(This paper was originally published in Japanese in the *Bank of Japan Monthly Bulletin*, June 1999 issue.).

Research and Statistics Department
Bank of Japan

The Methodology of the Sampling and Aggregation of the *All Enterprises Tankan*

Preface

In *the Short-term Economic Survey of Enterprises in Japan (Tankan)* of March 1999, the Bank of Japan changed the sample for the *All Enterprises Tankan*, which consists of approximately 10,000 enterprises nationwide, for the first time in five years, and also changed the aggregation methodology. Additionally, the *Tankan* release format was changed from the prior focus on the results of the *Principal Enterprises Tankan* to one centered around the results of the *All Enterprises Tankan* so that users can make consistent comparisons by scale and grasp economic conditions as accurately as possible.[1]

The Bank of Japan views statistics as public goods, and endeavors to disclose information related to the statistics it prepares itself as widely as possible. Accordingly, this paper presents a somewhat detailed explanation regarding the *All Enterprises Tankan*, which is the center of the revision, covering the sample design and aggregation methodology, as well as information regarding the sample maintenance and

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[1] For an outline of the content of the revisions, please refer to "Revision of 'the Short-term Economic Survey of Enterprises in Japan (*Tankan*)," which was released by the Research and Statistics Department on December 24, 1998 and appears in the January 1999 edition of the *Bank of Japan Monthly Bulletin*.

management practices.

1. Outline of the *All Enterprises Tankan*

The *All Enterprises Tankan* is a statistical survey covering private-sector enterprises nationwide with 50 or more regular employees (20 or more regular employees for the wholesaling, retailing, service and leasing industries).[2]   This survey has been implemented since 1974[3] for the purpose of providing an accurate grasp of Japan's corporate developments.

In the *All Enterprises Tankan*, the sample is chosen from the population of approximately 160,000 enterprises listed in the *Establishment and Enterprise Census of Japan* released by the Management and Coordination Agency.   As the *Establishment and Enterprise Census of Japan*, which provides the population for the *All Enterprises Tankan*, is implemented once every five years, the sample for the *All Enterprises Tankan* is also revised every five years when the new information on the population is provided from the most recent *Census*.   This population is essentially fixed between the census surveys and the sample is unchanged as the population is supposed to remain the same.   The number of enterprises in the population and the sample as of the March

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[2] Financial institutions as well as educational institutions, cooperatives, and other non-profit organizations are excluded from the *All Enterprises Tankan* sample because they utilize special financial accounting systems which make it difficult to survey and aggregate the data under the same conditions used for business corporations.   (For financial institutions, only the business fixed investment plans are surveyed).

[3] For manufacturing enterprises, the *Chusho-kigyou gyoukyou yosoku (*Small and Medium-Sized Enterprises Business Conditions Forecast), which was initiated in 1960 and renamed the *Chusho-kigyou tanki keizai kansoku chousa* (Small and Medium-Sized Enterprises Short-term Economic Observation Survey) in 1966, was the predecessor to the *All Enterprises Tankan*.

1999 revision (hereafter, the 1999 revision) are as presented in Chart 1.[4]

The survey is implemented by mailing survey forms to the sample enterprises, which are returned with the answers filled in.   The survey frequency is four times per year in March, June, September, and December.   There are a total of nearly 40 survey items, comprising qualitative judgement items such as the judgement of business conditions, in which the respondents choose from three answers, as well as numerical items such as the amounts of business fixed investment, profit and loss, and balance sheet figures.

The *All Enterprises Tankan* is a notified statistical survey as stipulated under the Statistics Law (Law No. 18 of 1947).   The responses submitted by the individual enterprises are managed with the utmost care to maintain strict confidentiality.

2. Sample Design

(1)   Sample Design

The basic idea of the sample design of the *All Enterprises Tankan* is to attain the following three goals.

(i) Enhance the statistical accuracy; (ii) minimize the statistical compilation burden;

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[4] The aggregated figures are released categorized by the Japanese standard industrial classification of 17 manufacturing industries and 10 non-manufacturing industries, and by three categories of enterprise scale in terms of the number of regular employees, that is, principle enterprises, medium enterprises, and small enterprises (refer to Chart 1 for the scale classification standards).   As explained below, the segmentation during the sample design is more detailed, but this is just a technical classification to facilitate more efficient sample design, and these aggregated figures are not released.

(iii) maintain transparency.

The first two goals are a trade-off.　For example, it is possible to enhance statistical accuracy just by increasing the number of samples when surveying the samples but this will increase the reporting burden of respondents as well as errors that occur when collecting survey forms (non-sampling errors).[5]　As for the sampling method, random sampling, which is an ideal method to avoid sample bias, places a large burden on both respondents and the statistics compilation section.

When designing samples, the *All Enterprises Tankan* adopts the following four procedures so that the compilation burden is reduced and the samples overall are almost the same as from random sampling: 1. Stratify the population enterprises.[6]　2. Set a target accuracy and calculate the number of enterprises to attain the target through "optimum allocation" by stratum.　3. Check the difference between the distribution of the population and that of sample enterprises based on continuing samples.[7]　4. For strata that need to be supplemented in order to attain the target accuracy and conform to the distribution, additional enterprises are selected at random.

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[5] When collecting survey sheets for the *All Enterprises Tankan*, we ask for cooperation from respondents through interviews.　In addition, we also try to reduce "non-sampling errors" by strictly examining the responses in order to prevent mistakes beforehand.

[6] When the population is not the same, enterprises with similar characteristics are grouped into a stratum and samples are selected from each stratum for the population.　This method is called stratified sampling.　By selecting the number of samples in order to minimize the variance overall based on the size and variance of each stratum (this is called the "optimum allocation" or the "Neyman allocation"), we can approximate the population with high accuracy even though the number of samples is small.

[7] Enterprises where the number of employees has decreased to less than 50 people are excluded from the *All Enterprises Tankan.*　These enterprises are also not included in the continuing samples.

In order to maintain transparency, the target accuracy, the attained accuracy, and the practical procedure of sampling are disclosed from the 1999 revision onwards.

(2) Procedures regarding the selection of sample enterprises

(Target accuracy)

In sample surveys, a target accuracy range must be set because unlike complete count, sampling errors occur.   In fact, no consensus exists on the maximum permissible error range for sample surveys.   An error range for an item does not represent the error range of the whole survey as the survey items of the *All Enterprises Tankan* vary. However, some kinds of criteria are needed to maintain the statistical accuracy.

The *All Enterprises Tankan* has set a target accuracy (target error) for the actual and projected amounts of sales.   Sales were chosen because they are an important survey item within the *Tankan*, and data closely related to the distribution of the population enterprises are available.   Moreover, sales are useful as they correlate with the amount of business fixed investment to some extent.[8]

The ratio of the standard error to the level of sales (hereafter, the error ratio of sales) is

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[8] The number of samples determined by "optimum allocation" is the "optimum" number of samples judged from the fact that it maintains the statistical accuracy of the base survey items and the positively correlated survey items.   According to the correlation coefficient of sales and business fixed investment by industry and scale of each stratum, using data of individual enterprises there is a positive correlation in many strata for large enterprises.   A distinct relation, however, cannot be seen in small enterprises as the business fixed investment amount of individual enterprises changes each fiscal year (Chart 2).   As for each stratum, a close examination has not been conducted. However, as regards the error ratio of business fixed investment obtained from samples compiled for the 1999 revision, the target accuracy was set based on sales as the error remained virtually within the same range as sales in the manufacturing industry.

set as a target accuracy for each of the six divisions by industry and scale as shown in the following chart.[9]

Target accuracy (error ratio of sales)

Unit, %

	Large enterprises	Medium-sized enterprises	Small enterprises
Manufacturing	3.0	3.0	3.0
Nonmanufacturing	5.0	5.0	5.0

(Calculating the error ratios)

The error ratios of continuing samples were calculated in order to examine whether the continuing samples are within the range of the target accuracy. This is used to determine whether or not new sample enterprises should be added to supplement the continuing samples.

The information required for the detailed calculation (the population mean and population variance of sales) could not be obtained from the *Establishment and Enterprise Census of Japan,* which lists the population enterprises. The next possibility was to use the "manufacturing industry" section (excluding shipments, heavy machinery, and other transportation machinery) of the *Basic Survey of Japanese Business Structure and Activities* released by the Ministry of International Trade and Industry (MITI) and the "wholesale trade and retail trade" sections of the *Census of*

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[9] As individual enterprises vary largely overall in the nonmanufacturing industry compared to the manufacturing industry, the target accuracy is also set slightly lower. Moreover the target accuracy

Commerce (MITI).   For industries whose population information could not be obtained, the population mean and population variance is estimated based on sales aggregated by the *Tankan*.[10]

The equation to calculate the error ratio using the population mean and the population variance is as follows:

Error ratio $= \dfrac{SE}{\bar{\bar{y}}}$

$$SE = \sqrt{Var(\bar{y})}, \quad \bar{y} = \sum_{i=1}^{L} W_i \bar{y}_i,$$

$$Var(\bar{y}) = \sum_{i=1}^{L} W_i^2 \frac{N_i - n_i}{N_i - 1} \frac{\sigma_i^2}{n_i}$$

N_i : number of population enterprises of Stratum i

n_i : number of continuing samples of Stratum i

$\bar{y}_i$: sales mean of the population of Stratum i

σ_i^2 : sales variance of the population of Stratum i

L : number of strata

W_i : number of population enterprises of the i stratum out of

the number of population enterprises overall $\left(\dfrac{N_i}{N} \right)$

In the process of changing samples in the 1999 revision, it was been revealed that the error ratios for large enterprises in both manufacturing and nonmanufacturing industries

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by scale and industry, which require further detail, are not particularly set.

[10] The *Basic Survey of Japanese Business Structure and Activities* covers enterprises with at least 50 employees and capital of at least 30 million yen.   Thus, the population does not exactly match the population of the *All Enterprises Tankan* but it is useful since it is a complete count.   Strictly speaking, there is a problem in that the *All Enterprises Tankan* is not a random sampling survey. However, it can be used as an alternative for the estimate of the population statistic by using the unbiased estimator (Population mean = sample mean, population variance= $\dfrac{\text{number of population enterprises} - 1}{\text{number of population enterprises}} \cdot \dfrac{\text{sample standard deviation sum of square}}{\text{number of samples - 1}}$).

did not fulfill the target accuracy for continuing samples (samples adopted from the November 1993 survey, excluding enterprises that are not respondents) as shown below.

Accuracy of continuing samples (error ratio of sales)

Unit, %

	Error ratio	Large enterprises	Medium-sized enterprises	Small enterprises
Manufacturing	Continuing samples	4.4	2.6	2.5
	Target	3.0	3.0	3.0
Nonmanufacturing	Continuing samples	16.3	4.1	3.7
	Target	5.0	5.0	5.0

(Reexamination of strata)

When the error ratios by industry and scale are large, this means that there is a deficiency in the number of sample enterprises in those strata. Before simply increasing the number of sample enterprises, however, it should be considered whether the stratification adopted for the continuing samples is appropriate.

When the sales variance of population enterprises within a certain stratum is small, only a limited number of sample enterprises is needed. On the other hand, when the variance is large, a larger number of sample enterprises is indispensable. If, by revising the stratification, the variance of population enterprises within each stratum is decreased, a more efficient sampling is possible, as shown in the following chart.

Stratified Sampling (the sales of each enterprise are indicated as the height of the
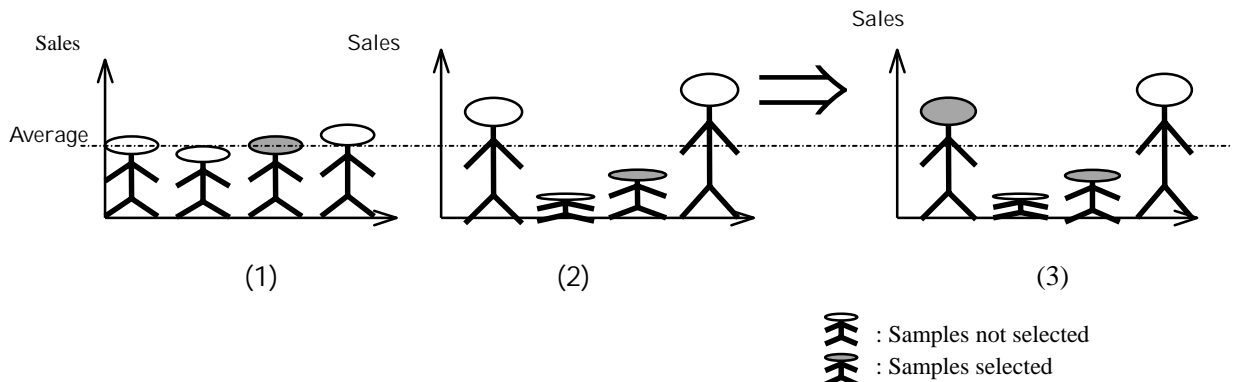
Stratum 1

Sales of enterprises within the stratum are basically the same

Stratum 2

Sales of enterprises within the stratum vary

(1)   (2)   (3)

: Samples not selected
: Samples selected

Note: (1) A 25 percent selection is sufficient to estimate the approximate average within the stratum.   The accuracy estimate will not be enhanced significantly even if the percentage is raised to 50 percent.
   (2) A 25 percent selection is not sufficient to estimate the approximate average within the stratum.
   (3) A 50 percent selection is needed to estimate the approximate average within the stratum.

In the 1999 revision, we examined how each stratum affected the sampling error of continuing samples overall (this was conducted in the previous sample design). Through this, we found that 80 percent of sampling errors occurred in large manufacturing enterprises were contributed by the electrical machinery and motor vehicle industries, and over 90 percent of large nonmanufacturing enterprises by the wholesaling industry.   Moreover, we compiled a scale / sales distribution chart (Chart 3) in order to examine the characteristics of these strata.   All three industries had a large number of enterprises with 5,000 employees or less, while there were also some large enterprises with well over 5,000 employees.   This means that the conventional stratification for firms with 1,000 or more employees was not adequate in terms of designing samples for these three industries.

The population of the strata of these three industries was redivided into enterprises with 5,000 or more employees and those with less than 5,000 employees.   As a result, the error ratio of the continuing samples was improved significantly.   The error ratio calculated at this stage indicated (as shown below) that sample enterprises only had to be added to large nonmanufacturing enterprises.[11]

Accuracy of the statistics after revision of the strata division (error ratio of sales)

Unit, %

	Error ratio		Large enterprises	Medium-sized enterprises	Small enterprises
Manufacturing	Continuing samples	Pre-revision	4.4	2.6	2.5
		Post-revision	2.3	2.6	2.5
	Target		3.0	3.0	3.0
Nonmanufacturing	Continuing samples	Pre-revision	16.3	4.1	3.7
		Post-revision	7.1	4.1	3.9
	Target		5.0	5.0	5.0

In order to examine whether the number of employees is adequate for stratification, we

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[11]Consequently, large, medium, and small enterprises of each industry were divided into a total of 118 strata.   As for large wholesaling enterprises, there was a bipolarization between "general trading companies" and "specialized trading companies" even in enterprises with 5,000 employees and over.   However, this distinction is not included in the *Establishment and Enterprise Census of Japan* so the number of population enterprises could not be obtained.   Thus, a further stratification of large wholesaling enterprises was not conducted.

prepared a graph indicating the distribution of enterprises by scale and industry using the individual survey sheets of the *All Enterprises Tankan*.   This graph confirmed that similar enterprises had been grouped together in both manufacturing and nonmanufacturing industries in terms of both sales and business fixed investment (Chart 4).

(Checking the distributions of the continuing samples and the population)

The distributions of the population enterprises and the sample enterprises is then checked.   This is because the sample enterprises are not selected at random but based on continuing samples, and thus they may not reflect the population adequately.   This procedure provides the samples with the same effects as random sampling.

In the *All Enterprises Tankan*, the "test of the goodness of fit" method is used to test the distributions of the number of population enterprises and sample enterprises by the number of employees.   Specifically, this method compares the two distributions as shown below and tests the null hypothesis ("Ho: the distribution of the sample and the distribution of the population are the same").[12]

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[12] The test is as follows:

(1) As for the population and sample, each stratum that is population estimated is divided further into strata $(i=1,2,\cdots,j)$ according to the statistic which is the criteria when examining the distribution.

(2) The number of population enterprises $(N_1, N_2, \cdots, N_j, \ N = \sum_{i=1}^{j} N_i)$ and the number of sample enterprises $(n_1, n_2, \cdots, n_j, \ n = \sum_{i=1}^{j} n_i)$ are calculated for each stratum.

(3) The composition ratio $p_i = \dfrac{N_i}{N}$ of population enterprises is determined for each stratum.

(4) In this case, the null hypothesis is "H_0 : the distribution of the sample and the distribution of the population are the same."
If the distribution of the sample and the distribution of the population are the same, the number

Example: Population distribution and sample distribution
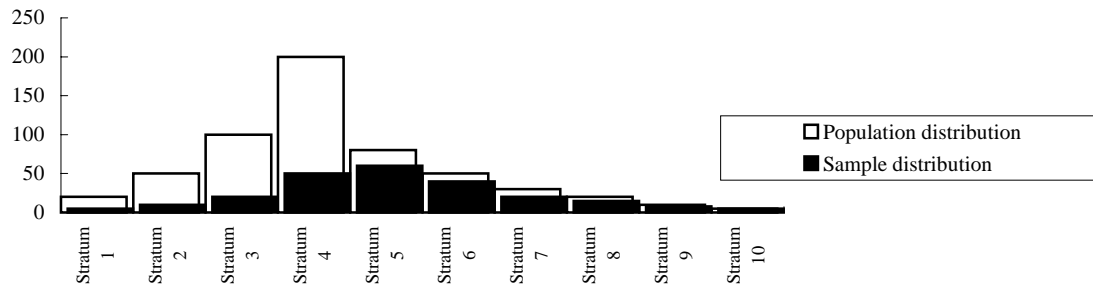
In the 1999 revision, the strata were divided in accordance with the number of enterprises in each stratum[13], and the critical region identified as 5 percent on both sides. It was found that 44 out of 118 strata rejected the null hypothesis or did not satisfy the number of samples required for testing. Consequently, the continuing samples of over one-third of the strata were to be revised.

(Determining the number of sample enterprises)

The number of sample enterprises is determined by examining the error ratio and checking the distribution. If there is no statistical problem with the continuing samples, there is no need to make changes. However, changes in the industrial structure affect the population enterprises, and it is also likely that the sample enterprises themselves will change over the years.

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of sample enterprises in each stratum is expected to be $e_i = n \cdot p_i$. As for this e_i and n_i (number of samples actually included in each stratum), when n is large, the $\sum_{i=1}^{j} \frac{(n_i - e_i)^2}{e_i}$ will be similar to the χ^2 distribution having j-1 degrees of freedom and the critical region is identified from the distribution chart of χ^2.

[13] Each stratum is divided according to the size of the stratum. The strata are basically divided into 5 employees, 10 employees, 50 employees, 100 employees, and 1000 employees, although there

In the 1999 revision, the results from checking both the error ratio and the distribution indicated a need to revise the continuing samples. In practice, the revision of the continuing samples was conducted by adding additional enterprises. We recalculated the error ratio based on the number of enterprises obtained and added additional enterprises when necessary. In using this method, it is likely that there will eventually be more sample enterprises than needed. As for the outlook, however, the number of sample enterprises is expected to decrease due to factors such as corporate bankruptcies, so there is some leeway. Chart 5 presents the revised electrical machinery industry distribution (medium-sized enterprises) as an example.

Based on the procedure above, 1,094 enterprises were added to the continuing sample enterprises, and the total number of sample enterprises rose to 9,510 (Chart 6).[14] As shown in the chart below, the error ratio of sales is now below that of the error ratio set as the target accuracy for each division. The error ratio of business fixed investment, calculated from the number of sample enterprises that are finalized, is now around 3 percent for the manufacturing industry, but over 10 percent for medium-sized and large enterprises in the nonmanufacturing industry.[15]

Finally attained accuracy (error ratio of sales)

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may be slight changes when it is impossible to divide them this way.

[14] The numbers of sample enterprises are those at the time of sample design and differ from those in March 1999 when the survey actually started.

[15] The high error ratio in business fixed investment of nonmanufacturing enterprises may reflect the fact that investments by large enterprises in the telecommunication industry and medium enterprises in the leasing industry vary to an extremely large extent within the stratum. As for business fixed investment, the population variance and the population mean are estimated from the actual results for fiscal 1996 as measured by the June 1997 survey of *the All Enterprises Tankan.*

<div align="right">Unit, %</div>

	Error ratio	Large enterprises	Medium-sized enterprises	Small enterprises
Manufacturing	Samples	2.3	2.4	2.4
	Target	3.0	3.0	3.0
Nonmanufacturing	Samples	4.8	4.0	3.2
	Target	5.0	5.0	5.0

Finally attained accuracy (error ratio of business fixed investment)

<div align="right">Unit,%</div>

	Error ratio	Large enterprises	Medium-sized enterprises	Small enterprises
Manufacturing	Samples	2.8	3.2	3.4
Nonmanufacturing	Samples	10.1	12.4	6.1

(Sampling enterprises)

Enterprises to be added were sampled at random by stratum from the list of enterprises in the *Establishment and Enterprise Census of Japan*. In the random sampling, we prepared a list of the first choices and second choices in case the first-choice enterprises refused to cooperate with the survey.[16] For the *All Enterprises Tankan*, responses were collected nationwide and enterprises sampled at random through the main branch and local branches of the Bank of Japan. The difference in the industrial structure by region was not taken into consideration. Therefore, the aggregates by region of the *All*

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[16] In terms of statistics compilation, there are problems when the *Establishment and Enterprise Census of Japan* lists an enterprise twice or when the industry categorization of the enterprise differs from its actual business. We sometimes came across such cases during the 1999 revision, and these enterprises were omitted.

Enterprises Tankan are basically considered as reference material.[17]

3.Aggregating method

(Aggregating and releasing the statistical surveys)

The aggregating methods of the statistical surveys and judgement surveys differ in the *All Enterprises Tankan.* For the statistical surveys, data regarding each stratum are aggregated along with the common population estimate procedure as follows:

Population estimate= (simple aggregate/number of respondents) * number of population enterprises

Before the 1999 revision, simple aggregates were prepared for some statistical surveys,[18] but population estimates are prepared for all items after this revision.

As for aggregates, we release the year-to-year rate of change, the revision rate from the previous survey, and various other rates along with the actual and projected amounts obtained from the population estimates. Before the 1999 revision, both the rate of change and the revision rate were calculated on enterprises that responded to both the relevant survey period and the previous survey period. After the 1999 revision,

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[17] Apart from this, the local branches of the Bank of Japan also aggregate and release figures in order to grasp the economic developments within each district. These figures are based not only on the responses to each branch but also on responses from the branch offices of establishments that are not included in aggregates on a nationwide basis.

[18] Profit-and-loss-related items (current profits etc.), overseas business plans, and employment of new graduates were simple aggregates until the December 1998 survey. As a result, for these items there is a discontinuity between the data from the March 1999 survey and onwards, and the data prior to this period.

however, we calculate the actual and projected amounts as the denominator at each survey. As for the year-to-year rate, the actual result of the previous fiscal year is finalized at the June survey of each year. Thus, from the September survey and onwards, the year-to-year rate of a fiscal year uses the actual result of the previous June as the denominator (the actual and projected amounts of the previous year of overseas business plans are finalized at the December survey).

When adopting this aggregating method, compared to the previous way of aggregation, the data are likely to fluctuate, as all the enterprises do not respond. Nevertheless, the response ratio is over 90 percent at present so we judge that this is not a problem. If the response ratio decreases in the future and when data with a large gap from the average are missing, there is a possibility that a disparity may occur between the actual conditions of enterprises and the estimate. Those responses from sample enterprises will become increasingly important for the *Tankan*.

(Aggregating the judgement surveys)

As for the judgement surveys, simple aggregates are prepared from the number of respondents for each judgement and the "percentage share of the number of respondents" to all respondents is calculated. In addition, the DI (Diffusion Index), is also calculated and released according to the following equation.

D.I. = (percentage share of the number of respondents choosing the first judgement) – (percentage share of the number of respondents choosing the third judgement)

Simple aggregation is adopted for the judgement surveys because processing the

statistics may confuse users as figures for the judgement of the population overall do not exist.   Users can process the statistics according to their various needs.   This can be done, for example, by calculating the weighted averages of sales, the number of enterprises, and the amount of added value.

(Sampling error in aggregates)

For the *All Enterprises Tankan,* the error ratio in sales is the criteria for target accuracy. This means that aggregates remain within a certain range of error ratio.   Nevertheless, items that change largely compared to sales and vary significantly for individual enterprises also produce substantial error ratios.   As for business fixed investment, the error ratio is high in the nonmanufacturing industry, as already mentioned.   For example, in cases such as current profits, the data of each enterprise varies from negative to positive, so it needs to be considered on a larger scale.

The error ratio of the target accuracy is set only for the level of the actual and projected amounts.   There is another range of sampling error in the rate of change, which is often used by analysts.   In theory, the sampling error range of the rate of change cannot be found as long as the data are random variables.   However, assuming that the value of the base point is correct (for instance, the actual result of the previous year), and that the sample enterprises of both points are the same, then the theoretical value of the sampling error of the rate of change may be regarded as the result from dividing the standard errors of the increase-decrease range by the value of the base point.   Hence, it is possible to measure the sampling error of the rate of change by using the sample

data.[19]

The ratio of the standard error to the previous year of sales and business fixed investment, (calculated by using the difference between fiscal 1997 and 1998) obtained from the June 1998 survey was low compared to the error ratios of the levels (the results are presented below).[20] This indicates that the sampling error will be minimized when the data of individual enterprises are correlated on a time series and that the increase or decrease itself varies only to a small extent. Indeed, it should be noted that the error calculated above is smaller than the real conditions because the numbers of respondents are the same for the comparative point and the base point.[21]

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[19] The sampling error in the rate of change is calculated by dividing the standard error of the difference between the comparative point and the base point by the value of the base point. This is, the standard error (SE) of the difference ($\Delta \overline{y}$) between the comparative point (t +1) and the base point (t) is $\sqrt{\mathrm{Var}(\Delta \overline{y})}$, and as the samples of both points are the same, it can be written in sum as ; $\Delta \overline{y} = \overline{\Delta y}$, $\mathrm{Var}(\Delta \overline{y}) = \mathrm{Var}(\overline{\Delta y})$. Consequently, the value obtained from this sum $\mathrm{SE} = \sqrt{\mathrm{Var}(\Delta \overline{y})} = \sqrt{\mathrm{Var}(\overline{y_{t+1} - y_t})} = \sqrt{\dfrac{N-n}{N-1} \dfrac{\mathrm{Var}(y_{t+1}) + \mathrm{Var}(y_t) - 2\mathrm{Cov}(y_{t+1}, y_t)}{n}}$ is the sampling error of the increase-decrease ratio subtracting $\overline{y_t}$. For the population statistic, we use the unbiased estimator obtained from the *All Enterprises Tankan.*

[20] The results of the preliminary survey conducted along with the December 1998 survey are used for sample enterprises that are newly added.   The year-to-year figures on the chart are also based on the same samples.

[21] It is necessary to keep in mind that the calculation conducted here is based on the data of sales and business fixed investment collected at a specific point in time.   This is because the sampling error

Error of the rate of change to the previous year for Fiscal 1998 Sales

Unit, error % point, year-to-year percent change

		Large enterprises	Medium-sized enterprises	Small enterprises
Manufacturing	Error	0.1	0.5	0.4
	Year-to-year change	-0.4	-0.7	-2.8
Nonmanufacturing	Error	0.7	0.4	0.4
	Year-to-year change	-1.4	0.6	-1.9

Error of the rate of change to the previous year for Fiscal 1998 Business Fixed Investment

Unit, error % point, year-to-year percent change

		Large enterprises	Medium-sized enterprises	Small enterprises
Manufacturing	Error	0.8	3.5	5.5
	Year-to-year change	-3.0	-6.7	-20.3
Nonmanufacturing	Error	2.0	2.4	4.7
	Year-to-year change	-3.5	-4.9	-12.8

Since the judgement surveys cannot specify population information, the statistical accuracy of the results cannot be measured. For example, however, the variance of sample enterprises and the variance of population enterprises are regarded as the same for the business conditions D.I. So calculating the standard error on this basis, the

expands in cases such as economic turning points, when the movement of each enterprise varies.

result is basically around the 1-3 percentage point range (Chart 7).[22]   This means that as the judgement regarding business conditions of respondents hardly differs, the standard error will also be low.

The various sampling errors described above are based on the premise that all the surveyed enterprises have responded.   If the response ratio declines, the accuracy at the time of sample design cannot be maintained.   Especially for large enterprises, which comprise a relatively small proportion of the population enterprises, a decrease in the response ratio may substantially affect the sampling error.[23]   Therefore, the above points require careful monitoring.

4. Maintenance

(The problems of maintaining the samples with the real conditions of enterprises)

The *All Enterprises Tankan* is a sample survey that selects respondents in order to reflect the current conditions of enterprises nationwide.   In reality, however, the population information itself diverges from the real conditions of enterprises over the years.   The population information is revised once every five years in the

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[22] The sum for the standard error of business conditions D.I. is:
Define the ratio of enterprises choosing judgement j   (j=(1,2,3)) as p_j.   The equation will be $p_1 + p_2 + p_3 = 1$,   and $\mu = p_1 - p_3$ for   the   D.I.   Find   the   D.I.   variance   from

$$\sigma_\mu^2 = \mathrm{Var}(p_1 - p_3) = \frac{1}{n}(p_1 - p_1^2) + \frac{1}{n}(p_3 - p_3^2) - \frac{2}{n}p_1 p_3 = \frac{(p_1 + p_3) - (p_1 - p_3)^2}{n}$$ and   calculate   the   standard   error:

$SE = \sigma_\mu$.

[23] In the i stratum, when the number of population enterprises N_i is small, the decrease in the number of sample enterprises n_i significantly affects the limited revision item $\frac{N_i - n_i}{N_i - 1}$.

Establishment and Enterprise Census of Japan, and completing the actual sample design using this data takes another three years from the time of the survey. What is more, the respondents themselves change in such cases as changes in industry and scale, to mergers, corporate spin-offs, and corporate bankruptcies.

For the *All Enterprises Tankan,* we have set certain rules regarding the maintenance of samples.

(Population Information)

As the economic environment changes, the conditions of enterprises also change. When the surveyed enterprises of the *All Enterprises Tankan* change due to corporate bankruptcies, mergers, or spin-offs, this affects the actual population enterprises. However, the *Establishment and Enterprise Census of Japan* is the only source to trace these changes comprehensively. As for changes other than those in the sample enterprises, it is difficult to grasp changes in the population enterprises from the *All Enterprises Tankan,* especially for newly established businesses.[24]

Consequently, instead of revising the population, and supplementing/omitting sample enterprises based on partial information, the best approach is to fix the sample survey for the *All Enterprises Tankan* based on the latest population information available. This method is efficient as it averts arbitrariness.

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[24] With respect to changes in the number of sample enterprises of the *All Enterprises Tankan* and the total number of enterprises in statistics released by the National Tax Administration Agency, the number of enterprises in the *All Enterprises Tankan* tends to decrease although the number of enterprises overall is increasing. Thus, it is difficult to look at the movements of population enterprises from changes in the sample enterprises of the *All Enterprises Tankan* (Chart 8).

(Special measures for mergers and corporate spin-offs)

When the changes in sample enterprises are not reflected in the population information, mergers and corporate spin-offs in a stratum may affect the overall population estimate even though the simple total value has not changed.[25]　When a merger or corporate spin-off occurs within a given stratum, the changes in the estimate of aggregates overall will be significant owing to the features of population estimates when the characteristics of this stratum are as follows: (1) the ratio of the number of population enterprises of the stratum to the number of population enterprises overall is high, (2) the number of sample enterprises is low, (3) the simple aggregates are high for the data (sales, etc.) within the stratum to be estimated.[26]

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[25] There are various cases when a merger or corporate spin-off occurs, and it is necessary to take the various factors into consideration when conducting the survey.　Basically when a merger occurs, if either company is a respondent of the survey, we ask the amalgamated enterprise to cooperate with the survey.　In cases of corporate spin-offs, we survey the core enterprise and when the other enterprises are within the same stratum, we also survey that enterprise.

[26] On the assumption that there were no changes in the simple aggregate Si in Stratum i around the merger/corporate spin-off and to maintain the number of population enterprises in Stratum i, the number of sample enterprises is set as n_{it} before the merger or corporate spin-off, and $n_{i(t+1)}$ after the merger or corporate spin-off.　As a result, the population estimate is $\overline{y}_t = \sum\limits_{i=1}^{L} \frac{N_i}{N} \frac{1}{n_{it}} S_i$ before the merger or corporate spin-off, and $\overline{y_{t+1}} = \sum\limits_{i=1}^{L} \frac{N_i}{N} \frac{1}{n_{i(t+1)}} S_i$ after the merger or spin-off.　When a merger or corporate spin-off happens only in Stratum i, the changes in the population estimate before and after the merger or spin-off is , $\overline{y_{t+1}} - \overline{y}_t = \frac{N_i}{N} \left(\frac{1}{n_{i(t+1)}} - \frac{1}{n_{it}} \right) S_i$.　If the ratio of the population enterprises is large $\left(\frac{N_i}{N} \right)$, the number of sample enterprises is small (n_i) (if n_i is small, the $\left(\frac{1}{n_i} \right)$ is large), and the simple aggregate (S_i) is large in such a stratum, the changes will be large.　As it is $n_{it} > n_{i(t+1)}$ for mergers and $n_{it} < n_{i(t+1)}$ for spin-offs, mergers create a positive value while spin-offs create a negative value.

Basically, we respect the population information as discussed above. In order to deal with such cases, however, the *All Enterprises Tankan* has established a special rule. This rule is that "if a merger or corporate spin-off occurs in a stratum where the number of population enterprises is fixed when sales and the amount of business fixed investment, based on the six divisions by industry and scale, change by more than 1 percent, the number of population enterprises is revised in line with the change in sample enterprises."[27]

We conducted simulations in which an enterprise is split up into three enterprises in a certain strata based on the value at the time of sample design. According to the simulations, only a limited number of strata were significantly affected. Nevertheless, there were strata where the changes exceeded 1 percent. These were the telecommunications, leasing, and gas and electricity industries for business fixed

$$
\begin{cases}
N_i : \text{number of population enterprises of Stratum i} \\
N : \text{number of population enterprises overall} \\
n_i : \text{number of sample enterprises of Stratum i} \\
S_i : \text{simple aggregate of Stratum i} \\
\bar{y} : \text{population estimate overall} \\
L : \text{number of strata} \\
W_i : \text{ratio of the number of population enterprises in Stratum i to the} \\
\quad \text{number of population enterprises overall} \left(\dfrac{N_i}{N} \right) \\
t : \text{point before mergers and corporate spin-offs} \\
t+1 : \text{point after mergers and corporate spin-offs}
\end{cases}
$$

[27] This rule is only to correct the distortion of the population estimate value within a possible range, so it does not mean that figures will not change by changing the population. Depending upon the stratum, however, changes in the number of population enterprises maybe very effective (refer to Chart 9).

investment, and the electricity, and some wholesaling industries for sales (total of seven strata, 236 strata overall <118 strata*2 : sales, business fixed investment>). This indicates that the number of population enterprises may change, despite the low percentage (Chart 9).

(Changes in sample enterprises)

In cases when enterprises close due to corporate bankruptcies or when enterprises are added into another stratum owing to mergers, the influence of these factors on a stratum depends on the individual case. Following the general rule, the number of population enterprises will not be changed. However, in cases when bankruptcies of sample enterprises continue, the error increases in line with the decrease in the number of respondents, or the distortion of the sample distribution occurs. In these circumstances, it is difficult to maintain the original statistical accuracy.

With respect to these problems, we plan to check the distribution and error based on responses about once a year. We will also supplement the number of sample enterprises where needed. As the number of enterprises omitted from the sample was limited conventionally, the changes in the number of sample enterprises did not need to be considered.[28] Amid the rapid changes in the economic environment, however, these

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[28] In order to check whether a distortion occurred in the *All Enterprises Tankan* owing to bankruptcies etc., we examined the difference between the continuing sample distribution and the omitting sample distribution by stratum adopting the "rank sum test." This examination was conducted using the respondents of the February 1995 survey and those of the March 1997 survey. According to this, there was no significant distortion except for some data (Chart 10).
The procedure was as follows:
(1) Divide the samples into two groups, the continuing sample group and the omitting sample group.

Continuing samples	x_1 , x_2 , ········ , x_m
Omitting samples	y_1 , y_2 , ········ , y_n

kinds of problems cannot be avoided.   This approach will not only prevent a decrease in statistical accuracy and a decline in the number of sample enterprises but will also be effective in lessening the gap between the old and new data, which occurs when the samples are rearranged.

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(2) Combine the two groups and list them according to size.   Number the samples as follows:

			←Small			Large→	
Continuing samples	Data		x_1	x_2	....	x_{m-1}	x_m
	Rank		a_1	a_2	....	a_{m-1}	a_m
	<eg>	Data	110	120	....	260	280
		Rank	2	3	....	25	26
Omitting samples	Data		y_1	y_2	....	y_{n-1}	y_n
	Rank		b_1	b_2	....	b_{n-1}	b_n
	<eg>	Data	100	130	....	150	180
		Rank	1	4	....	10	20

(3) The null hypothesis is: H_0: the locations of the continuing sample and omitting sample distributions are the same.   When the test statistic W_0 is $W_0 = \sum_{i=1}^{n} b_i$ (when it is $m \leq n$, $m > n$, it will be $W_0 = \sum_{i=1}^{m} a_i$)   When the (m, n) is small, we find the $\underline{w}_{m,n}, \overline{w}_{m,n}$ from the Rank Sum Test, and find the critical region from either $W_0 \leq \underline{w}_{m,n}$ or $\overline{w}_{m,n} \leq W_0$.   When the (m, n) is large, we find the critical region from the normal distribution chart as the W_0 is similar to the normal distribution $N\left(\dfrac{m(m+n+1)}{2}, \dfrac{mn(m+n+1)}{12} \right)$.

(Chart 1)

# Number of Population and Sample Enterprises by Industry and Scale

	Total		Large enterprises		Medium-sized enterprises		Small enterprises	
	Population	Sample	Population	Sample	Population	Sample	Population	Sample
All industries	160,002	9,433	2,715	1,436	38,736	2,976	118,551	5,021
Manufacturing	31,404	3,923	1,078	781	3,113	1,116	27,213	2,026
Textiles	3,206	301	42	30	180	49	2,984	222
Lumber & Wood products	1,073	118	12	10	68	26	993	82
Pulp & Paper	954	131	18	16	78	34	858	81
Chemicals	1,221	267	113	87	204	73	904	107
Petroleum & Coal products	79	42	10	10	19	12	50	20
Ceramics	1,319	199	28	23	107	48	1,184	128
Iron & Steel	675	150	30	28	78	42	567	80
Nonferrous metals	522	112	24	21	55	25	443	66
Food & Beverages	4,329	453	124	84	418	134	3,787	235
Processed metals	2,355	245	43	31	190	74	2,122	140
Industrial machinery	3,334	475	101	80	325	133	2,908	262
Electrical machinery	4,792	652	251	165	622	247	3,919	240
Shipbuilding & Heavy machinery	231	68	10	10	21	13	200	45
Motor Vehicles	1,695	278	127	98	217	80	1,351	100
Other transportation machinery	236	47	9	8	27	13	200	26
Precision machinery	758	127	35	27	95	31	628	69
Other manufacturing	4,625	258	101	53	409	82	4,115	123
Nonmanufacturing	128,598	5,510	1,637	655	35,623	1,860	91,338	2,995
Construction	9,134	715	201	107	526	80	8,407	528
Real estate	1,199	194	26	12	116	25	1,057	157
Wholesaling	32,986	1,348	258	83	5,784	305	26,944	960
Retailing	31,550	1,152	398	174	10,552	652	20,600	326
Transportation	9,237	690	200	115	786	113	8,251	462
Communication	158	42	15	9	36	12	107	21
Electric & Gas utilities	130	52	18	17	12	10	100	25
Services	42,954	1,142	505	125	17,412	600	25,037	417
Leasing	1,125	143	11	9	388	55	726	79
Other nonmanufacturing	125	32	5	4	11	8	109	20

Note: 1. Figures above are based on the March 1999 survey and differ slightly

from the number of sample enterprises in the sample design (Chart 6).

2. The criteria for each scale of enterprises are as follows:

○ Large enterprises …1,000 employees and over

○ Medium sized enterprises… 300-999 employees
(100-999 employees for wholesaling, 50-999 employees for retailing, service and leasing)

○ Small enterprises… 50-299 employees
(20-99 employees for wholesaling, 20-49 employees for retailing, service and leasing)

(Chart 2)

Distribution of Correlation Coefficient
Between Sales and Business Fixed Investment

% share out of all strata
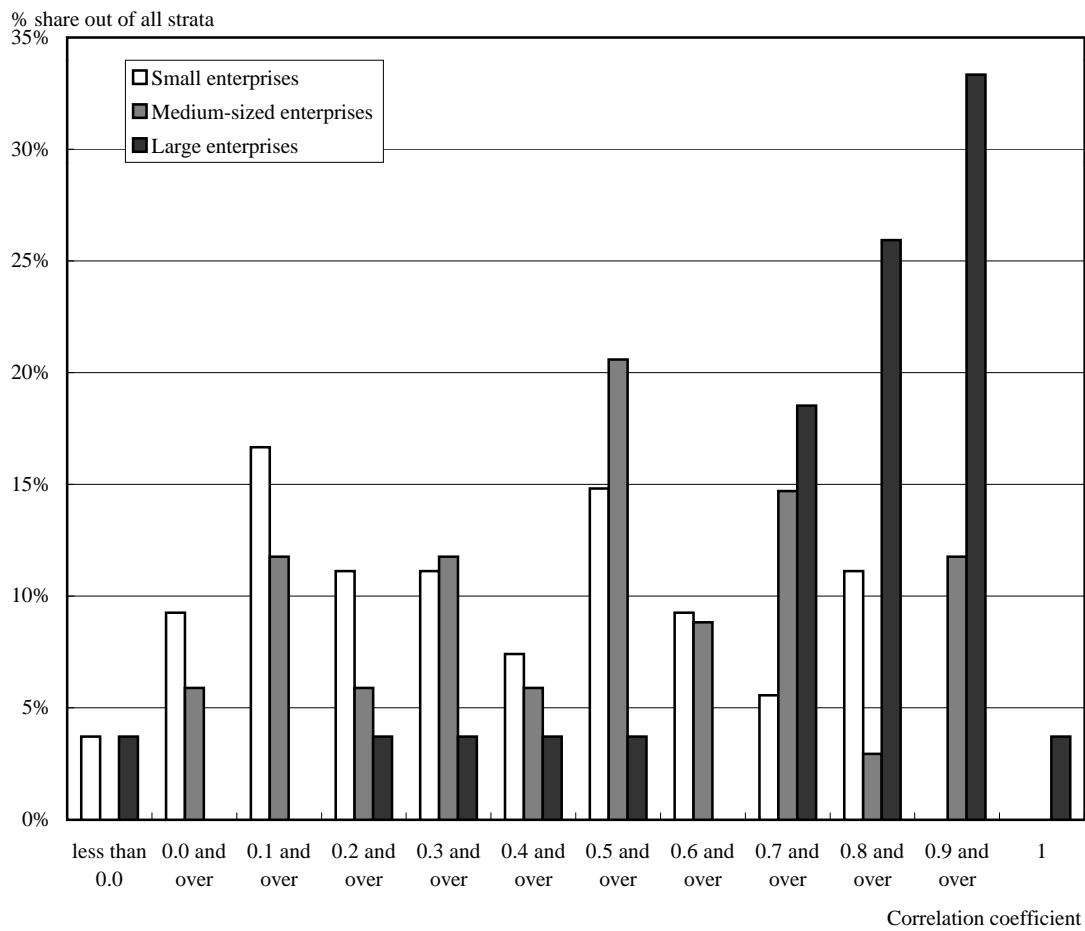
Note: This table shows the correlation coefficient between sales and business fixed investment in each stratum.

(Chart 3)

Distribution of Sample Enterprises (1,000 employees and over)

trill. yen

Electrical machinery

thous. employees

trill. yen

Motor vehicles

thous. employees

trill. yen

Wholesaling

thous. employees
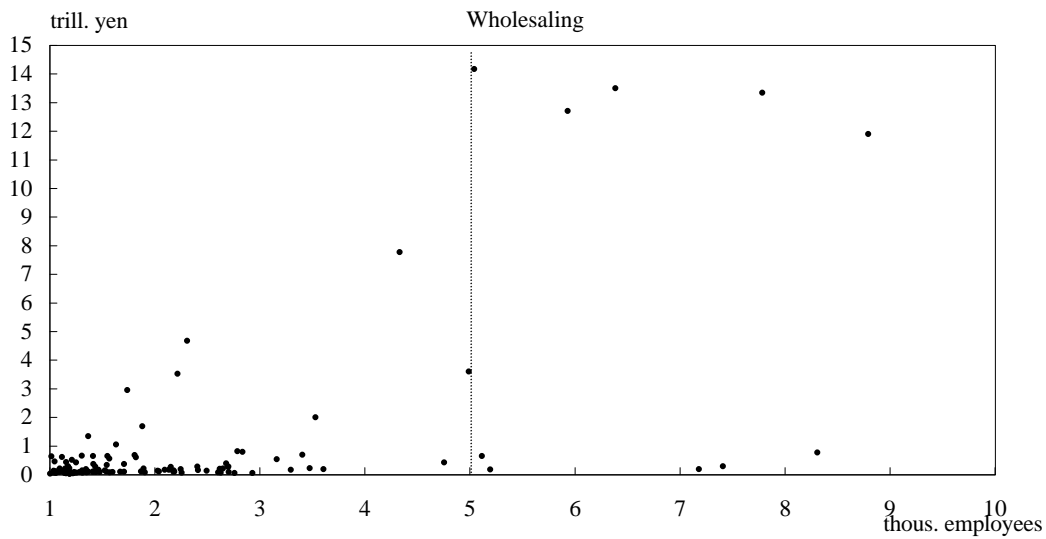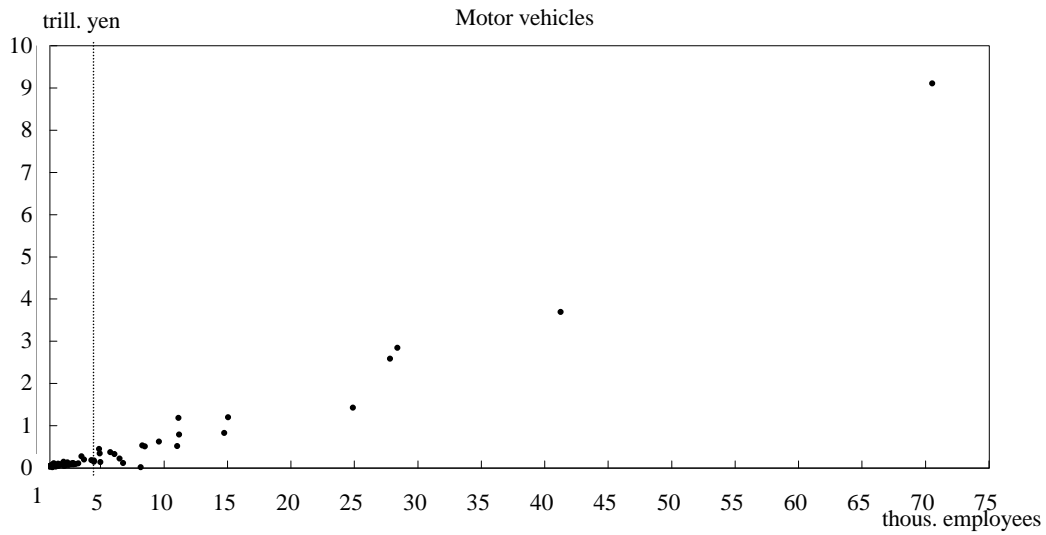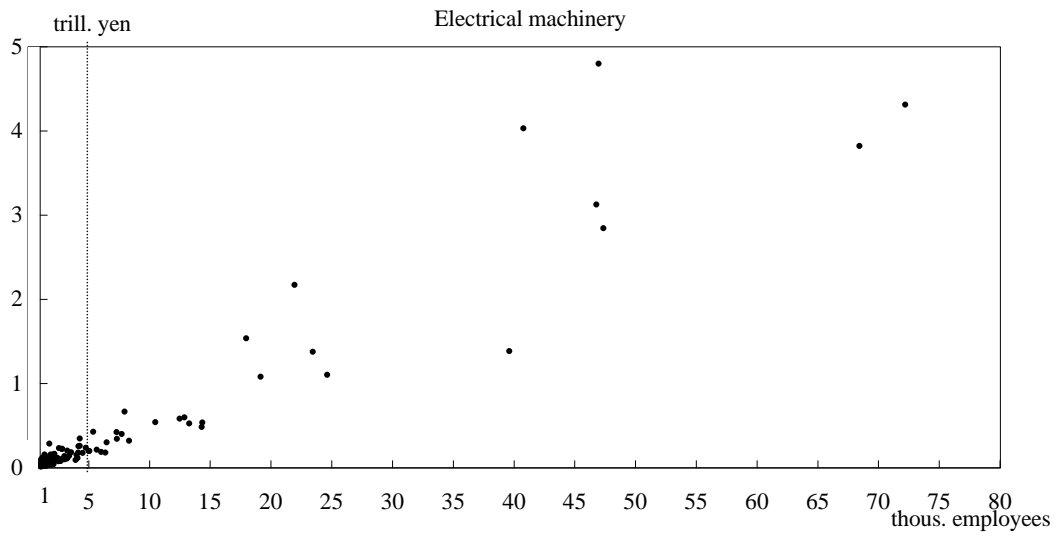
Note: The charts have been compiled using enterprises listed in the Nikkei Needs.
   The vertical line indicates sales for fiscal 1999 and the horizontal line the number of employees
   at the end of fiscal 1999.

(Chart4)

Distribution of Sales and Business Fixed Investment by Scale

Sales
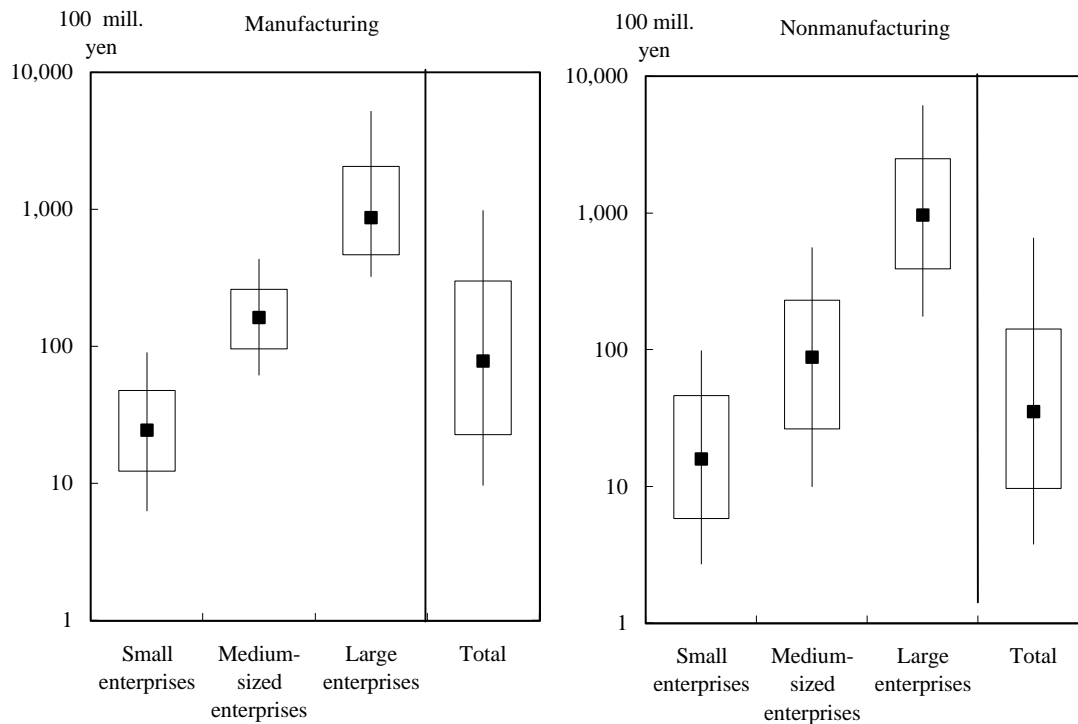
Business Fixed Investment
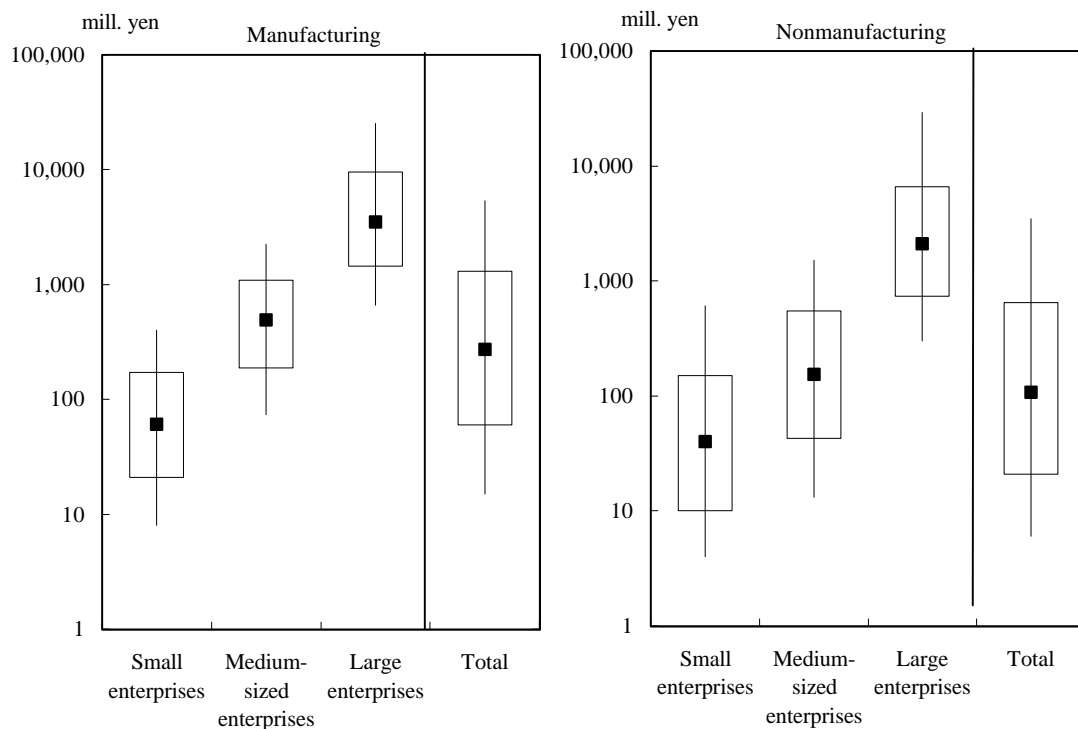
This graph, named box-and-whisker plots, shows the distribution of sample enterprises in each stratum. The box shows the inter quartile range. The straight line indicates the inter decimal range. The plot in the box indicates the medium.

Notes: 1.Data of FY 1996 are based on the June 1997 survey.
2.The vertical line is majored by a logarithm.
3.Enterprises that have no business fixed investment are omitted from the sample.

(Chart5)

Added Sampling After the Check of Distribution Between Sample Enterprises and Population
(Electrical Machinery, Medium-sized enterprises)

Enterprises
250

Enterprises
100

- Number of necessary samples (right scale)
- Number of sample enterprises before revision (right scale)
- Number of population enterprises (left scale)

200 — 80
150 — 60
100 — 40
50 — 20
0 — 0

300 employees and over
400 employees and over
500 employees and over
600 employees and over
700 employees and over
800 employees and over
900 employees to 999 employees

number of regular employees

(Chart 6)

Breakdown of Sample Enterprises

	Total		Large enterprises				Medium-sized enterprises						
					Scale 1		Scale 2				Scale 2		Scale 3		Scale 4	
All industries	9,510	(1,094)	1,438	(39)	1,168	(39)	270	(0)	2,996	(287)	1,391	(81)	1,046	(206)	559	(0)
Manufacturing	3,949	(299)	782	(1)	580	(1)	202	(0)	1,119	(89)	791	(30)	328	(59)		
Textiles	303	(20)	30	(0)	30	(0)			49	(0)	49	(0)				
Lumber & Wood products	121	(1)	10	(0)	10	(0)			27	(0)	27	(0)				
Pulp & Paper	131	(12)	16	(0)	16	(0)			34	(0)	34	(0)				
Chemicals	268	(5)	87	(0)	87	(0)			73	(0)	73	(0)				
Petroleum & Coal products	42	(7)	10	(0)	10	(0)			12	(0)	12	(0)				
Ceramics	199	(5)	23	(0)	23	(0)			48	(1)	48	(1)				
Iron & Steel	152	(4)	29	(0)	29	(0)			42	(0)	42	(0)				
Nonferrous metals	113	(0)	21	(0)	21	(0)			25	(0)	25	(0)				
Food & Beverages	455	(42)	84	(0)	84	(0)			134	(11)	134	(11)				
Processed metals	246	(21)	31	(0)	31	(0)			75	(6)	75	(6)				
Industrial machinery	479	(44)	80	(0)	80	(0)			133	(5)	133	(5)				
Electrical machinery	657	(103)	165	(0)	36	(0)	129	(0)	248	(59)			248	(59)		
Shipbuilding & Heavy machinery	69	(1)	10	(1)	10	(1)			13	(0)	13	(0)				
Motor Vehicles	279	(0)	98	(0)	25	(0)	73	(0)	80	(0)			80	(0)		
Other transportation machinery	48	(7)	8	(0)	8	(0)			13	(0)	13	(0)				
Precision machinery	128	(4)	27	(0)	27	(0)			31	(0)	31	(0)				
Other manufacturing	259	(23)	53	(0)	53	(0)			82	(7)	82	(7)				
Nonmanufacturing	5,561	(795)	656	(38)	588	(38)	68	(0)	1,877	(198)	600	(51)	718	(147)	559	(0)
Construction	719	(99)	107	(4)	107	(4)			80	(0)	80	(0)				
Real estate	197	(3)	12	(0)	12	(0)			25	(3)	25	(3)				
Wholesaling	1,362	(333)	83	(4)	15	(4)	68	(0)	309	(0)			134	(0)	175	(0)
Retailing	1,161	(175)	174	(6)	174	(6)			655	(140)	221	(26)	298	(114)	136	(0)
Transportation	693	(88)	115	(1)	115	(1)			113	(12)	113	(12)				
Communication	43	(24)	9	(3)	9	(3)			13	(6)	13	(6)				
Electric & Gas utilities	52	(1)	17	(0)	17	(0)			10	(0)	10	(0)				
Services	1,157	(56)	125	(13)	125	(13)			609	(33)	116	(0)	270	(33)	223	(0)
Leasing	145	(7)	10	(7)	10	(7)			55	(0)	14	(0)	16	(0)	25	(0)
Other nonmanufacturing	32	(9)	4	(0)	4	(0)			8	(4)	8	(4)				

			Small enterprises					
			Scale 4		Scale 5		Scale 6	
All industries	5,076	(768)	2,113	(310)	2,021	(225)	942	(233)
Manufacturing	2,048	(209)	1,373	(189)	675	(20)		
Textiles	224	(20)	146	(20)	78	(0)		
Lumber & Wood products	84	(1)	53	(0)	31	(1)		
Pulp & Paper	81	(12)	49	(12)	32	(0)		
Chemicals	108	(5)	69	(5)	39	(0)		
Petroleum & Coal products	20	(7)	10	(2)	10	(5)		
Ceramics	128	(4)	86	(4)	42	(0)		
Iron & Steel	81	(4)	49	(0)	32	(4)		
Nonferrous metals	67	(0)	39	(0)	28	(0)		
Food & Beverages	237	(31)	171	(31)	66	(0)		
Processed metals	140	(15)	98	(15)	42	(0)		
Industrial machinery	266	(39)	181	(39)	85	(0)		
Electrical machinery	244	(44)	198	(44)	46	(0)		
Shipbuilding & Heavy machinery	46	(0)	21	(0)	25	(0)		
Motor Vehicles	101	(0)	63	(0)	38	(0)		
Other transportation machinery	27	(7)	14	(1)	13	(6)		
Precision machinery	70	(4)	40	(0)	30	(4)		
Other manufacturing	124	(16)	86	(16)	38	(0)		
Nonmanufacturing	3,028	(559)	740	(121)	1,346	(205)	942	(233)
Construction	532	(95)	310	(44)	222	(51)		
Real estate	160	(0)	82	(0)	78	(0)		
Wholesaling	970	(329)			403	(125)	567	(204)
Retailing	332	(29)			165	(5)	167	(24)
Transportation	465	(75)	317	(71)	148	(4)		
Communication	21	(15)	10	(5)	11	(10)		
Electric & Gas utilities	25	(1)	11	(0)	14	(1)		
Services	423	(10)			246	(5)	177	(5)
Leasing	80	(0)			49	(0)	31	(0)
Other nonmanufacturing	20	(5)	10	(1)	10	(4)		

Notes: 1. Figures are those at the time of sample design and differ from those of the March 1999 survey.
    Figures in parentheses indicate the number of newly added enterprises.
  2. The breakdown of Scale 1-5 of large, medium-sized, and small enterprises indicates the stratification
    at the time of sample design. The strata are as follows:

	Electrical machinery, Motor vehicles	Wholesaling	Retailing, Service, Leasing	Others
Scale 1	5,000 employees -	5,000 employees -	1,000 employees -	1,000 employees -
Scale 2	1,000 - 4,999 employees	1,000 - 4,999 employees	300 - 999 employees	300 - 999 employees
Scale 3	300 - 999 employees	300 - 999 employees	100 - 299 employees	--
Scale 4	100 - 299 employees	100 - 299 employees	50 - 99 employees	100 - 299 employees
Scale 5	50 - 99 employees	50 - 99 employees	30 - 49 employees	50 - 99 employees
Scale 6	--	20 - 49 employees	20 - 29 employees	--

(Chart7)

Changes of Business Conditions D.I.and Range of Standard Error

% point

Large enterprises

% point
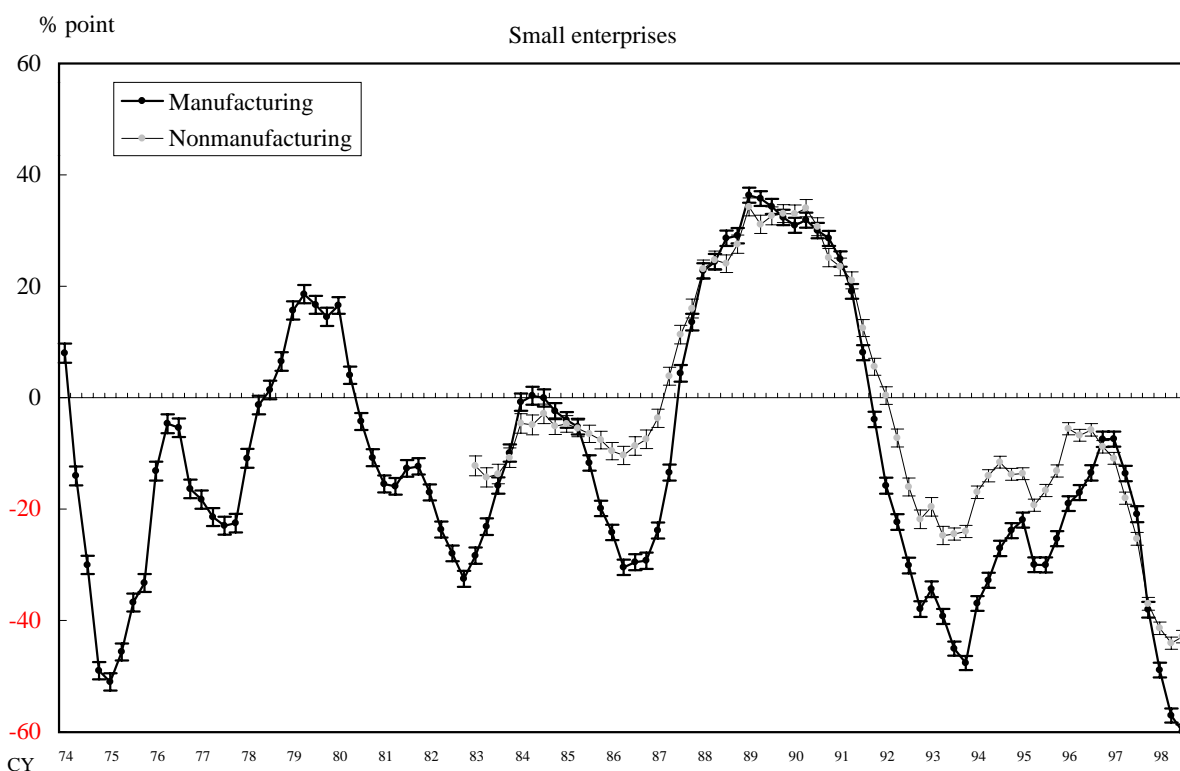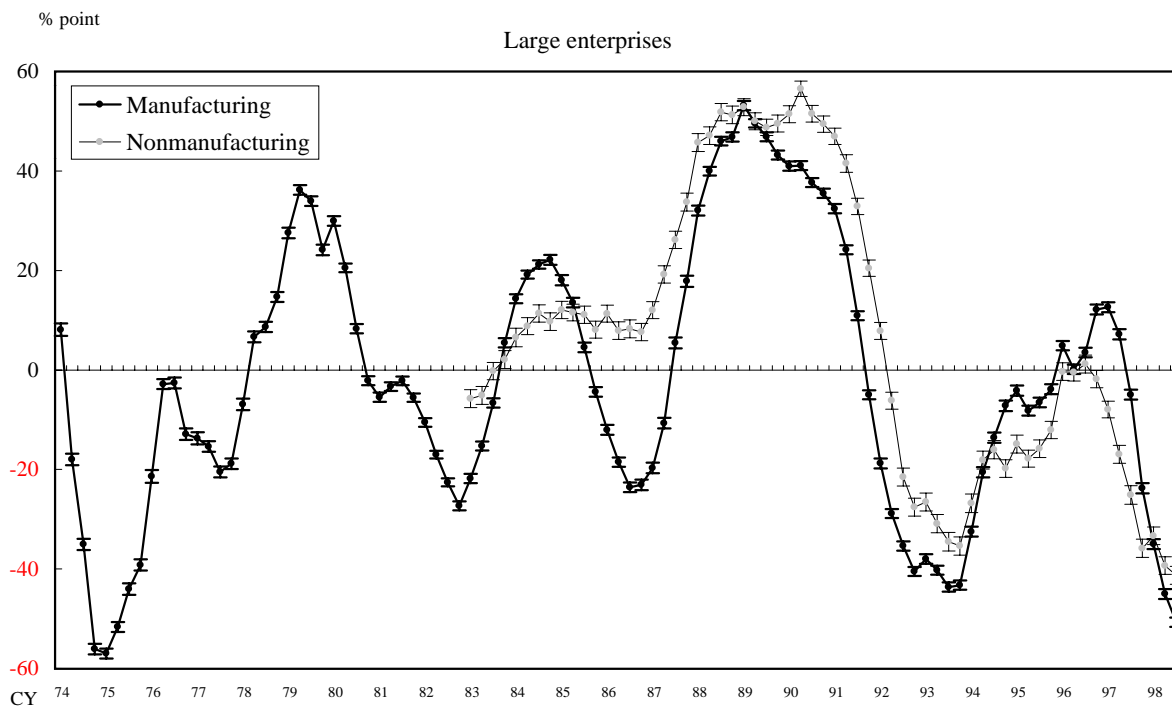
Small enterprises

Note: The range between the upper line and the lower line shows the range of the standard error of the Business
Conditions DI (=1 S.E)

(Chart 8)

Changes in the Number of Sample Enterprises and All Enterprises Nationwide
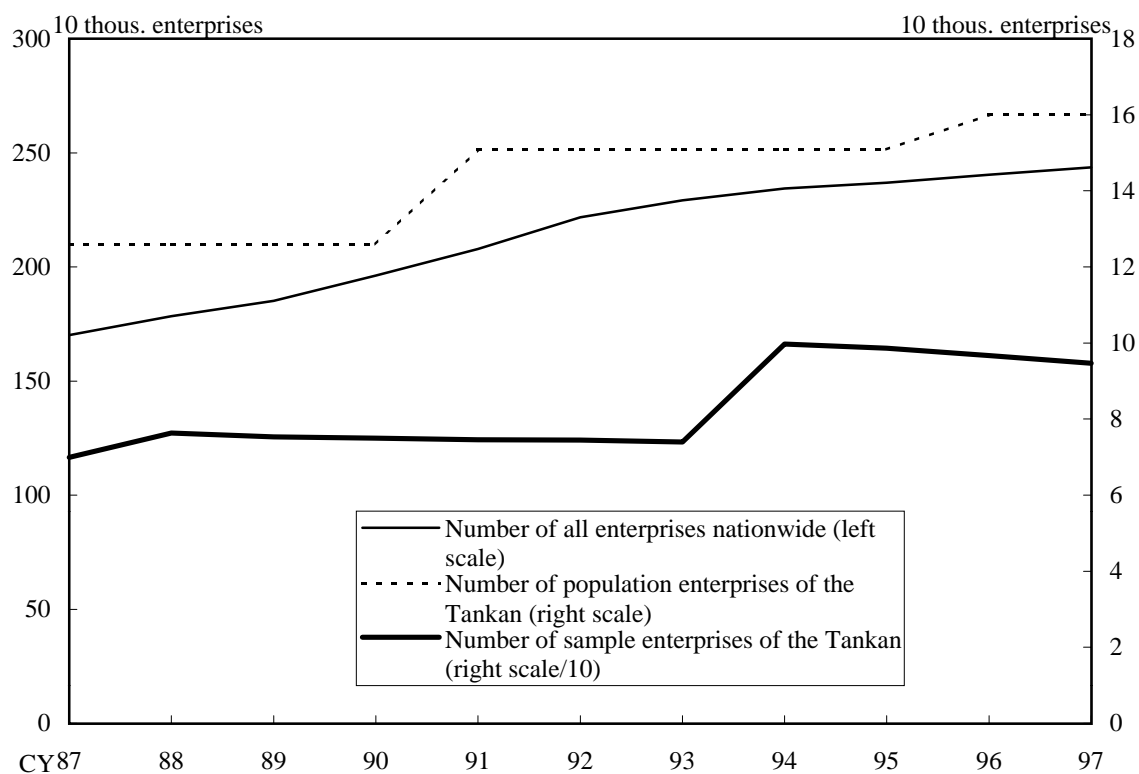
Notes: 1. The data source of the number of all enterprises is the National Tax Agency.
  2. The numbers of population enterprises and sample enterprises are based on the following surveys:
     population enterprises: Establishment and Enterprises Census of Japan (July 1986, July 1991)
     sample enterprises: June each year.

(Chart 9)

Percentage Change of Population Estimate Caused by Corporate Spin-offs
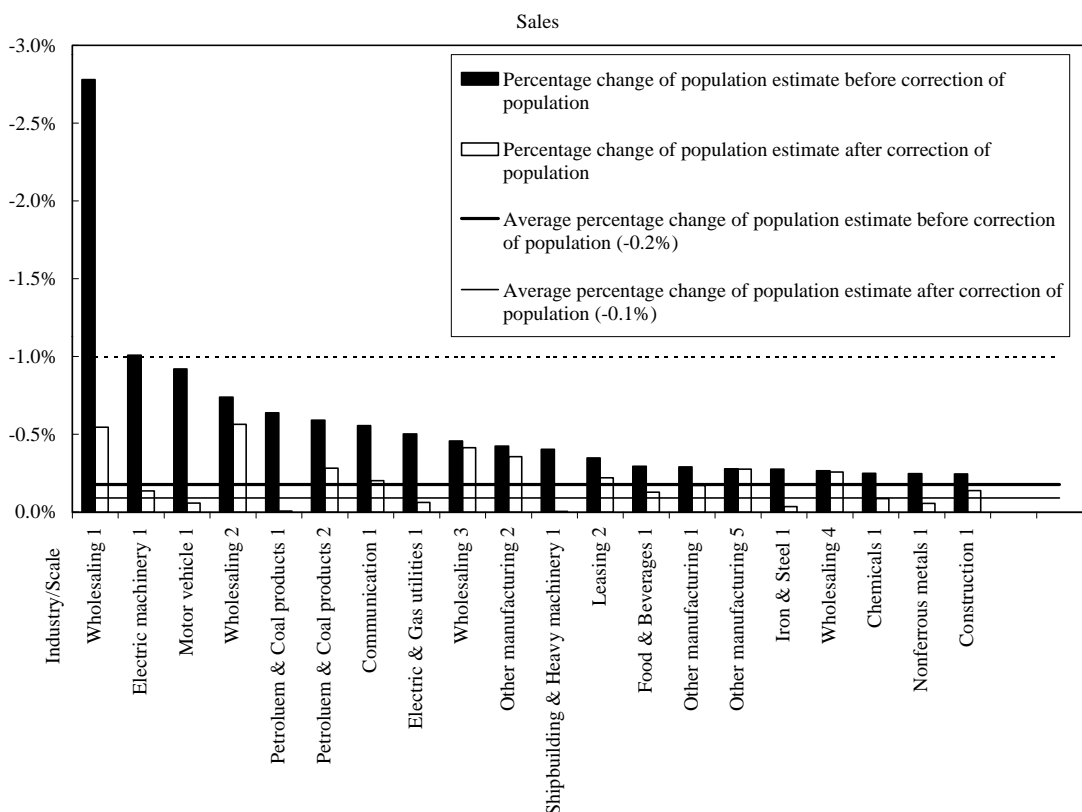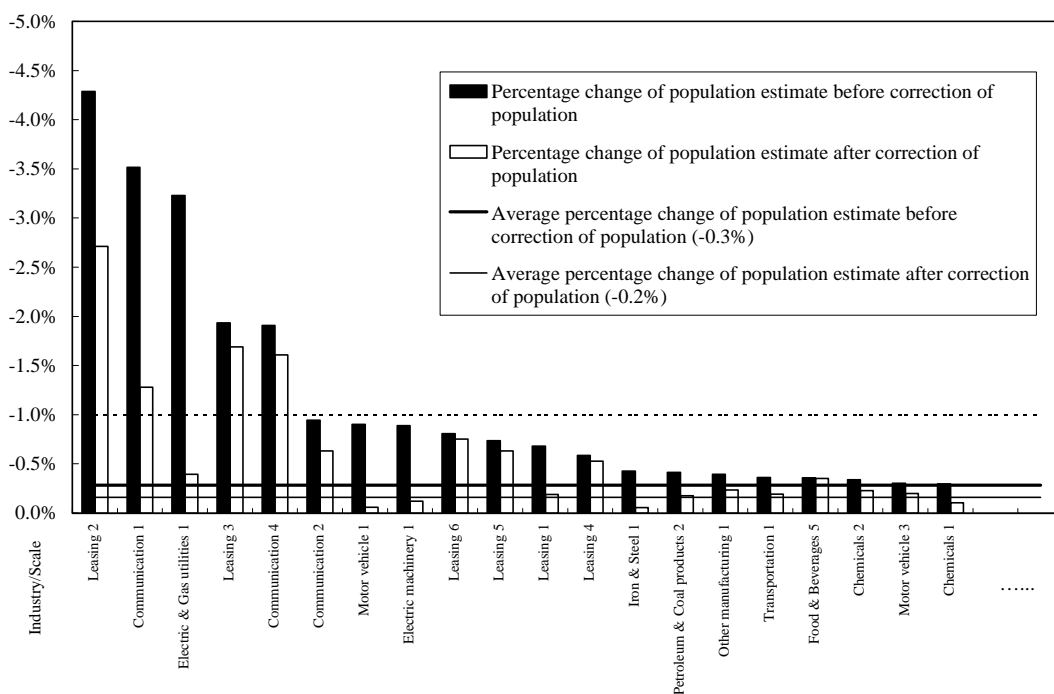──Simulation result: when a company spins off into two subdivisions──

Sales

Legend:
- Percentage change of population estimate before correction of population
- Percentage change of population estimate after correction of population
- Average percentage change of population estimate before correction of population (-0.2%)
- Average percentage change of population estimate after correction of population (-0.1%)

Industry/Scale: Wholesaling 1, Electric machinery 1, Motor vehicle 1, Wholesaling 2, Petroluem & Coal products 1, Petroluem & Coal products 2, Communication 1, Electric & Gas utilities 1, Wholesaling 3, Other manufacturing 2, Shipbuilding & Heavy machinery 1, Leasing 2, Food & Beverages 1, Other manufacturing 1, Other manufacturing 5, Iron & Steel 1, Wholesaling 4, Chemicals 1, Nonferrous metals 1, Construction 1

Business Fixed Investment

Legend:
- Percentage change of population estimate before correction of population
- Percentage change of population estimate after correction of population
- Average percentage change of population estimate before correction of population (-0.3%)
- Average percentage change of population estimate after correction of population (-0.2%)

Industry/Scale: Leasing 2, Communication 1, Electric & Gas utilities 1, Leasing 3, Communication 4, Communication 2, Motor vehicle 1, Electric machinery 1, Leasing 6, Leasing 5, Leasing 1, Leasing 4, Iron & Steel 1, Petroleum & Coal products 2, Other manufacturing 1, Transportation 1, Food & Beverages 5, Chemicals 2, Motor vehicle 3, Chemicals 1 ......

Note: The vertical line indicates the percentage change of population estimate based on the six divisions by industry and scale each affected by the corporate spin-off within a stratum (118 strata by industry and scale).
The horizontal line indicates the 20 strata sampled out of all 118 strata which have been affected the most by the spin-off.

(Chart 10)

Test of Significance of Distribution Between Continuing Samples and Omitting Samples

Scale / Category	Large enterprises		Medium-sized enterprises		Small enterprises		
	Scale 1	Scale 2	Scale 3	Scale 4	Scale 4	Scale 5	Scale 6
Textiles	-	○			○	○	
Lumber & Wood products	-	-			○	○	
Pulp & Paper	○	○			○	-	
Chemicals	-	○			○	○	
Petroleum & Coal products	-	-			-	-	
Ceramics	-	-			○	-	
Iron & Steel	-	-			-	-	
Nonferrous metals	-	-			-	○	
Food & Beverages	-	○			-	○	
Processed metals	-	○			-	○	
Industrial machinery	-	-			○	○	
Electrical machinery	-	○			○	○	
Shipbuilding & Heavy machinery	-	-			-	-	
Motor Vehicles	-	-			○	-	
Other transportation machinery	-	-			○	-	
Precision machinery	○	○			○	○	
Other manufacturing	-	○			○	○	
Construction	○	-			○	○	
Real estate	-	-			-	○	
Wholesaling	-	-	○		○	○	○
Retailing	-	○	×	×		○	-
Transportation	○	○			○	○	
Communication	○	-			-	-	
Electric & Gas utilities	-	-			○	-	
Services	-	○	○	○		×	○
Leasing	-	-	-	-		○	○
Other nonmanufacturing	-	-			-	○	

Notes: 1. The table is the results of the "rank sum test" using the respondents of the February 1995 survey and those of the March 1997 survey.

2. The significance level is 95% (○ : stratum with no significant difference, × : stratum with a significant difference, - : stratum excluded from the testing).

3. Large, medium-sized, and small enterprises are divided according to scale in order to conduct the population estimate. The strata are as follows:

	Wholesaling, retailing, service, leasing	Others
Scale 1	1,000 employees -	1,000 employees -
Scale 2	300 - 999 employees	300 - 999 employees
Scale 3	100 - 299 employees	--
Scale 4	50 - 99 employees	100 - 299 employees
Scale 5	30 - 49 employees	50 - 99 employees
Scale 6	20 - 29 employees	--