employees were not available, the following analysis targeted only business establishments with 4 employees or more.[*10] The number of sampled business establishments is a little more than 400,000, although the number differs from year to year.

Survey items used for the analysis were business establishment number, industrial classification, the existence or non-existence of other business establishments, the number of employees, gross salary paid in cash, shipment amount, gross value added, shipment amount of a product with the largest shipment amount, etc.

To make a comparison between manufacturing and non-manufacturing industries, publicly-available data from the Statistics Bureau, Management and Coordination Agency[1995] ("1994 Establishment Directory Maintenance Survey") were used.

The procedure of re-totalization is as follows. For each period of 1) 1988-1990 and 2) 1990-1993, individual business establishments in the intial year and the final year are matched and re-totalization for required items is conducted for a whole of the manufacturing industries in Japan with re-totalization by industry (two-digit, three-digit and four-digit industry classifications), by size of business establishment (4-9, 10-19, 20-29, 30-49, 50-99, 100-199, 200-299, 300-499, 500-999, 1000 employees or more) and by prefecture, was conducted.

Before conducting re-totalization, business establishments were broadly grouped into three categories: A) new establishments, B) surviving establishments, and C) disappeared establishments. Surviving business establishments were further classified into three groups: B1) establishments which increased employment, B2) establishments whose employment remained unchanged, and B3) establishments which decreased employment. Before conducting re-totalization by industry, new establishments were grouped into: A1) newly-opened establishments, and A2) establishments which shifted from other industries (entry by business

conversion). Disappeared establishments were grouped into: C1) establishments which were shut down, and C2) establishments which shifted to other industries (exit by business conversion) (see Figure 1)).[*11]

Then, the number of business establishments, the number of employees and their net changes were totalled for each category. If necessary, total salary paid in cash, shipment amount of products, gross value added, etc. were totalized. If Figure 1) is used for explanation, gross entry is represented by A (A1 + A2), entry by business conversion is by A2, gross exit is by C (C1 + C2), gross job creation is by the total of increased employment of A and increased employment of B1, and gross job destruction is by the total of decreased employment of C and decreased employment of B3.

When calculating "rates", such as gross entry rate, gross job creation rate, etc., average value of figures in the intial year and the last year was used as a denominator as in the case of Davis et al.[1996]. As long as an analysis by establishment size is concerned, however, a figure in the intial year was used as a denominator in order to avoid effects of shifts by establishments between different size classes.

[Figure 1] Conceptual figure

For such concepts often used in this paper as "start-up", "shutdown", "gross entry", "gross exit", "entry by business conversion", "exit by business conversion", "net change in the number of establishments", "gross job creation", "gross job destruction", "gross job reallocation" and "net variability rate", notations of OPEN, CLOSE, GENTRY, GEXIT, CENTRY, CEXIT, NENTRY, GJC, GJD, GJR and NJC are used respectively.

4. Entry, exit, start-up and shutdown

(1) Manufacturing industries ("Census of Manufacturers")

1) Manafacturing industries as a whole

For a whole of manufacturing industries in Japan, both start-up rate (= gross entry rate) and shutdown rate (= gross exit rate) are a few percentage on an annualized basis, and these rates are far larger than net entry (exit) rate (-0.18% for a period of 1988-1990; -1.78% for a period of 1990-1993) (see Table 1).[*12]

When these two periods are compared, a decline in start-up rate is significant for a period of 1990-1993, a recessionary phase. Compared with start-up rate, there is less difference for exit rates between two periods. Although it is impossible to draw a definite conclusion only from the comparison of two periods, a decline in the number business establishments in a recessionary phase is due mainly to a decline in the start-up rate.

[Table 1] Start-ups, shutdowns and net change in the number of manufacturing establishments (all manufacturing industries in Japan)

When average characteristics of surviving, started-up and shut-down business establishments are compared, started-up and shut-down establishments tend to be smaller in size (the number of employees per establishment, or shipment amount per establishment) and tend to be lower in the diversification rate (product specialization rate is high) than surviving establishments (see Table 2).

When figures per employee are compared, shipment amount, gross value added and salary paid in cash of started-up and shut-down establishments are smaller than those of surviving establishments.

There is a tendency that smaller establishments are started-up or shut-down more frequently and larger establishments remain stable.

When single plant (one establishment for one company) and multiplant(a company has more than one establishments) are compared, there are few differences in terms of the start-up rate, but the shutdown rate of single plants is larger than that of multiplants (see Table 3). As a result, the variable single plant has a negative net change rate, but the variable multiplant has a positive net change rate.

Some studies made in Western countries indicate that multiplants find it easier to exit than a single plant does. But our results are opposed to their results.[*13]

[Table 2] Comparison of characteristics of surviving, started-up and shut-down establishments

[Table 3] Comparison of single plant and multiplant (on an annualized basis)

2) By industry

By industry (under the two-digit SIC), rubber products, leather/leather products/fur, plastic products, electric machinery, general machinery have high start-up rates, but these industries have comparatively high shutdown rates. Conversely, basic material industries, such as chemical, petroleum/coal products, ceramics stone and clay products and non-ferrous materials, tend to have lower start-up and shutdown rates (but, entry by business conversion rates and exit by business conversion rates are rather high) (see Table 4).

However, the results for the whole manufacturing industries, that gross entry and gross exit (start-ups and shutdowns) are significantly large as compared with net variability of business establishments, hold true for individual industries. This means that many new plants are established even in an industry where the number of business establishments is on the decrease.

[Table 4] Gross entry and exit rates by industry
(under the 2-digit classification, on an annualized basis)

The above results hold true for the subdivided industries (by three-digit or four-digit SIC).[*14] In many industries, entry and exit, and start-ups and shutdowns, occur simultaneously. Industries under the three-digit classification, where gross entry and exit rates are high (about 10% or more on an annualized basis) include services related to the printing industry, industrial leather products, boilers & power machinery, household electrical machinery, computers & peripheral equipment, electrical applied equipment, etc. On the contrary, industries under the three-digit classification where gross entry and exit rates are low include liquor, pharmaceutical, cement/cement product, steel/rolled steel, etc. These facts indicate the possibility that entry regulations and high capital intensity operate as barriers to entry and exit.

By the four-digit classification, "gross entry rate + gross exit rate" are more than twice as large as net variability of business establishments in more than 90% of all industries, and more than five times in 60-70% of all industries, and more than ten times in 30-40% of all industries (see Table 5).

[Table 5] Distribution of [Gross entry + Gross exit]／[Net change]
(under the 4-digit classification)

By industry, gross entry is composed of 1) entry by start-up and 2) entry by business conversion from other industry, and gross exit is composed of 1) shutdown and 2) exit by business conversion to other industry. When ratios of start-ups and entry by business conversion to gross entry are compared under the two-digit classification, it is found that the ratio of start-ups to gross entry is larger than the ratio of entry by business conversion to gross entry in all industries except the arms manufacturing industry with less samples, although the degree of difference between such ratios differs from industry to industry (see Table 4 as mentioned earlier). Under the two-digit classification, the ratio of start-ups to gross entry for all industries is 72.1% (1988-1990) and 72.9% (1990-1993). Similarly, the ratio of shutdowns to gross exit for all industries is 72.8% (1988-1990) and 79.2% (1990-1993).

However, it should be noted that the above ratios will be affected by the minuteness of industrial classification. If a similar calculation is made under the three-digit classification, the ratio of start-ups to gross entry and the ratio of shutdowns to gross exit will decline to 60-70%. If a similar calculation is made under the four-digit classification, the ratio of start-ups to gross entry and the ratio of shutdowns to gross exit will further decline. Conversely the ratio of entry by business conversion to gross entry and the ratio of exit by business conversion to gross exit will be larger. If the distributions of the ratio of start-ups to gross entry and the ratio of shutdowns to

gross exit are compared by industry under the four-digit classification, it is found that the ratio of start-ups to gross entry and the ratio of shutdowns to gross exit generally account for 50% or more in less than half of all industries (only the ratio of shutdowns to gross exit is somewhat higher in a period of 1990-1993), and the ratio of entry or exit by business conversion is higher under the minuter classification (see Tables 6 and 7). In industries for which classification is made in more detail, the frequency of business conversion is significantly higher. This may be because the number of cases of business conversion to a technologically-similar industry (transfer between two industries under the four-digit classification within the same two-digit or three-digit classification) is larger than the number of cases of business conversion to a technologically-different industry (transfer between two different industries under the two-digit classification).

[Table 6] Distribution of ratios of entry by start-up to gross entry
(under the 4-digit classification)

[Table 7] Distribution of ratios of exit by shutdown to gross exit
(under the 4-digit classification)

When gross entry rates and gross exit rates under the four-digit classification are plotted, it is found that industries with high gross entry rates have high gross exit rates (see Figure 2). Correlation coefficients between gross entry rates and gross exit rates were calculated at -0.5787 for the period 1988-1990 and -0.3943 for the period 1990-1993 (signs become negative because gross exit rates, shutdown rates, etc. have negative figures). High correlation between gross entry and gross exit as mentioned above was also observed in preceding studies made in Western countries.

When the above results were examined from the perspective of business conversion and start-up/shutdown, it was found that the correlation coefficient between start-up rates and shutdown rates is low (-0.2223 for the period 1988-1990; -0.0963 for the period 1990-1993) and the correlation coefficient between entry by business conversion and exit by business conversion is comparatively high (-0.6737 for the period 1988-1990; -0.6281 for the period 1990-1993). On the other hand, the correlation coefficient between start-up rates and entry by business conversion rates (entry of different types) and the correlation coefficient between shutdown rates and exit by business conversion rates (exit of different types) are low (0.2680 and -0.1356 respectively for the period 1988-1990; 0.1775 and 0.0407 respectively for the period 1990-1993).

The above results suggest that correlation between gross entry and gross exit mainly reflects the relationship between entry by business conversion and exit by business conversion, and that start-ups/shutdowns are different in character from entry by business conversion/exit by business conversion.

[Figure 2] Relationship between gross entry rates and gross exit rates (on an annualized basis)

To verify the persistency of variability through two periods, correlation coefficients under the four-digit classification between the two periods of 1988-1990 and 1990-1993 were computed. As a result, extremely interesting results were obtained (see Table 8). Correlation coefficients between two periods are 0.5800 for gross entry rates, 0.6638 for gross exit rates, 0.4362 for start-up rates, 0.5514 for shutdown rates, 0.5567 for entry by business conversion rates, 0.7749 for exit by business conversion rates and 0.03935 for net entry rates. Thus, persistency can be generally observed for gross entry of business establishments by industry, but little persistency can be observed for net variability of business establishments by industry. Although an industry which has large gross entry or exit rate for a certain period tends to have large gross entry or exit rate for the following period, it doesn't always follow that the number of business establishments of an industry which increased (decreased) in net terms for a certain period will increase (decrease) for the following period.

[Table 8] Correlation coefficients between change rate in the period 1988-1990 and the period 1990-1993 (under the 4-digit classification)

The effects of government regulations on entry/exit were analyzed for an industry which is subject to unique entry regulations ("regulated industry"), and the results were compared with the case of "nonregulated industry". Cross-industry regulations (environmental regulations, regulations under the Anti-Monopoly Law, etc.) were excluded in this analysis. Since entry/exit is the objective of the analysis, price regulations or quality regulations were also excluded. Business regulations include various types (public enterprise, permission, registration, notification, etc.), and regulations under the same title have different regulating powers. The classification of regulated industries under various laws doesn't always conform to the standard industrial classification. Since the strict separation of "regulated industry" and "nonregulated industry" under the four-digit classification is difficult. Therefore, if at least part of an industry under the four-digit classification is subject to business regulations, the industry was, in principle, treated as a regulated industry. In the case of manufacturing industries, only a few industries are subject to entry regulations and the number of regulated industries under the four-digit classification is 46 and the number of nonregulated industries is 515.

For average figures, the gross entry rate/gross exit rate and the start-up rate/shutdown rate of regulated industries is lower than those of nonregulated industries, which indicates the possibility that regulations restrain entry and exit (see Table 9). This holds true for both periods of 1988-1990 and 1990-1993. By average establishment size (the number of employees per

establishment; shipment amount per establishment), there is a possibility that effects of establishment size are reflected because business establishments of regulated industries are comparatively larger in size. Since regulated industries have comparatively high capital intensity on average, there is a possibility that inflexibility of capital is also reflected. Strictly speaking, therefore, it is necessary to verify whether or not entry/exit restraining effects of regulations can be observed after the above factors are controlled.

[Table 9] Comparison of regulated and nonregulated industries

Although a comprehensive analysis is outside the reach of this paper, we conducted a simple cross-industry (under the four-digit classification) regression analysis (OLS) by controlling changes in shipment amounts of various industries (GSL), the average size of establishment (the number of employees per establishment (SCALE)), capital intensity (tangible fixed assets per employee (KL). As a result, it was found that business regulations (dummy variable for regulations) tend to decelerate gross entry rate, etc. to a significant level in some regression equations (see Table 10). In addition, it was confirmed that growth of shipment amount increases gross entry and decreases gross exit, and (average) size of establishment decreases gross entry/exit, and high capital intensity doesn't restrain entry/exit.

[Table 10] Estimation results of gross entry rates, etc. including regulations (1990-1993)

3) Others (by establishment size, by prefecture)

By establishment size, business establishments of smaller size tended to have high start-up and shutdown rates as expected (see Table 11). Such figures were reaggregated using the size classification for the number of employees in the initial year, unlike reaggregation for all industries and reaggregation by industry and by prefecture (therefore, a denominator for rate calculation is the number of employees in the initial year).

[Table 11] Start-up and shutdown rates by establishment size in the initial year
(on an annualized basis)

By prefecture, start-up and shutdown rates (equivalent to gross entry and exit rates respectively, if data of all manufacturing industries are used) vary significantly. No such apparent relationship can be observed that a prefecture with high (low) start-up rate has high (low) shutdown rate (see Table 12). For all prefectures, the correlation coefficient between start-up and shutdown rates was -0.2195 for the period 1988-1990 and 0.1667 for the period 1990-1993, and these figures are not so large.

To verify "persistency" of changes in the number of business establishments through the two periods of 1988-1990 and 1990-1993, correlation coefficients between the two periods were computed, using the prefecture-level data. As a result, correlation coefficients between the two periods are 0.3693 for start-up rate (gross entry rates), 0.7931 for shutdown rate (gross exit rate) and 0.4276 for net entry rate, and prefectures with high shutdown rates tend to maintain such high shutdown rates (see Table 13).

[Table 12] Start-up/shutdown rates and entry/exit rates
(by prefecture, on an annualized basis)

[Table 13] Correlation coefficients between change rates in two periods of 1988-1990 and 1990-1993 (by prefecture)

(2) All industries ("Establishment Directory Maintenance Survey")

The trend of the number of business establishments and figures of start-ups/shutdowns for all establishments including those in non-manufacturing industries for a period of 1991-1994 are available in the published data prepared by the Statistics Bureau, Management and Coordination Agency [1995]. The survey has a great advantage in that all industries, including non-manufacturing industries and all business establishments including those with 1-3 employees, are covered. Data of business conversion from other industries (change in industrial classification) for existing establishments are also available.[*15] It is easy to grasp the number of establishments which were transferred to other industry (exit by business conversion) in each industry by a simple computation. Furthermore, it is possible to compute "gross entry" by totalizing the number of start-ups and the number of entry by business conversion, and "gross exit" by totalizing the number of shutdowns and the number of exit by business conversion. Since, however, the industrial classification in the survey is based on the standard three-digit industrial classification, it is rougher than the classification for "Census of Manafacturers" (under the four-digit classification). As the number of items to be surveyed is small, no data are available for capital intensity, sales, value added, etc.

Based on the results of the survey and some analyses using such results, the trend for start-ups/shutdowns, gross entry/exit, etc. of establishment level in Japan for a period of 1991-1994 is examined and compared with the trend in manufacturing industries in the following part.

1) All industries

As in the case of analytical results for manufacturing industries based on "Census of Manufacturers", gross change in the number of establishments due to start-ups/shutdowns is far greater than net variability rate in the number of establishments for all industries. For all

industries, the start-up rate is 4.14% and the shutdown rate is -4.20%, while the net change rate in the number of establishments for all industries (on an annual basis) is -0.06%.

[Table 14] Gross entry rate, gross exit rate, start-up rate, shutdown rate and net change rate by industry (under the 1-digit classification; on an annualized basis)

When average sizes of all establishments, started-up establishments, shut-down establishments and establishments of entry by business conversion for all industries were compared, it was found that the size of shut-down establishments is small and the size of establishments of entry by business conversion is larger than the size of started-up establishments. Unexpectedly, the size of started-up establishments was not so different from the average size of all establishments, unlike the analytical results of manufacturing industries as mentioned earlier.

When observations were made for each of single establishments and multiple establishments ("main site" and "branch"), it was found that start-up and shutdown rates of multiple establishments (especially branch) are higher than those of single establishments. This indicates that the restructuring of establishments within a company with multiple establishments is more easily carried out than start-upts/shutdowns of single establishments (one establishment for one company). These results are different from the results for manufacturing industries based on the "Census of Manufacturers" (shutdown rates of single plants are high).

2) By industry

By industry (under the one-digit classification), gross change in the number of establishments is basically larger than net change in the number of establishments (see Table 14). When industries were compared, start-up rates are low in mining and manufacturing industries (shutdown rates in these industries are almost the same as those in other industries), and as a result, the rate of net decrease in the number of establishments is high.

When figures were computed by dividing [the number of start-ups + the number of shutdowns] by the absolute value of net change in the number of establishments (such figures mean how many times start-ups/shutdowns are as large as the required minimum change in number) using the data of the three-digit industrial classification, this figure was more than twice as large as the required minimum change in number in 92.3% of all industries, more than five times in 59.7% of all industries, and more than ten times in 35.2% of all industries. As in the case of manufacturing industries, it was found that if the number of establishments changes only marginally in net terms, many start-ups and shutdowns occur simultaneously.

Contribution of business conversion by existing establishments to net variability in the number of establishments of each industry is extremely small, and is only a change (increase or decrease) of 0.20% or less per year, for each industry under the one-digit classification. Most of gross entry by establishments is due to start-ups and most of gross exit is due to shutdowns (see Table 15). Ratios of entry by business conversion and exit by business conversion by existing

establishments are extremely small. Most changes in the number of establishments of each industry are due to start-ups and shutdowns.

[Table 15] Contributions of start-ups/shutdowns to gross entry/gross exit
(under the 1-digit classification)

Even in the case of three-digit classification, the weight of start-ups to gross entry, the weight of shutdowns to gross exit, or the weight of [the number of start-ups + the number of shutdowns] to [gross entry + gross exit] is more than 80-90% in most industries, and the weight of business conversion by existing establishments to change in the number of establishments is extremely small. In the case of gross entry, the ratio of entry by start-ups is 80% or more in 97.9% of all industries, and 90% or more in 86.7% of all industries, and 95% or more in 53.1% of all industries (in the case of gross exit, the ratio of exit by shutdowns is 80% or more in 96.3% of all industries, and 90% or more in 85.8% of all industries, and 95% or more in 56.2% of all industries). When figures were computed by dividing the total of gross entry + gross exit by the absolute value of net change in the number of establishments (such figures mean how many times start-ups/shutdowns are as large as the required minimum change in number) using the data of the three-digit industrial classification, this figure was more than twice as large as the required minimum change in number in 93.9% of all industries and 94.8% of manufacturing industries as in the case of start-ups and shutdowns, and thus gross changes are larger than net changes.

Using the cross-section data under the three-digit industrial classification, correlation coefficients between various variables concerning various changes in the number of establishments were computed. As a result, it was found that the correlation coefficient between start-up rate (OPEN) and net variability in the number of establishments (net entry rate) (NENTRY) and correlation coefficient between gross entry rate (GENTRY) and net variability in the number of establishments (net entry rate) (NENTRY) were 0.67 and 0.68 respectively (0.57 and 0.73 respectively, if limited to manufacturing industries). The correlation coefficient between shutdown rates (CLOSE) and net variability in the number of establishments (net entry rate) (NENTRY) was 0.41 (0.57, if limited to manufacturing industries). The correlation coefficient between start-up rate (OPEN) and shutdown rate (CLOSE) was -0.39 and the correlation coefficient between gross entry rate (GENTRY) and gross exit rate (GEXIT) was -0.38.[*16]

As in the case of manufacturing industries, samples under the three-digit classification were grouped into entry-regulated and non-entry-regulated industries, and a comparison was made. Since the number of regulated industries, such as financial/insurance industries and transportation industry, is comparatively large in non-manufacturing industries, the number of regulated industries is 188 and the number of nonregulated industries is 246. As long as these two groups were compared, business regulations do not apparently restrain start-ups/shudowns and entry/exit.[*17]

[Table 16] Comparison of regulated and nonregulated industries (all industries, 1991-1994)

5. Job creation and job destruction

(1) Manufacturing industries ("Census of Manufacturers")

1) Manufacturing industry as a whole

Gross job creation rate and gross job destruction rate are about 4-6% on an annualized basis (see Table 17). As a result, the gross job reallocation rate is considerably higher at around 10% on an annualized basis, and far larger than the net job change rate (+1.18% for a period of 1988-1990; -0.88% for a period of 1990-1993) (about ten times as large as net job change rate for all manufacturing industries).

About half of gross job creation and gross job destruction were accounted for by changes due to "start-ups" and "shutdowns" respectively, and the remaining half is due to employment change of existing establishments.[*18]

By sex, both gross job creation (GJC) rate and gross job destruction (GJD) rates for females are higher than those of males (about 30% higher for GJC and about 50% higher for GJD) (see Table 18). This indicates that female employment is unstable compared with male employment. The net employment change rate for females is lower than that of males in a phase of increasing employment (1988-1990) and higher than that for males in a phase of decreasing employment (1990-1993).

[Table 17] Gross job creation rate, gross job destruction rate and net employment change rate (all manufacturing industries in Japan; on an annualized basis)

[Table 18] Comparison of gross job creation rate, etc. by sex (on an annualized basis)

When annualized figures for a period of 1988-1990 (expansion period) and a period of 1990-1993 (recessionary period) were compared, it was found that gross job destruction rates of two periods were similar (-5.30% and -5.59%) but gross job creation rate in a phase of increasing employment is larger than the corresponding figure in the other phase (6.16% and 4.23%). As long as these results are taken into consideration, it seems that the effects of economic recession on employment are reflected in a decline in gross job creation rate (gross job creation is more responsive to economic conditions). These results are different from analytical results for the U.S. manufacturing industries in Davis et al.[1996] (the responsiveness of job destruction to economic conditions is stronger than that of job creation to economic conditions).[*19]

2) By industry

By industry (under the two-digit classification), industries with high gross employment variability rates include precision machinery, metal machinery, garment and other textile products, furniture and furnishings, etc. On the contrary, industries with low gross employment variability rates include petroleum product/coal product, chemical, iron and steel, etc. (see Table 19). It seems that industries with high capital intensity has small employment variability. By industry, the fact remains unchanged that gross job creation rate and gross job destruction rate are far larger than net employment change rate.

When the distribution of ratios (absolute values) of gross job reallocation rates to net employment change rates under the four-digit classification was examined, it was found that the value of the gross job reallocation rate is more than twice as large as the net employment change rate in about 90% of all industries, more than five times in 50-60% of all industries, and more than ten times in 30% or more of all industries (see Table 20).

[Table 19] Gross job creation rate and gross job destruction rate, etc.
(under the 2-digit classification; on an annualized basis)

[Table 20] Distribution of gross job reallocation rates / net employment variability rates
(under the 4-digit classification)

On the average, gross job creation is composed of: gross increase by existing establishments (remaining the same industry) at about 40%; gross increase by started-up establishments at about 40%; and gross increase by business conversion from other industries at about 20%. On the average, gross job destruction is composed of: gross decrease by existing establishments at about 40%; gross decrease by shut-down establishments at about 40%; and gross decrease by business conversion to other industries at about 20%. However, as in the case of entry/exit, these ratios are subject to the minuteness or roughness of the industrial classification. By the four-digit classification, the contribution of an increase by entry to gross job creation and the contribution of a decrease by exit to gross job destruction are larger, while the contributions of start-ups/shutdowns to gross job creation/destruction are smaller.

By industry (under the four-digit SIC), the magnitude of employment variability due to gross entry/exit to net employment variability and the magnitude of employment variability due to start-ups/shutdowns to net employment variability are smaller than the magnitude of gross entry/exit and start-ups/shutdowns to net change in the number of business establishments as mentioned in the preceding section (see Tables 21 and 22). This may be because the importance of job creation and job destruction for existing establishments is comparatively large.

[Table 21] Distribution of ratios of start-ups and entry by business conversion to gross job creation (under the 4-digit classification)

[Table 22] Distribution of ratios of shutdowns and exit by business conversion to gross job destruction (under the 4-digit classification)

When gross job creation rates and gross job destruction rates are plotted under the four-digit industrial classification, some correlation between gross job creation rates and gross job destruction rates was found (see Figure 3). But the correlation coefficient is not so large: -0.2043 for the period 1988-1990 and -0.0783 for the period 1990-1993. These results are different from those at an establishment level concerning correlation between start-up rates and shutdown rates.

On the other hand, there was no correlation between net employment change rates (absolute values) and gross job reallocation rates (gross job creation rates + gross job destruction rates) (correlation coefficient was -0.1758 for the period 1988-1990 and 0.0996 for the period 1990-1993). Therefore, we cannot say that industries with the high rate of entry/exit turnover create employment in net terms.

As a matter of course, there was a positive correlation between gross job creation rates and net employment change rates (correlation coefficient was 0.5449 for the period 1988-1990 and 0.7174 for the period 1990-1993).

[Figure 3] Relationship between gross job creation rates and gross job destruction rates (on an annualized basis)

To verify "persistency" of employment variability under the four-digit industrial classification, correlation coefficients between two periods of 1988-1990 and 1990-1993 were computed (see Table 23). As a result, it was found that the correlation coefficient is 0.3233 for the gross job creation rate , 0.3472 for the gross job destruction rate, 0.7143 for the gross job reallocation rate and -0.1720 for the net employment change rate. As far as these results are concerned, only the gross job reallocation rate has apparent persistency and the net employment change rate has less persistency. Therefore, we can say tentatively, that in an industry where employment increases easily, employment decreases easily. Further, a sharp increase or decrease in the number of employees occurs due to economic cycles, but only a few industries continue to follow an expanding or declining trend.

[Table 23] Correlation coefficients between two periods of 1988-1990 and 1990-1993 (under the 4-digit classification)

As mentioned in the preceding section, the number of regulated industries under the four-digit classification is 46 and the number of nonregulated industries is 515. When employment variabilities of regulated industries and nonregulated industries were compared (see Table 24), large differences were not observed for gross job creation rates/gross job destruction rates and employment variability due to gross entry/gross exit in a period of 1988-1990 (employment variability due to start-ups/shutdowns of regulated industries is a little bit lower that that of nonregulated industries).

[Table 24] Comparison of regulated industries and nonregulated industries
(on an annualized basis)

For the period 1990-1993, gross job destruction rate, the employment reduction rate due to gross exit, and employment change due to start-ups/shutdowns for regulated industries tended to be small. In this connection, we can say that there is possibility that entry regulations affect employment variability, but such effects are not clear. We cannot make any definite judgement based only on the results mentioned above. An analysis in which other factors are controlled is required.

When a simple and tentative regression analysis (OLS) was made, in which the shipment amount variability, establishment size, etc. was controlled, it was found that a dummy variable for business regulations tends to decrease the gross job creation rate, the gross job destruction rate and the gross job reallocation rate significantly (see Table 25). However, since the effect of a dummy variable for business regulations are not significant for net employment change rate, however, we cannot say that business regulations affect employment variability in net terms.

Aside from business regulations, it was observed that the employment variability of industries subject to the employment adjustment subsidy tended to decrease significantly. To our surprise, the employment adjustment subsidy had no effect on gross job destruction.

[Table 25] Estimation results for employment change including business regulations
(1990-93)

3) Others (by size; by prefecture; single establishments)

By establishment size, business establishments with a smaller number of employees in the initial year tend to have higher gross job destruction rates (see Table 26). As in the case of business establishments, figures by size were reaggregated using the classification by employee size in the initial year.

When gross job destruction was broken into employment reduction due to shutdowns and

employment reduction by existing establishment, it was found that the smaller establishments tend to have larger job destruction due to shutdowns. There are no large gaps among job destruction rates of existing establishments of various sizes. The smaller establishments tend to have a little bit larger gross job creation rates.

[Table 26] Gross job creation rates, gross job destruction rates, etc. by establishment size in the initial year (on an annualized basis)

By prefecture (see Table 27), gross job creation rate and gross job destruction rate differ significantly. However, a relationship cannot be observed, that a prefecture with a high gross job creation rate has a high gross job destruction rate, or that a prefecture with a high gross job reallocation rate has a high net employment change rate. For all prefectures, the correlation coefficient between gross job creation rates and gross job destruction rates was -0.2639 for the period 1988-1990 and -0.1208 for the period 1990-1993, and the correlation coefficient between gross employment reallocation rates and net employment change rates was 0.1584 for the period 1988-1990 and 0.2334 for the period 1990-1993.

When the correlation coefficient between the two periods 1988-1990 and 1990-1993 was computed by prefecture (see Table 28), it was found that correlation coefficient was 0.7058 for gross job creation rate, 0.7157 for gross job destruction rate, 0.8012 for gross job reallocation rate and 0.5787 for net employment variability rate. Thus, persistency of employment variability was observed in both gross and net terms.

[Table 27] Gross job creation rate/gross job destruction rate by prefecture (on an annualized basis)

[Table 28] Correlation coefficient between change rates in two periods of 1988-90 and 1990-93 (by prefecture)

The analysis in this paper is based on the data of establishment level. What relationship is there between employment variabilities of establishment level and of company level? For example, the necessity of "moveability for labor force" has been repeatedly discussed lately with reference to long-term employment practices which are one of the characteristics of so-called "Japanese style economic system". Identification of gross job creation/gross job destruction at a company level would contribute to these discussions. In the case of figures of employment variability of establishment (plant) level, intra-company reallocation of employees (job transfer) among more than one plant of a company, is recorded as "gross job creation" and "gross job destruction". A large company with more than one business establishment has a large capability

for job reallocation among establishments. If employment adjustment of this type accounts for a large portion, the gross employment variability rate at an establishment level cannot be considered to be an approximation of a corresponding figure at a company level.

Since there are no appropriate census statistics on a company level at present, it is impossible to correctly grasp employment variability at a company level. In this paper, therefore, we have tried to identify employment variability at a company level by aggregating employment variabilities of single establishments only (one establishment for one company) as sub-samples (accounting for more than 80% of all samples). The reason is that an establishment is identical to a company in the case of single establishments, and so gross job creation rates and gross job destruction rates at an establishment level mean corresponding figures at a company level.[*20] If these figures are compared with those of all samples, we can verify how gross employment variability at a company level is overvalued by gross employment variability at an establishment level.

Analytical results are as follows (see Table 29). Both the gross job creation rate and gross job destruction rate of single establishments as sub-samples were a little larger than corresponding figures of all samples. However, the differences are not so large, and figures for single establishments are only larger by 10-15% than those of all samples of all manufacturing industries (gross job creation rate and gross job destruction rate of single establishments are only larger by 0.5-1.0% points than those of all samples).

On average, a single establishment has about 16 employees, which is smaller than the average number of employees of all samples (about 25 employees). As mentioned earlier, since there is a negative correlation between employment variability due to start-up/shutdown and establishment size, comparatively smaller single establishments as sub-samples are considered to have larger gross employment variability rates due to start-up/shutdown.

When gross job creation rates (those due to start-ups are not included) and gross job destruction rates (those due to shutdowns are not included) of "surviving establishments" were examined, figures of single establishments as sub-samples are somewhat smaller than those of all samples. Conversely speaking, the reason why single establishments had high gross employment variability rates was not because the employment variability of surviving establishments was high, but because employment variability due to start-ups/shutdowns was large.

The reason why gross employment variability of surviving single establishments as sub-samples is small (gross employment variability of establishment level for a company with more than one establishments is comparatively large) despite the fact that average size of such single establishments is small, may be because companies with more than one establishments can more flexibly reallocate employees among their establishments.

Since differences between figures of single establishments and of all establishments are not so large, if gross employment variability of establishment level is interpreted as an approximation of gross employment variability of company level, this interpretation would not lead to a serious error (if the data of company level are used for an analysis, results would not be significantly

different from those obtained using the data of establishment level).[*21] Therefore, we can say that an analysis of gross employment variability of establishment level will have a certain validity in the case of a study on changes in Japanese employment practices.

[Table 29] Employment change of single establishments as sub-samples
(on an annualized basis)

(2) All industries ("Establishment Directory Maintenance Survey")

As in the case of the number of business establishments, the data concerning the trend in the number of employees of all establishments including those of non-manufacturing industries and net variability in the number of employees due to start-ups/shutdowns for a period of 1991-1994 are available in Statistics Bureau, Management and Coordination Agency[1995].[*22] As mentioned earlier, the survey has an advantage in that all industries are covered and all establishments including those with 1-3 employees are also covered. Since aggregations by establishment with increasing employment and by establishment with decreasing employment are not made, it is impossible to compute "gross job creation rate", "gross job destruction rate", unlike the case of Davis et al.[1996]. By taking the above conditions into consideration, we conducted some analyses using the survey and analytical results were compared with those for manufacturing industries.

1) All industries

As in the case of the number of business establishments, there is a wide gap between net variability in the number of employees and an increase in the number of employees due to start-ups or a decrease in the number of employees due to shutdowns. For all industries, variability (on an annualized basis) of the number of employees for the period 1991-1994 was -0.41%, but the employment increasing rate, due to start-ups, was considerably large at 4.08% and the employment decreasing rate due to shutdowns, was considerably large at -3.59%.

Unlike the case of the number of establishments, however, the contribution of net variability in the number of employees of existing establishments is considerably large in the case of the number of employees. The variability rate (in net terms) of the number of employees of existing establishments was -1.20% a year for all industries (-1.73% a year only for manufacturing industries).[*23]

By establishment type, "branch" out of multiple establishments has somewhat large gross increase in the number of employees due to start-ups on an all industry basis (this doesn't always hold true for manufacturing industries). Concerning net variability in the number of employees of existing establishments, decreasing rates of single establishments were larger both for all industries and for manufacturing industries.

2) By industry

By industry (under the one-digit classification), the increase in employment due to start-ups and the decrease in employment due to shutdowns were larger than the net change rate (see Table 30). Gross employment variability for the tertiary industry including real estate, wholesale/retail/restaurants, service business, etc. is large, but gross employment variability of manufacturing industries is comparatively small.

[Table 30] Employment change rates by industry under the 2-digit industrial classification (on an annualized basis)

By the two-digit classification, the increase due to start-ups + decrease due to shutdowns (absolute value) is several to twenty times or more as large as the net change (absolute value) in the number of employees, although the multiple differs from industry to industry.[*24] By the three-digit classification, [increase due to start-ups + decrease due to shutdowns] (absolute value) is twice or more as large as net variability (absolute value) in the number of employees in 61.8% of all industries, and five times or more in 33.3% of all industries. Thus, job turnover which greatly exceeds the required minimum employment adjustment figure occurs due to start-ups and shutdowns.[*25]

Using the three-digit classification data, the correlation coefficient between the employment increase rate due to start-ups (OPENL) and net variability in the number of employees (NJC), and correlation coefficient between employment increase rate due to gross entry (GENTRYL) and net variability in the number of employees (NJC), were computed to be 0.35 and 0.36 respectively. These correlation coefficients are far smaller than those between gross and net figures of the number of business establishments. The correlation coefficient between employment increase rate due to start-ups (OPENL) and employment decrease rate due to shutdowns (CLOSEL) was -0.57, which is higher than the case of the number of establishments. For all industries, in an industry where employment increases easily, employment tends to decrease easily. There was a positive correlation (correlation coefficient: 0.73) between the rate of an increase in the number of establishments (NENTRY) and the rate of increase in employment (NJC).

To verify whether or not various business regulations affect employment variability, samples under the three-digit classification were broken into regulated and nonregulated industries, and a comparison was made, as in the case of the number of establishments (see Table 31). As mentioned earlier, business regulations affected employment variability to some degree only in manufacturing industries. In the case of all industries, however, it cannot be observed that business regulations significantly affected employment variability of establishment level.

[Table 31] Comparison of regulated and nonregulated industries (all industries, 1991-1994, on an annualized basis)

6 Conclusions

Using the micro data (1988-1993) of business establishments of manufacturing industries in Japan, a quantitative analysis was made in this paper for start-ups/shutdowns, entry/exit and job creation/job destruction. Based on publicized data, trends of all industries including non-manufacturing industries were examined, and the results of all industries and manufacturing industries were compared.

The gist of analytical results obtained in this paper is as follows. Firstly, concerning entry/exit and start-ups/shutdowns, the following results were obtained.

1) The gross entry rate/gross exit rate and start-up rate/shutdown rate are far larger than the net entry rate for manufacturing industries. These results hold true for the total of manufacturing industries and for every manufacturing industry. In many manufacturing industries, entry and exit (or start-ups and shutdowns) occur simultaneously. When manufacturing and non-manufacturing industries were compared, the start-up rate of manufacturing industries was smaller than that of non-manufacturing industries, but shutdown rates of manufacturing and non-manufacturing industries were almost the same.
2) A decrease in the number of establishments in a recessionary phase is due more to a decline in the start-up rate than due to an increase in shutdown rate.
3) On average, started-up and shut-down establishments are smaller in size, less diversified in products, and had lower productivity, than surviving establishments.
4) When single plants (one establishment for one company) and multiplants (two or more establishments for one company) were compared, it was found that their start-up rates were almost the same, but shutdown rate of single plants were larger than that of multiplants. For all industries including non-manufacturing industries, however, start-up and shutdown rates of multiplants (especially branches) were larger than those of single plants.
5) If gross entry (gross exit) is broken into [1] entry by start-up (exit by shutdown) and [2] entry by business conversion from other industries (exit by business conversion to other industries) for each industry, the ratio of start-up under the rougher industrial classification is higher (70-80% under the two-digit industrial classification), but the ratio of entry by business conversion becomes considerably higher under the more minute industrial classification (about 50% under the four-digit industrial classification). We can understand that these results reflect the fact that business conversion frequently occurs between industries with similar technology.
6) By industry, in an industry where the gross entry rate is high, the gross exit rate is also high. Although the correlation coefficient between the start-up rate and the shutdown rate is not so large, the correlation coefficient between entry by business conversion rate and exit by business conversion rate is high. The correlation coefficient between the start-up rate and

entry by business conversion rate, and correlation coefficient between shutdown rate and exit by business conversion rate, were low. By prefecture, there is no clear relationship that a prefecture with high gross entry rate (start-up rate) has high gross exit rate (shutdown rate).

7) Although gross variability of the number of establishments, such as gross entry/gross exit, has persistency over time for each industry (if gross entry rate of an industry is high in a certain period, the rate tends to be high in the following period), net change rate has no persistency. By prefecture, persistency can be observed not only for gross entry rate/gross exit rate but also for the net entry rate.
8) By establishment size, smaller establishments tend to have high start-up and shutdown rates. These results hold true not only for manufacturing industries but also for all industries, including non-manufacturing industries.
9) Although we cannot say definitely since factors, such as establishment size and capital intensity, are likely to have some effects, we can observe a tendency that the gross entry rate/gross exit rate and start-up rate/shutdown rate for regulated industries in the manufacturing sector are smaller than corresponding figures for nonregulated industries. If non-manufacturing industries are included, however, there is no clear evidence that regulations have an effect to restrain start-ups/shutdowns and entry/exit.

Secondly, concerning employment variability, the following matters were identified.

1) The gross job creation rate and the gross job destruction rate are far larger than the net employment change rate.
2) For all manufacturing industries, gross job creation is composed of start-ups at about 50% and employment increase of surviving establishments at about 50%, and gross job destruction is composed of shutdowns at about 50% and employment decrease of surviving establishments at about 50%. By industry, since employment variability due to entry by business conversion/exit by business conversion has a certain magnitude, ratios of business conversion will be larger, if industries are classified in more detail.
3) The gross job creation rate and the gross job destruction rate for females were larger than those for males. This indicates that female employment is relatively unstable.
4) As far as the target period in this analysis is concerned, the effects of the economic cycle on employment variability were stronger for gross job creation and weaker for gross job destruction. These results are different from those of preceding studies made in the U.S.
5) By industry, the correlation between gross job creation rate and the gross job destruction rate was not large. By prefecture, the same result was obtained.
6) There is no such relationship that in an industry where gross job reallocation rate is high, net employment change rate is high. We cannot say that industries with a high "metabolism" create employment in net terms.
7) By industry, persistency over time of the gross job reallocation rate is strong, but the net employment change rate did not have persistency. In other words, in an industry where employment increases easily, employment tends to decrease easily, and the number of

employees greatly increases or decreases due to the economic cycle. By prefecture, employment variability has persistency in both gross and net terms.

8) By employment size, the smaller establishments tend to have high gross job destruction rates.

9) For manufacturing industries, there is a possibility that entry regulations affect job creation or job destruction. However, regulations have no effects for all industries including non-manufacturing industries.

10) According to an analysis using only single establishments as sub-samples, gross employment variability rate of surviving establishments tended to be small, which indicates that job reallocation among establishments was made more frequently by companies with more than one establishment. However, we can safely say that the gross job creation rate and the gross job destruction rate at an establishment level may be interpreted as approximations of the gross employment variability rates at a company level.

The policy implications obtained from this analysis are that full attention should be paid, not only to existing establishments, but also to started-up establishments, in order to facilitate the creation of new industries and employment and the reform of the industrial structure and the employment structure. Therefore, it is important to improve financial markets, the labor market and corporate laws to facilitate start-ups. Since it seems that surviving establishments play an important role in employment changes in Japan, however, policies to facilitate business conversion for surviving establishments (business conversion assistance policy) may be effective.

[Notes]

*1 This paper represents the results of a research which was implemented as one of the research projects of the Research Institute of International Trade and Industry, the Ministry of International Trade and Industry. Before using the individual slip data of "Census of Manufacturers" for an analysis in this paper, we obtained approval from Statistics Bureau, Management and Coordination Agency for using the data for the purpose other than the designated statistics. We received various forms of cooperation and advice concerning the use of "Census of Manufacturers" from Industrial Statistics Division, Research and Statistics Department, the Ministry of International Trade and Industry.

*2 In this paper, the results of reaggregation of micro data are mainly mentioned. A regression analysis using the micro data was made in another paper (Tachibanaki and Morikawa[1998]).

*3 See Schmalensee[1989].

*4 For the analytical survey of entry/exit, see Geroski[1991,1995] and Caves[1998], and for the survey of corporate growth, see Sutton[1997].

*5 Theoretical models of this type include Jovanovic[1982], Frank[1988], Klepper and Graddy [1990], Lambson[1991], Hopenhayn[1992], Jovanovic and MacDonald[1994], Cabral[1995], Klepper[1996], Das and Das[1996], etc.

*6 Most studies target manufacturing industries (exceptions are Troske[1996] and Audretsch et al.[1997] which targeted non-manufacturing industries and made a comparison with manufacturing industries. For job creation to be mentioned later, Lane et al.[1996] and Foote [1998] conducted analyses where non-manufacturing industries are included).

*7 Small and Medium Enterprise Agency[1997] reorganized and processed "Census of Manufacturers" and "Census of Establishments" to estimate start-up/shutdown rates by size, shutdown rates by start-up year, surviving rates of establishment by age, etc.

*8 As expansionary studies based on these studies, relationship between entry/exit/growth patterns and technical characteristics/industrial characteristics including market structure (Acs and Audretsch[1989], Audretsch[1991,1995], Doms et al.[1995]) and relationship between entry/exit and industrial productivity (Baily et al.[1992], Campbell[1997]) were analyzed using the micro data.

*9 If Z_{est} is used as a denominator when calculating variability rates, job creation and destruction

rates are distributed between -2 to +2 and they form symmetry (if $Z_{es,t-1}$ is used as a denominator, figures will be distributed between -1 and ∞).

*10 For example, the data used in Davis et al.[1996] are based on the data of establishments with five employees or more. It should be noted that in our study "start-ups" and "shutdowns" include shifts between establishments with 1-3 employees and establishments with 4 employees or more (figures of start-ups and shutdowns are somewhat overvalued). There is a possibility that figures of the gross job creation and the gross job destruction are also overvalued to some extent.

*11 Business conversion as mentioned here means a change of industrial classification for each establishment in the "Census of Manufacturers". Industrial classification in the survey is, in principle, made based on the item whose shipment amount is the largest. Therefore, business conversion doesn't always mean that old business was abandoned, or that an establishment has never conducted newly-classified business before. It should be noted that entry or exit by business conversion has implications which are different from those of "entry" or "exit".

*12 In the case of all industries on a national basis, gross entry or gross exit means start-up or shutdown, because there exists no entry or exit by "business conversion" between industries. Strictly speaking, there is a possibility that business conversion occurs between manufacturing and non-manufacturing industries (for example, an establishment itself survives, but the establishment abolishes manufacturing business and specializes in distribution business). Since this kind of business conversion cannot be observed in the "Census of Manufacturers" which targets manufacturing industries, however, we cannot deny the possibility that start-ups and shutdowns may be overvalued.

*13 However, there is a possibility that the results are affected by the difference in establishment size (single plants are smaller in size than multiplants).

*14 For the data under the three-digit or the four-digit industry classification, see Appendix of Morikawa and Tachibanaki[1997].

*15 Unlike the case of "Census of Manufacturers", industrial classification of individual establishments in these statistics is based on self-certification by each establishment.

*16 In the case of sub-samples of manufacturing industries, the correlation coefficient between start-up rate and shutdown rate is -0.17, and the correlation coefficient between the gross entry rate and the gross exit rate is -0.19, and these two figures are smaller than corresponding figures for all industries.

*17 Since the data of variability of shipment amount, capital intensity, etc. under the three-digit

industrial classification were not available, we could not conduct a regression analysis where many factors are controlled as in the case of manufacturing industries.

*18 There should be a bias, because transfer between establishments of this size and those of 1-3 employees may be counted as "start-ups" or "shutdowns". Since the weight of small establishments in employment is small, however, the effects of such bias are considered to be small as compared with the case of start-ups and shutdowns.

*19 Since only two periods are compared and two periods are different in length (two years vs. three years), however, it should be noted that annualized figures of the gross job creation rate and the gross job destruction rate for the period 1990-1993 are undervalued, if 1) a considerable number of establishments are started up and shut down within a short period of time and 2) there are establishments which increased employment at first and then decreased employment in the target period, or vice versa, are taken into consideration.

*20 However, single establishments are on average smaller in size than multiple establishments. In this analysis, such single establishments are totalized that remained to be categorized as single establishments from the intial year to the last year of the period. However, there are cases that single plants were changed to multiplants, or conversely, multi-establishments are changed to single establishments (when some plants were closed). But such cases are very small in number (about 0.8% of all establishments, or about 1% if single establishments are used as a denominator).

*21 By industry under the two-digit classification, said results remain unchanged.

*22 See Higuchi[1997] which summarized figures of job creation and job destruction, including the results of the survey.

*23 If a figure of -1.73% for manufacturing industries is compared with a corresponding figure calculated based on "Census of Manufacturers" (-1.99% for the period 1990-1993), no large difference can be observed. This indicates that the effects of unavailability of samples of establishments with 1-3 employees in the "Census of Manufacturers" are small for employment.

*24 Although this concept is similar to the concept of the "excess job reallocation" in Davis et al.[1996], our figures are smaller than their figures because net variability in the number of existing establishments is not taken into consideration.

*25 If limited to manufacturing industries, increase due to start-ups + decrease due to shutdowns is more than twice as large as net variability in the number of employees in 48.4% of all industries, and more than five times in 21.9% of all industries. Thus, the magnitude of changes

in the number of employees in manufacturing industries is smaller than that in non-manufacturing industries.

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[Tables and Figures]

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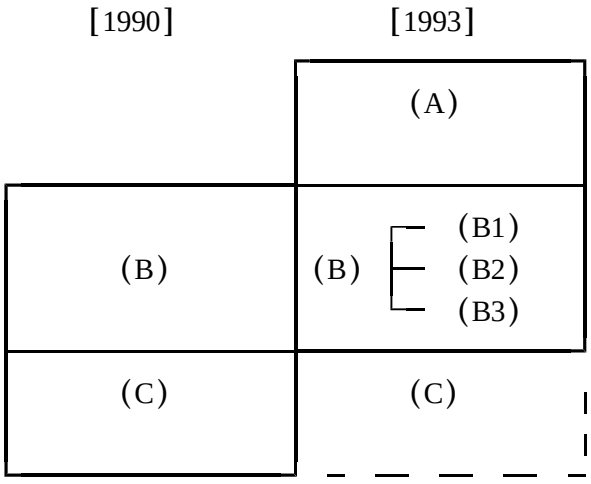
〔Figure 1〕 Conceptual Figure (1990-1993)



A: New Establishments
A1: Start-up Establishments
A2: Establishment Converted from Other Industries
B: Surviving Establishments
B1: Employment Increased
B2: Employment Remained Unchanged
B3: Employment Decreased
C: Disappeared Establishments
C1: Shut-down Establishments
C2: Establishments Converted to Other Industries

〔Table 1〕 Start-ups, Shutdowns and Net Change in the Number of Manufacturing Establishments (All Manufacturing Industries in Japan)

	The Number of Establishments	The Number of Start-up Establishments (Annualized Basis)	The Number of Shut-down Establishments (Annualized Basis)	The Number of Net Change (Annualized Basis)
1988-90	436786	47809 (5.33%)	-49386 (-5.82%)	-1577 (-0.18%)
1990-93	424834	52002 (3.92%)	-74329 (-6.21%)	-22327 (-1.78%)

(Note) The number of establishments means average of figures in the initial year and in the final year (the same shall apply hereinafter, unless otherwise mentioned).

〔Table 2〕 Comparison of Characteristics of Surviving, Start-up, and Shut-down Establishments

	Start-up	Surviving	Shut-down
Number of employees per establishment (persons)	13.2 14.6	27.0 28.3	10.6 11.2
Shipment amount per establishment (in million yen)	206.4 265.2	746.7 839.4	166.3 183.4
Shipment amount per employee (in million yen)	15.7 18.2	27.7 29.7	15.6 16.3
Gross value added per employee (in million yen)	7.23 8.11	10.95 11.86	7.06 7.00
Salary paid in cash per employee (in million yen)	2.72 3.22	3.69 4.08	2.82 2.92
Gross value added ratio (%)	46.1 44.5	39.6 40.0	45.2 42.8
Product specialization ratio (ratio of a product with the largest shipment amount)	87.2 87.8	74.5 74.5	86.1 86.4

(Note) Upper and lower figures in each item are those for 1988-90 and 1990-93 respectively.
The number of surviving establishments is the average value of numbers in the initial year and the last year of each period.

〔Table 3〕 Comparison of Single Plant and Multiplant (on an annualized basis)

	Plant Characteristics	Start-up Rate	Shut-down Rate	Net Change Rate
1988-90	Single Plant Multiplant	5.33% 5.33%	-6.11% -4.15%	-0.80% 3.36%
1990-93	Single Plant Multiplant	3.88% 4.18%	-6.48% -4.80%	-2.26% 0.71%

〔Table 4〕 Gross Entry and Exit Rates by Industry (2-digit classification, on an annualized basis)
① 1988-90

	Gross Entry Rate	Start-up Rate	Entry by Conversion	Gross Exit Rate	Shutdown Rate	Exit by Conversion	Net Change Rate
Food	4.15%	4.05%	0.10%	-5.71%	-5.59%	-0.11%	-1.32%
Beverages, food, and tobacco	4.90%	4.25%	0.68%	-6.09%	-5.59%	-0.47%	-0.88%
Textiles	5.78%	4.50%	1.34%	-9.05%	-7.53%	-1.41%	-2.73%
Garments,textile product	7.18%	5.79%	1.47%	-8.13%	-6.55%	-1.48%	-0.36%
Lumber and wood product	4.73%	3.65%	1.11%	-7.14%	-6.01%	-1.06%	-2.07%
Furniture and furnishing	6.69%	5.36%	1.40%	-8.50%	-6.55%	-1.82%	-1.23%
Pulp, paper	5.59%	4.14%	1.50%	-7.15%	-5.54%	-1.52%	-1.16%
Publishing	6.28%	5.74%	0.57%	-7.72%	-7.06%	-0.61%	-0.95%
Chemical	4.58%	3.56%	1.06%	-4.91%	-3.79%	-1.08%	-0.10%
Petroleum and coal products	4.98%	4.35%	0.65%	-4.60%	-3.63%	-0.94%	0.61%
Plastic products	8.53%	6.10%	2.57%	-7.87%	-5.30%	-2.43%	1.32%
Rubber products	8.39%	6.79%	1.70%	-8.63%	-6.43%	-2.06%	0.48%
Leather, leather products and fur	7.81%	6.21%	1.69%	-8.59%	-6.98%	-1.49%	-0.11%
Ceramics and earthware	4.36%	3.91%	0.47%	-4.80%	-4.35%	-0.42%	-0.22%
Iron and steel	8.74%	5.03%	3.89%	-7.91%	-3.97%	-3.77%	1.52%
Non-ferrous metal	8.71%	4.72%	4.17%	-9.04%	-4.23%	-4.60%	0.46%
Metal products	9.04%	6.11%	3.10%	-9.28%	-5.74%	-3.33%	0.60%
General machinary	9.71%	6.27%	3.65%	-8.60%	-5.12%	-3.29%	1.94%
Electrical	9.01%	6.24%	2.94%	-8.72%	-5.09%	-3.44%	1.07%
Transportation	10.93%	5.72%	5.49%	-10.41%	-4.57%	-5.56%	1.64%
Precision	9.47%	5.19%	4.50%	-11.71%	-5.93%	-5.41%	-1.11%
Arms	11.80%	1.77%	10.19%	-9.37%	-1.80%	-7.42%	3.51%
Others	8.42%	5.66%	2.91%	-10.77%	-7.59%	-2.93%	-1.43%
Total	7.32%	5.33%	2.09%	-8.09%	-5.82%	-2.14%	-0.18%

② 1990-93

	Gross Entry Rate	Start-up Rate	Entry by Conversion	Gross Exit Rate	Shutdown Rate	Exit by Conversion	Net Change Rate
Food	3.72%	3.62%	0.11%	-5.03%	-4.95%	-0.07%	-0.93%
Beverages, food, and tobacco	4.42%	3.97%	0.48%	-5.92%	-5.28%	-0.58%	-0.97%
Textiles	4.11%	3.19%	0.98%	-9.94%	-8.70%	-1.03%	-4.94%
Garments,textile product	5.19%	4.31%	0.95%	-8.64%	-7.43%	-1.04%	-2.51%
Lumber and wood product	3.59%	2.79%	0.84%	-7.23%	-6.34%	-0.79%	-3.10%
Furniture and furnishing	5.17%	4.15%	1.10%	-8.05%	-6.58%	-1.28%	-2.02%
Pulp, paper	4.34%	3.28%	1.13%	-5.88%	-4.59%	-1.17%	-1.02%
Publishing	4.71%	4.29%	0.45%	-6.51%	-6.01%	-0.44%	-1.18%
Chemical	3.86%	3.08%	0.83%	-4.26%	-3.38%	-0.82%	-0.07%
Petroleum and coal products	4.91%	4.24%	0.72%	-3.75%	-3.29%	-0.43%	1.52%
Plastic products	6.11%	4.30%	1.96%	-7.38%	-5.62%	-1.56%	-0.36%
Rubber products	5.61%	4.33%	1.40%	-8.61%	-6.66%	-1.69%	-1.99%
Leather, leather products and fur	5.72%	4.38%	1.46%	-9.39%	-8.17%	-1.02%	-2.55%
Ceramics and earthware	3.50%	3.12%	0.40%	-4.81%	-4.42%	-0.35%	-0.97%
Iron and steel	5.68%	3.47%	2.37%	-8.15%	-4.96%	-2.86%	-1.51%
Non-ferrous metal	5.88%	3.08%	2.97%	-9.77%	-5.62%	-3.68%	-2.69%
Metal products	6.40%	4.36%	2.22%	-8.60%	-5.99%	-2.29%	-1.07%
General machinary	6.22%	4.00%	2.40%	-9.28%	-6.38%	-2.53%	-1.87%
Electrical	6.36%	4.41%	2.13%	-9.77%	-6.96%	-2.42%	-2.12%
Transportation	7.54%	3.96%	3.86%	-9.56%	-5.23%	-3.86%	-0.55%
Precision	6.49%	3.66%	3.03%	-11.67%	-7.26%	-3.75%	-3.56%
Arms	9.10%	3.83%	5.65%	-1.01%	0.00%	-1.01%	8.26%
Others	6.30%	4.48%	1.97%	-10.04%	-7.59%	-2.08%	-2.42%
Total	5.31%	3.92%	1.49%	-7.97%	-6.21%	-1.54%	-1.78%

〔Table 5〕 Distribution of [Gross Entry + Gross Exit]/[Net Change]
(under the 4-digit classification)

	1988-90	1990-93
Number of Industries	561 (100%)	561 (100%)
≧ 2	521 (92.9%)	511 (91.1%)
≧ 5	396 (70.6%)	343 (61.1%)
≧ 10	248 (44.2%)	182 (32.4%)

〔Table 6〕 Distribution of Ratios of Entry by Start-up to Gross Entry
(under the 4-digit classification)

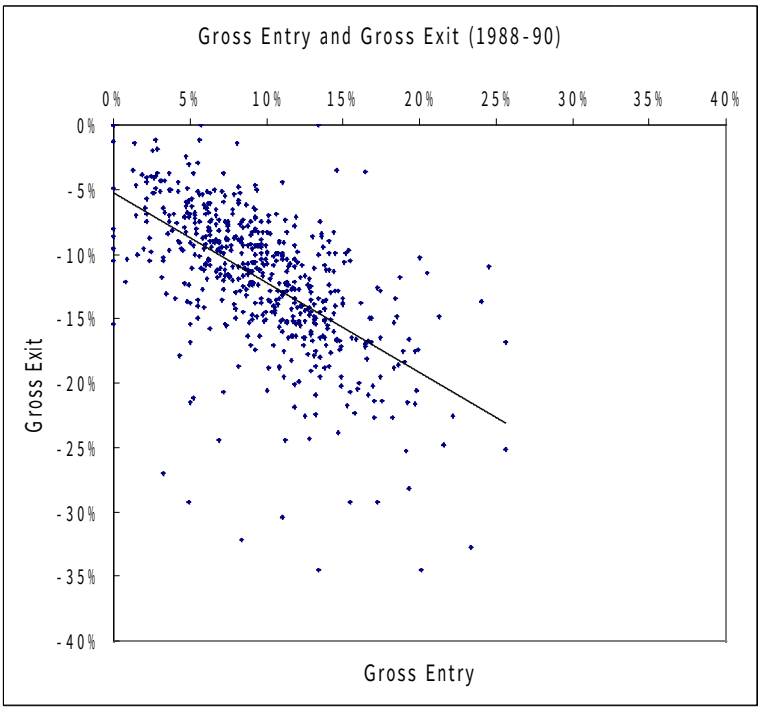
	1988-90	1990-93
Number of Industries	561 (100%)	561 (100%)
≧ 50%	251 (44.7%)	258 (46.0%)
≧ 70%	81 (14.4%)	83 (14.8%)
≧ 90%	24 (4.3%)	22 (3.9%)
= 100%	15 (2.7%)	13 (2.3%)

〔Table 7〕 Distribution of Ratios of Exit by Shut-down to Gross Exit
(under the 4-digit classification)

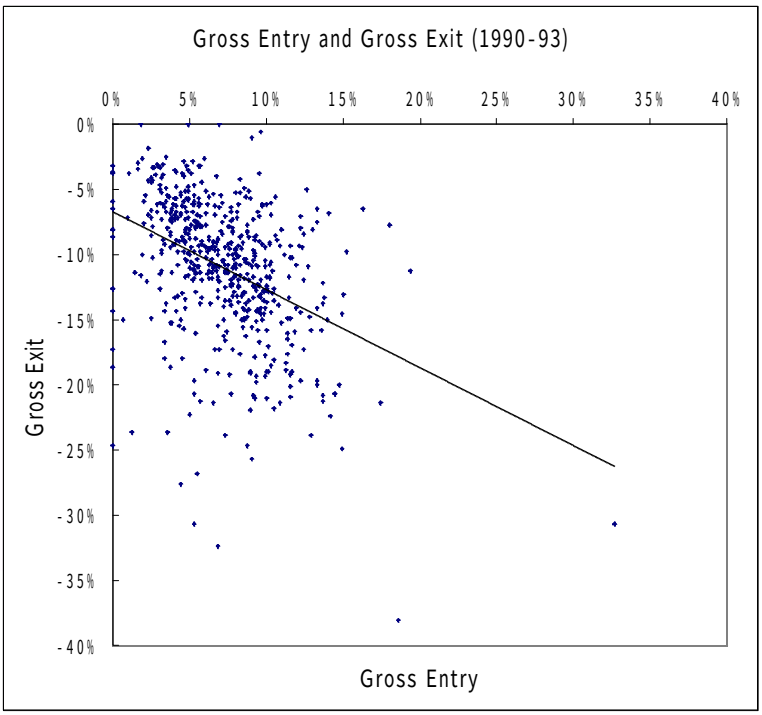
	1988-90	1990-93
Number of Industries	561 (100%)	561 (100%)
≧ 50%	272 (48.5%)	369 (65.8%)
≧ 70%	118 (21.0%)	155 (27.6%)
≧ 90%	29 (5.2%)	31 (5.5%)
= 100%	16 (2.9%)	11 (2.0%)

〔Figure 2〕 Relationship between Gross Entry Rates and Gross Exit Rates（on an annualized basis）

① 1988-90



② 1990-93



〔Table 8〕 Correlation Coefficients between the Period 1988-90 and the Period 1990-93 (under the 4-digit classification)

Gross entry rate (GENTRY)	0.5800
Start-up rate (OPEN)	0.4362
Entry by business conversion rate (CENTRY)	0.5567
Gross exit rate (GEXIT)	0.6638
Shut-down rate (CLOSE)	0.5514
Exit by business conversion rate (CEXIT)	0.7749
Net change rate (NENTRY)	0.0393

〔Table 9〕 Comparison of Regulated and Nonregulated Industries

	1988-90		1990-93	
	Regulated Industries	Nonregulated Industries	Regulated Industries	Nonregulated Industries
Gross entry rate	8.2%	9.9%	6.3%	7.3%
Start-up rate	3.5%	4.6%	3.1%	3.5%
Entry by business conversion rate	4.9%	5.5%	3.4%	4.1%
Gross exit rate	-10.1%	-12.0%	-8.5%	-10.9%
Shut-down rate	-4.8%	-5.4%	-4.5%	-5.7%
Exit by business conversion rate	-5.0%	-6.1%	-3.6%	-4.6%
Net change rate	-1.0%	-0.9%	-1.0%	-1.9%
Number of employees per establishment	31.4	15.5	31.2	16.0
Shipment amount per establishment	1812.8	381.3	2046.4	416.6
Capital intensity	14.3	8.2	16.7	8.2

(Note) Figures such as gross entry rate, etc. mean simple average figures for industry of each type. Figures of the number of employees per establishment, shipment amount per establishment (in million yen) and capital intensity (establishments with 10 or more employees: in million yen per employee) are average values of figures in the initial and final years (weighted average values based on the data for all establishments).

〔Table 10〕 Estimation Results of Gross Entry Rates, etc. Including Regulations (1990-1993)

	GENTRY	CENTRY	GEXIT
const.	0.2290 (36.4285)**	0.1110 (21.9122)**	-0.3052 (-48.2310)**
GSL	0.0562 (6.6292)**	0.0394 (5.7663)**	-0.0255 (-2.9847)**
SCALE	$-5.94*10^{-5}$ (-3.1209)**	$-3.68*10^{-5}$ (-2.4000)*	$6.35*10^{-5}$ (3.3179)**
KL	$1.68*10^{-3}$ (3.9441)**	$2.59*10^{-3}$ (7.5372)**	$9.44*10^{-4}$ (2.1976)*
REGD	-0.0675 (-3.6054)**	-0.0563 (-3.7300)**	0.0621 (3.2974)**
sample R^2	561 0.1035	561 0.1373	561 0.0593

(Note) Figures in brackets are t values. ** means the significance level of 1%, and * means the significance level of 5%.

Figures in the first row are explained variables (before conversion to annualized figures). GSL as explanatory variable means growth rate of shipment amount in an industry, SCALE means the size of establishment, KL means capital intensity, and REGD means a dummy variable for business regulations.

〔Table 11〕 Start-up and Shutdown Rates by Establishment Size in the Initial Year (on an annualized basis)

Classification of Establishment Size	1988-90		1990-93	
	Shutdown Rate	Start-up Rate	Shutdown Rate	Start-up Rate
All Sizes	-6.6%	6.0%	-7.5%	4.6%
4 ～ 9	-9.7%	7.8%	-11.3%	5.9%
10 ～ 19	-3.6%	4.2%	-4.3%	3.6%
20 ～ 29	-3.0%	4.0%	-3.6%	3.3%
30 ～ 49	-2.7%	3.7%	-3.1%	2.8%
50 ～ 99	-2.1%	3.2%	-2.5%	2.5%
100 ～ 199	-1.6%	2.4%	-1.8%	2.0%
200 ～ 299	-1.0%	2.0%	-1.3%	1.7%
300 ～ 499	-1.3%	1.2%	-0.9%	1.3%
500 ～ 999	-0.7%	0.8%	-0.7%	1.1%
1000 ～	-0.6%	0.5%	-0.4%	0.3%

〔Table 12〕 Start-up/Shutdown Rates and Entry/Exit Rates (by prefecture, on an annualized basis)

	1988-90			1990-93		
	Gross entry rate	Gross exit rate	Net change rate	Gross entry rate	Gross exit rate	Net change rate
	(=Start-up)	(=Shutdown)		(=Start-up)	(=Shutdown)	
Hokkaido	5.1%	-4.7%	0.6%	4.8%	-5.1%	0.2%
Aomori	6.2%	-4.6%	1.8%	5.6%	-4.8%	1.3%
[illegible]	7.5%	-3.8%	3.9%	4.7%	-5.0%	0.2%
Miyagi	5.5%	-6.1%	-0.3%	5.6%	-5.6%	0.6%
[illegible]	7.0%	-4.7%	2.6%	5.1%	-5.4%	0.3%
[illegible]	5.7%	-3.9%	2.0%	3.6%	-5.0%	-1.0%
[illegible]	5.9%	-4.9%	1.2%	4.3%	-5.9%	-1.1%
Ibaragi	4.6%	-4.3%	0.5%	3.9%	-5.0%	-0.8%
Tochigi	4.9%	-5.4%	-0.2%	3.5%	-5.7%	-1.8%
[illegible]	5.2%	-5.7%	-0.2%	3.6%	-6.2%	-2.2%
Saitama	6.1%	-5.8%	0.6%	3.9%	-7.1%	-2.7%
[illegible]	3.6%	-5.3%	-1.5%	5.4%	-5.9%	0.2%
Tokyo	4.9%	-8.0%	-2.7%	3.1%	-8.0%	-4.4%
[illegible]	5.1%	-5.8%	-0.4%	3.7%	-6.9%	-2.7%
Niigata	4.9%	-4.2%	1.0%	3.6%	-5.0%	-1.1%
Toyama	3.5%	-4.0%	-0.4%	3.1%	-4.3%	-0.9%
Ishikawa	6.0%	-5.0%	1.4%	4.3%	-6.5%	-1.7%
Fukui	5.6%	-5.1%	0.8%	4.1%	-5.7%	-1.1%
[illegible]	5.2%	-5.5%	0.0%	4.0%	-6.0%	-1.5%
Nagano	4.7%	-4.5%	0.4%	3.7%	-5.8%	-1.7%
Gifu	5.0%	-5.2%	0.1%	3.7%	-5.9%	-1.8%
Sizuoka	5.2%	-5.5%	0.0%	3.6%	-5.8%	-1.8%
Aichi	5.1%	-5.4%	0.0%	3.6%	-5.9%	-1.9%
Mie	4.9%	-5.0%	0.2%	3.7%	-5.5%	-1.4%
[illegible]	5.0%	-4.9%	0.4%	4.2%	-4.9%	-0.3%
Kyoto	5.5%	-7.7%	-1.8%	4.4%	-7.7%	-2.6%
[illegible]	6.7%	-7.8%	-0.6%	4.0%	-7.5%	-2.9%
Hyogo	5.2%	-5.6%	-0.1%	3.7%	-6.1%	-1.9%
Nara	4.4%	-5.2%	-0.6%	3.7%	-5.5%	-1.3%
Wakayama	4.9%	-5.5%	-0.3%	3.2%	-6.4%	-2.7%
Tottori	6.8%	-5.0%	2.1%	3.7%	-5.7%	-1.5%
[illegible]	5.4%	-5.1%	0.6%	3.6%	-5.4%	-1.4%
Okayama	4.6%	-5.8%	-0.9%	3.9%	-5.5%	-1.2%
[illegible]	5.3%	-5.4%	0.2%	4.6%	-5.6%	-0.5%
[illegible]	4.6%	-3.9%	0.9%	3.4%	-4.8%	-1.0%
[illegible]	4.3%	-5.4%	-0.9%	3.0%	-6.4%	-3.1%
Kagawa	3.6%	-5.0%	-1.1%	4.3%	-5.5%	-0.7%
Ehime	4.9%	-4.5%	0.6%	3.5%	-5.3%	-1.4%
Kochi	5.2%	-5.6%	0.0%	4.4%	-5.9%	-1.0%
Fukuoka	5.7%	-5.9%	0.2%	4.8%	-5.3%	0.0%
Saga	4.4%	-3.8%	0.9%	5.4%	-4.3%	1.6%
[illegible]	4.9%	-4.3%	0.7%	4.4%	-5.2%	-0.3%
Kumamoto	5.8%	-5.0%	1.1%	4.1%	-5.6%	-1.1%
Oita	5.0%	-5.1%	0.2%	4.3%	-4.0%	0.7%
Miyazaki	6.4%	-5.9%	0.9%	5.6%	-5.4%	0.7%
[illegible]	5.9%	-6.1%	0.2%	3.9%	-5.8%	-1.5%
Okinawa	6.6%	-7.7%	-0.5%	6.7%	-6.4%	1.2%

〔Table 13〕 Correlation Coefficients between Two Periods of 1988-90 and 1990-93 (by prefecture)

Gross entry rate (GENTRY)	0.3692
Gross exit rate (GEXIT)	0.7931
Net change rate (NENTRY)	0.4276

〔Table 14〕 Gross Entry Rate, Gross Exit Rate, Start-up Rate, Shutdown Rate and Net Change Rate by Industry (under the 1-digit classification, on an annualized basis)

Industry	Gross Entry Rate	Start-up Rate	Gross Exit Rate	Shutdown Rate	Net Change Rate
All Industries	4.14%	4.14%	-4.20%	-4.20%	-0.06%
Agriculture, forestry, and fisheries	5.28%	4.94%	-4.59%	-4.04%	1.17%
Mining	3.02%	2.76%	-4.35%	-3.69%	-1.07%
Construction	4.38%	4.30%	-4.23%	-3.84%	0.52%
Manufacturing	2.93%	2.86%	-4.64%	-4.14%	-1.44%
Electricity, gas, heat supply and water supply	3.71%	3.53%	-3.70%	-3.39%	0.28%
Transport and communication	4.79%	4.70%	-5.01%	-4.47%	0.26%
Wholesale, retail and restaurants	4.22%	4.18%	-4.97%	-4.45%	-0.33%
Finance and insurance	5.04%	4.99%	-5.16%	-4.64%	0.39%
Real estate	4.96%	4.83%	-4.92%	-4.40%	0.53%
Services	4.52%	4.43%	-4.18%	-3.82%	0.71%

〔Table 15〕 Contributions of Start-ups/Shutdowns to Gross Entry/Gross Exit (under the 1-digit industrial classification)

Industry	Start-up / Gross entry	Shutdown / Gross Exit
Agriculture, forestry, and fisheries	93.1%	95.9%
Mining	91.1%	91.9%
Construction	98.1%	98.6%
Manufacturing	97.5%	97.4%
Electricity, gas, heat supply and water supply	95.2%	98.5%
Transport and communication	98.0%	98.0%
Wholesale, retail and restaurants	99.2%	98.5%
Finance and insurance	98.9%	99.1%
Real estate	97.2%	98.3%
Services	98.0%	99.0%

〔Table 16〕 Comparison of Regulated and Nonregulated Industries (all industries, 1991-94)

	Regulated industries	Nonregulated industries
Number of industries	188	246
Gross entry rate	4.67%	4.43%
Start-up rate	4.48%	4.19%
Gross exit rate	-4.69%	-5.43%
Shutdown rate	-4.46%	-5.07%
Net change rate	0.46%	-0.46%
Average number of employees	29.74	29.67

(Note) Simple average figures of industry of each type (on an annualized basis)

〔Table 17〕 Gross Job Creation Rate, Gross Job Destruction Rate and Net Employment Change Rate (all manufacturing industries in Japan, on an annualized basis)

	Gross job creation rate	Increase due to start-ups	Gross job destruction rate	Decrease due to shutdowns	Gross job reallocation rate	Net change rate
1988-90	6.16%	2.81%	-5.30%	-2.41%	10.92%	1.18%
1990-93	4.23%	2.24%	-5.59%	-2.59%	8.88%	-0.88%

〔Table 18〕 Comparison of Gross Job Creation Rate, etc. by Sex (on an annualized basis)

		Gross job creation rate	Gross job destruction rate	Gross job reallocation rate	Net change rate
1988-90	Male	5.60%	-4.53%	9.72%	1.31%
	Female	7.07%	-6.60%	12.88%	0.96%
1990-93	Male	3.90%	-4.62%	7.84%	-0.35%
	Female	4.78%	-7.28%	10.61%	-1.78%

〔Table 19〕 Gross Job Creation Rate, Gross Job Destruction Rate, etc.
(2-digit classification; on an annualized basis)

① 1988-90

	GJC	GJD	GJR	NJC
Food	6.74%	-6.70%	12.64%	0.49%
Beverages, food, and tobacco	5.64%	-6.88%	11.75%	-0.85%
Textiles	5.36%	-8.42%	12.76%	-2.59%
Garments,textile product	8.33%	-8.53%	15.62%	0.52%
Lumber and wood product	6.15%	-8.28%	13.38%	-1.62%
Furniture and furnishing	8.21%	-8.31%	15.33%	0.58%
Pulp, paper	6.22%	-5.87%	11.46%	0.71%
Publishing	8.18%	-7.50%	14.65%	1.29%
Chemical	4.99%	-3.87%	8.55%	1.31%
Petroleum and coal products	3.36%	-4.08%	7.16%	-0.59%
Plastic products	9.23%	-7.80%	15.89%	2.14%
Rubber products	6.86%	-6.04%	12.20%	1.22%
Leather, leather products and fur	8.70%	-8.44%	15.90%	0.98%
Ceramics and earthware	5.32%	-5.21%	10.03%	0.39%
Iron and steel	4.55%	-4.81%	8.95%	-0.04%
Non-ferrous metal	6.80%	-5.11%	11.36%	2.03%
Metal products	9.58%	-8.53%	16.79%	1.86%
General machinary	9.40%	-6.86%	15.30%	3.17%
Electrical	7.47%	-6.71%	13.34%	1.25%
Transportation	7.27%	-4.72%	11.48%	2.88%
Precision	8.98%	-8.95%	16.56%	0.83%
Arms	33.50%	-1.87%	34.89%	32.10%
Others	9.93%	-10.40%	18.56%	0.56%
Total	7.54%	-6.88%	13.55%	1.18%

② 1990-93

	GJC	GJD	GJR	NJC
Food	6.05%	-5.23%	10.29%	1.44%
Beverages, food, and tobacco	4.41%	-6.19%	9.49%	-1.23%
Textiles	3.81%	-9.59%	11.33%	-4.99%
Garments,textile product	5.52%	-8.99%	12.43%	-2.43%
Lumber and wood product	4.54%	-8.04%	10.92%	-2.74%
Furniture and furnishing	5.69%	-9.30%	12.78%	-2.50%
Pulp, paper	4.62%	-5.40%	9.09%	-0.28%
Publishing	5.31%	-5.46%	9.78%	0.42%
Chemical	3.91%	-3.20%	6.71%	0.96%
Petroleum and coal products	3.76%	-2.76%	6.19%	1.20%
Plastic products	6.83%	-7.06%	12.30%	0.74%
Rubber products	4.48%	-6.33%	9.66%	-1.27%
Leather, leather products and fur	5.66%	-10.13%	13.28%	-3.26%
Ceramics and earthware	4.00%	-5.51%	8.61%	-1.06%
Iron and steel	2.91%	-4.83%	7.08%	-1.64%
Non-ferrous metal	5.06%	-6.05%	9.98%	-0.37%
Metal products	6.91%	-7.70%	12.81%	0.27%
General machinary	5.50%	-7.85%	11.65%	-1.46%
Electrical	4.88%	-7.32%	10.73%	-1.70%
Transportation	4.82%	-4.78%	8.81%	0.50%
Precision	4.69%	-10.89%	12.92%	-5.09%
Arms	8.68%	-0.67%	9.23%	8.11%
Others	6.99%	-10.10%	14.43%	-1.65%
Total	5.22%	-6.82%	10.68%	-0.88%

〔Table 20〕 Distribution of Gross Job Reallocation Rates / Net Employment Change Rates (4-digit classification)

	1988-90	1990-93
Number of industries	561 (100%)	561 (100%)
≧ 2	504 (89.8%)	487 (86.8%)
≧ 5	330 (58.8%)	295 (52.6%)
≧ 10	187 (33.3%)	174 (31.0%)
≧ 100	20 (3.6%)	22 (3.9%)

〔Table 21〕 Distribution of Ratios of Start-ups and Entry by Business Conversion to Gross Job Creation (4-digit classification)

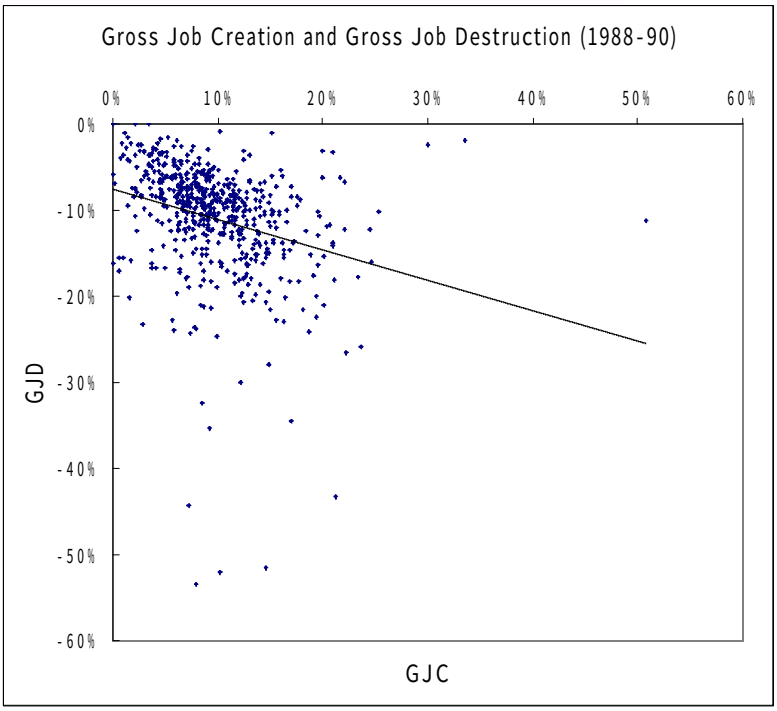
	Job creation due to start-ups		Job creation due to entry by business conversion	
	1988-90	1990-93	1988-90	1990-93
Number of industries	561 (100%)	561 (100%)	561 (100%)	561 (100%)
≧ 50%	391 (7.0%)	51 (9.1%)	461 (82.2%)	489 (87.2%)
≧ 70%	3 (0.5%)	10 (1.8%)	273 (48.7%)	348 (62.0%)
≧ 90%	- (-)	- (-)	31 (5.5%)	46 (8.2%)
= 100%	- (-)	- (-)	3 (0.5%)	10 (1.8%)

〔Table 22〕 Distribution of Ratios of Shutdowns and Exit by Business Conversion to Gross Job Destruction (4-digit classification)

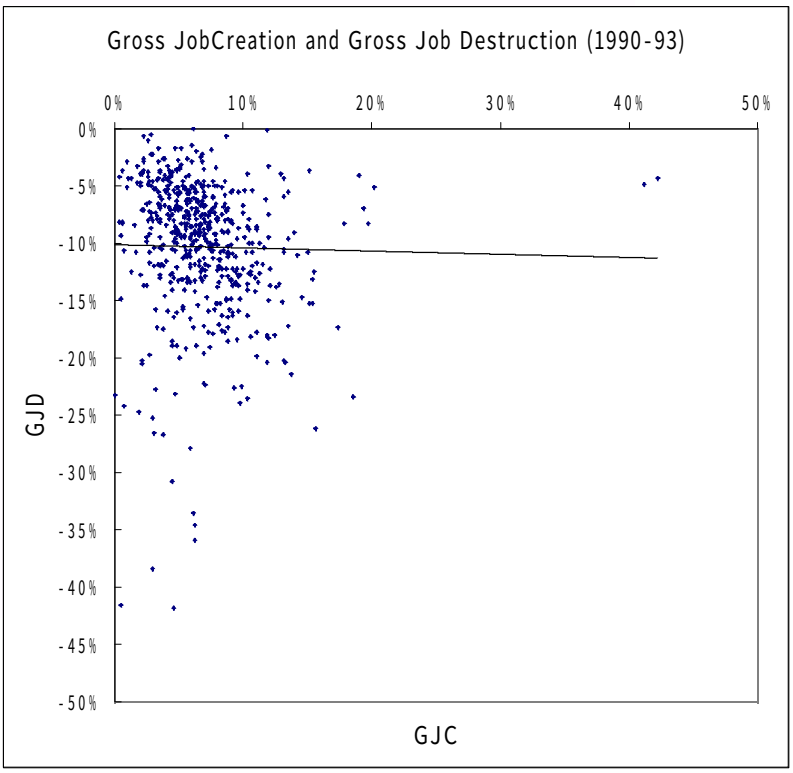
	Job destruction due to shutdown		Job destruction due to exit by business conversion	
	1988 ～ 90	1990 ～ 93	1988 ～ 90	1990 ～ 93
Number of industries	561 (100%)	561 (100%)	561 (100%)	561 (100%)
≧ 50%	52 (9.3%)	62 (11.1%)	497 (88.6%)	505 (90.0%)
≧ 70%	9 (1.6%)	9 (1.6%)	339 (60.4%)	317 (56.5%)
≧ 90%	1 (0.2%)	- (-)	46 (8.2%)	30 (5.3%)
= 100%	- (-)	- (-)	3 (0.5%)	- (-)

〔Figure 3〕 Relationship Between Gross Job Creation Rates and Gross Job Destruction Rates (on an annualized basis)

① 1988-90



② 1990-93



〔Table 23〕 Correlation Coefficients Between Change Rates in Two Periods of 1988-1990 and 1990-1993 (4-digit classification)

Gross job creation rate (GJC)	0.3233
Gross job destruction (GJD)	0.3472
Gross job reallocation rate (GJR)	0.7143
Net job change rate (NJC)	-0.1720

〔Table 24〕 Comparison of Regulated Industries and Nonregulated Industries (on an annualized basis)

	1988-90		1990-93 年	
	Regulated industries	Nonregulated industries	Regulated industries	Nonregulated industries
Gross job creation rate	9.7%	9.8%	7.0%	6.9%
Increase rate due to start-ups	1.9%	2.7%	1.4%	2.1%
Increase rate due to entry by business conversion	7.5%	7.2%	5.2%	5.4%
Gross job destruction rate	-11.7%	-10.8%	-6.9%	-10.0%
Decrease rate due to shutdowns	-2.4%	-2.9%	-2.3%	-2.9%
Decrease rate due to exit by business conversion	-8.4%	-4.7%	-4.7%	-7.2%
Gross job reallocation rate	19.3%	18.8%	12.4%	14.3%
Net change rate	-0.9%	0.0%	1.1%	-1.7%
Number of employees per establishment	31.4	15.5	31.2	16.0
Shipment amount per establishment	1812.8	381.3	2046.4	416.6
Capital intensity	14.3	8.2	16.7	8.2

(Note) Figures such as gross job creation rate, etc. mean simple average figures for industry of each type.

Figures of the number of employees per establishment, shipment amount per establishment (in million yen) and capital intensity (establishments with 10 or more employees: in million yen per employee) are average values of figures in the initial and final years (weighted average values based on the data for all establishments).

〔Table 25〕 Estimation Results for Employment Change Including Business Regulations (1990-93)

	GJC	GJD	GJR	NJC
Const.	0.2408 (39.7722)**	-0.2754 (-41.9566)**	0.5163 (52.7613)**	-0.0346 (-4.3309)**
GSL	0.1463 (16.6344)**	0.0385 (4.0381)**	0.1078 (7.5852)**	0.1848 (15.9322)**
SCALE	$-5.69*10^{-5}$ (-2.9484)**	$8.27*10^{-5}$ (3.9544)**	$-1.40*10^{-4}$ (-4.4775)**	$2.58*10^{-5}$ (1.0148)
ADJ	-0.0470 (-3.3286)**	$3.82*10^{-3}$ (0.2495)	-0.0508 (-2.2273)*	-0.0432 (-2.3188)*
REGD	-0.0628 (-3.2559)**	0.0605 (2.8950)**	-0.1233 (-3.9572)**	$-2.27*10^{-3}$ (-0.0891)
sample R^2	561 0.3517	561 0.0457	561 0.1369	561 0.3278

(Note) Figures in brackets are t values. ** means the significance level of 1%, and * means the significance level of 5%.

Figures in the first row are explained variables (before conversion to annualized figures). For explanatory variables, GSL means growth rate of shipment amount in an industry, ADJ means a dummy variable for an industry subject to employment adjustment subsidy, and REGD means a dummy variable for business regulations.

〔Table 26〕 Gross Job Creation Rates, Gross Job Destruction Rates, etc. by Establishment Size in the Initial Year (on an annualized basis)

① 1988-90

	Decrease (surviving)	Increase (surviving)	Decrease (shutdowns)	Increase (start-ups)	GJD	GJC	NJC
Total	-3.0%	3.6%	-2.6%	3.0%	-5.7%	6.5%	1.2%
4-9	-2.7%	4.6%	-8.0%	6.7%	-10.9%	11.0%	1.1%
10-19	-4.1%	4.3%	-3.6%	4.2%	-7.9%	8.3%	0.8%
20-29	-3.8%	3.5%	-3.0%	3.9%	-6.9%	7.3%	1.7%
30-49	-3.5%	4.0%	-2.6%	3.6%	-6.2%	7.5%	1.5%
50-99	-3.4%	3.7%	-2.1%	3.1%	-5.5%	6.7%	1.3%
100-199	-3.1%	3.5%	-1.6%	2.4%	-4.8%	5.9%	1.7%
200-299	-2.9%	3.4%	-1.0%	2.0%	-3.9%	5.4%	1.4%
300-499	-2.4%	3.8%	-1.3%	1.2%	-3.8%	5.0%	1.5%
500-999	-2.2%	3.5%	-0.7%	0.8%	-2.8%	4.3%	0.6%
1000-	-1.9%	2.5%	-0.4%	0.4%	-2.3%	2.9%	0.0%

② 1990-93

	Decrease (surviving)	Increase (surviving)	Decrease (shutdowns)	Increase (start-ups)	GJD	GJC	NJC
Total	-3.0%	2.2%	-2.8%	2.4%	-6.0%	4.5%	-0.9%
4-9	-2.6%	2.8%	-9.2%	5.2%	-12.4%	7.7%	-2.8%
10-19	-3.9%	2.7%	-4.2%	3.6%	-8.5%	6.1%	-1.3%
20-29	-3.6%	2.2%	-3.6%	3.3%	-7.4%	5.3%	-1.4%
30-49	-3.4%	2.5%	-3.1%	2.8%	-6.7%	5.1%	-0.8%
50-99	-3.3%	2.3%	-2.5%	2.5%	-6.0%	4.7%	-0.8%
100-199	-3.3%	2.2%	-1.7%	2.0%	-5.1%	4.1%	-0.6%
200-299	-3.1%	2.1%	-1.3%	1.7%	-4.4%	3.7%	-0.4%
300-499	-2.8%	2.1%	-0.9%	1.3%	-3.7%	3.4%	-0.1%
500-999	-2.3%	2.0%	-0.7%	1.0%	-3.1%	3.0%	0.1%
1000-	-2.3%	1.5%	-0.3%	0.2%	-2.6%	1.8%	-0.7%

〔Table 27〕 Gross Job Creation Rates and Gross Job Destruction Rates
(by prefecture; on an annualized basis)

	1988-90				1990-93			
	GJC	GJD	GJR	NJC	GJC	GJD	GJR	NJC
Hokkaido	8.0%	-5.1%	12.6%	3.3%	6.0%	-5.5%	10.4%	1.1%
Aomori	8.7%	-5.1%	13.1%	4.0%	6.2%	-6.2%	11.1%	0.7%
[illegible]	8.1%	-4.8%	12.3%	3.6%	5.6%	-5.4%	10.0%	0.8%
Miyagi	7.2%	-5.9%	12.4%	1.8%	6.0%	-6.8%	11.4%	-0.1%
[illegible]	8.1%	-5.2%	12.7%	3.4%	4.4%	-6.0%	9.3%	-1.0%
[illegible]	6.2%	-4.4%	10.3%	2.1%	4.0%	-5.1%	8.3%	-0.7%
[illegible]	6.9%	-5.3%	11.6%	2.0%	4.5%	-6.3%	9.7%	-1.2%
Ibaragi	5.8%	-4.3%	9.7%	1.7%	4.3%	-4.9%	8.5%	-0.2%
Tochigi	6.1%	-4.7%	10.4%	1.7%	3.7%	-4.6%	7.6%	-0.6%
[illegible]	5.8%	-4.9%	10.3%	1.2%	3.9%	-5.4%	8.5%	-1.1%
Saitama	6.0%	-5.5%	11.0%	0.8%	4.1%	-7.1%	9.8%	-2.4%
[illegible]	4.7%	-5.0%	9.3%	-0.1%	5.0%	-4.8%	9.0%	0.6%
Tokyo	5.8%	-7.3%	12.2%	-1.1%	3.6%	-7.6%	9.8%	-3.5%
[illegible]	4.9%	-4.8%	9.3%	0.3%	3.1%	-6.0%	8.2%	-2.5%
Niigata	6.4%	-4.9%	10.8%	1.9%	4.2%	-5.3%	8.6%	-0.7%
Toyama	5.1%	-4.0%	8.8%	1.3%	3.8%	-4.3%	7.6%	-0.2%
Ishikawa	7.3%	-4.7%	11.6%	3.0%	5.1%	-5.6%	9.7%	0.1%
Fukui	5.9%	-4.7%	10.2%	1.5%	4.2%	-5.1%	8.5%	-0.4%
[illegible]	6.5%	-5.4%	11.3%	1.5%	4.6%	-5.6%	9.2%	-0.5%
Nagano	5.5%	-4.4%	9.5%	1.3%	3.9%	-5.7%	8.7%	-1.3%
Gifu	6.2%	-5.1%	10.8%	1.4%	4.0%	-5.7%	8.8%	-1.2%
Sizuoka	5.8%	-4.9%	10.3%	1.2%	3.9%	-4.8%	8.0%	-0.6%
Aichi	5.4%	-4.2%	9.2%	1.4%	3.8%	-4.6%	7.7%	-0.5%
Mie	5.9%	-4.4%	9.9%	1.7%	3.9%	-4.6%	7.8%	-0.4%
[illegible]	5.9%	-3.5%	9.1%	2.5%	4.2%	-4.2%	7.8%	0.4%
Kyoto	6.7%	-6.1%	12.1%	1.0%	4.3%	-6.1%	9.3%	-1.2%
[illegible]	7.0%	-8.2%	14.1%	-0.6%	4.2%	-6.8%	9.7%	-2.0%
Hyogo	5.8%	-5.1%	10.4%	1.0%	4.2%	-4.9%	8.3%	-0.2%
Nara	6.9%	-4.2%	10.7%	3.0%	4.4%	-4.4%	8.1%	0.3%
Wakayama	6.0%	-6.4%	11.7%	-0.1%	4.4%	-5.6%	9.1%	-0.7%
Tottori	6.1%	-5.6%	11.1%	0.8%	4.7%	-5.6%	9.3%	-0.4%
[illegible]	6.3%	-4.6%	10.4%	2.0%	4.0%	-6.0%	9.0%	-1.5%
Okayama	5.8%	-5.7%	10.9%	0.4%	4.3%	-5.0%	8.4%	-0.3%
[illegible]	6.3%	-4.7%	10.6%	1.9%	4.1%	-5.1%	8.5%	-0.6%
[illegible]	5.4%	-3.9%	8.9%	1.7%	4.8%	-5.1%	9.1%	0.3%
[illegible]	5.7%	-5.4%	10.5%	0.6%	3.4%	-5.9%	8.4%	-2.1%
Kagawa	5.3%	-5.0%	9.8%	0.5%	4.5%	-5.3%	8.9%	-0.3%
Ehime	6.7%	-4.6%	10.8%	2.4%	4.4%	-5.4%	8.9%	-0.5%
Kochi	8.6%	-7.0%	14.6%	2.2%	6.0%	-5.9%	10.7%	0.8%
Fukuoka	7.3%	-5.6%	12.2%	2.1%	5.2%	-4.8%	9.2%	0.9%
Saga	6.0%	-4.3%	9.9%	2.0%	5.1%	-4.5%	8.9%	1.0%
[illegible]	7.7%	-3.8%	11.1%	4.1%	5.0%	-4.7%	8.9%	0.8%
Kumamoto	7.5%	-5.2%	12.2%	2.7%	5.0%	-5.8%	9.7%	-0.3%
Oita	7.6%	-4.3%	11.4%	3.6%	5.4%	-3.8%	8.6%	1.9%
Miyazaki	7.9%	-5.1%	12.4%	3.1%	5.1%	-5.2%	9.5%	0.4%
[illegible]	7.5%	-5.2%	12.2%	2.7%	4.6%	-5.4%	9.0%	-0.3%
Okinawa	7.6%	-7.9%	14.4%	0.3%	7.2%	-6.6%	12.3%	1.6%

〔Table 28〕 Correlation Coefficient Between Change rates in Two Periods of 1988-90 and 1990-93 (by prefecture)

Gross job creation rate (GJC)	0.7058
Gross job destruction rate (GJD)	0.7157
Gross job reallocation rate (GJR)	0.8012
Net job change rate (NJC)	0.5787

〔Table 29〕 Employment Change of Single Establishments as Sub-samples (on an annualized basis)

① 1988-90

	GJC	for Surviving Establish-ments	GJD	for Surviving Establish-ments	GJR	Net Change Rate
Single Establishments	8.3%	3.1%	-8.0%	-2.7%	14.3%	0.9%
All Establishments	7.5%	3.3%	-6.9%	-2.7%	13.5%	1.2%

② 1990-93

	GJC	for Surviving Establish-ments	GJD	for Surviving Establish-ments	GJR	Net Change Rate
Single Establishments	5.7%	1.9%	-7.9%	-2.6%	11.9%	-1.3%
All Establishments	5.2%	2.0%	-6.8%	-2.7%	10.7%	-0.9%

〔Table 30〕 Employment Change Rates by Industry under the 2-digit Industrial Classification (on an annualized basis)

Industry	Increase due to start-ups	Decrease due to shutdown	Net Change Rate
All Industries	4.08%	-3.59%	-0.41%
Agriculture, forestry, and fisheries	3.72%	-3.87%	-3.21%
Mining	1.86%	-2.64%	-2.61%
Construction	4.46%	-4.13%	-1.50%
Manufacturing	2.23%	-2.56%	-1.94%
Electricity, gas, heat supply and water supply	2.46%	-1.53%	1.35%
Transport and communication	4.08%	-3.50%	-0.17%
Wholesale, retail and restaurants	4.89%	-3.99%	0.51%
Finance and insurance	4.06%	-3.79%	-1.68%
Real estate	5.56%	-6.33%	-2.98%
Services	4.76%	-3.84%	0.79%

〔Table 31〕 Comparison of regulated and nonregulated industries (all industries, 1991-94, on an annualized basis)

	Regulated Industries	Nonregulated Industries
Number of Industries	188	246
Job creation rate due to start-ups	4.07%	3.51%
Job destruction rate due to shutdown	-3.38%	-3.63%
Employment change rate of surviving establishments	-1.00%	-1.62%
Net job change rate	-0.17%	-1.45%

(Note) These figures are simple average figures for industry of each type.