Appendix 3
Sampling Methods, Estimation Method of Results and Sampling Error of the Estimates

1 Sampling Method

The population of "the Monthly Survey on Service Industries" is based on the 2009 Economic Census for Business Frame.[*1] Using statistical methods, this survey takes samples from establishments and enterprises, etc. throughout the country engaging mainly in the industries listed in (1) below. Sample sizes are as follows.

Monthly survey	Establishments:	Approximately 26,000
	Enterprises, etc.:	Approximately 13,000
Annual survey	Establishments:	Approximately 67,000
	Enterprises, etc.:	Approximately 9,500

*1   Establishments and enterprises, etc. are extracted based on the 2009 Economic Census for Business Frame. Establishments and enterprises, etc. newly established after the implementation of the 2009 Economic Census for Business Frame are also added to the population to implement appropriate sampling, based on various information collected in the subsequent years. When an establishment closes down, a replacement establishment is selected and added to the subjects of the survey.

(1) Coverage of the Survey (Refer to Appendix 7)

The survey covers industries classified in divisions designated by the Japan Standard Industrial Classification (Rev.12, November 2007) as shown below (except for the group "Establishments engaged in administrative or ancillary economic activities" set for each major group).

- G   Information and communications[*2]
- H   Transport and postal activities
- K   Real estate and goods rental and leasing
- L   Scientific research, professional and technical services
      *Excluding the major group "71 Scientific and development research institutes" and the industry "7282 Pure holding companies"
- M   Accommodations, eating and drinking services
- N   Living-related and personal services and amusement services
      *Excluding the group "792 Domestic services"
- O   Education, learning support
      *Excluding the major group "81 School education"
- P   Medical, health care and welfare
      *Excluding the group "841 Public health centers," "851 Social insurance organizations," and "852 Welfare offices"
- R   Services, n.e.c.
      *Excluding the major group "93 Political, business and cultural organizations," "94 Religion," and "96 Foreign governments and international agencies in Japan"

*2   Since another annual survey covers "G Information and communications," it is not covered in the Annual Survey on Service Industries. (The Monthly Survey covers this division).

(2) Sampling and Sample Rotation
A. Enterprises, etc. (census group)
  (a) The survey is conducted on all enterprises, etc. mainly engaging in the following industries.

    (i)   Group "371 Fixed telecommunications" [*3]

    (ii) Group "372 Mobile telecommunications" [*3]

    (iii) Group "381 Public broadcasting except cablecasting" [*3]

    (iv) Major group "42 Railway transport"

    (v) Major group "46 Air transport"

    (vi) Major group "49 Postal activities including mail delivery service"

       [*3]   These groups are not included in the Annual Survey on Service Industries as they are categorized in "G Information and communications."

(b) The survey is conducted on all enterprises mainly engaging in the service industries other than those in (a) above, with capital, investment, or funds worth 100 million yen or more.

(c) The survey is conducted on a continuing basis without being replaced.

B. Establishments (census or sample survey group)

Establishments are extracted from those mainly engaging in service industries other than those in A.(a) above, excluding establishments that belong to the enterprises, etc. falling under the A.(a) and (b) above.

(a) Census is conducted continuously for establishments over a certain scale.

(b) Sample survey is conducted for establishments other than the (a) above. In principle, the survey continues for two years.

2   Estimation Method of Results

(1) Estimation of results

The results of the Annual Survey are aggregated by adding the estimates of enterprises etc. and establishments. These estimates are calculated after complementing missing values and correcting inconsistencies in answers by using the Economic Census and other public information of survey objects. Estimates of establishments in the sample survey group are calculated by ratio estimation for each stratum (by industry and size of number of persons) using the number of establishments based on the latest Economic Census available at the time of calculation as a benchmark.

The basic calculation formula is as follows (in the case of annual sales).

$$multiplier\ for\ ratio\ estimation = \frac{number\ of\ establishments\ as\ benchmark}{number\ of\ establishments\ in\ the\ population}$$

$$annual\ sales = annual\ sales\ by\ linear\ estimation \times multiplier\ for\ ratio\ estimation$$

* linear estimation: Estimating the overall figures by multiplying the value obtained from the sample by the inverse of the extraction rate.

(2) Estimation Procedure

Estimates procedure of estimates is as follows.

A. Calculate multiplier for linear estimation by multiplying annual sales etc. of each establishment in each stratum by the reciprocal of the extraction rate.

B. Multiply the value obtained by calculation of the above "A" by multiplier for ratio estimation to calculate the ratio estimated value $\hat{X}_h$ of each stratum.

C. Aggregate these $\hat{X}_h$ for each category to obtain results.

(Ref.) The procedure "A" and "B" in the survey group can be represented collectively as a calculation formula as follows.

$$\hat{X}_h = \sum_{i=1}^{n_h} x_{hi}\, W_h\, \frac{N'_h}{N_h}$$

h : Strata (by industry and size of the number of persons)

N_h: Number of establishments in the population in h-th stratum

n_h: Number of establishments surveyed in h-th stratum

W_h: Multiplier for linear estimation in h-th stratum (N_h/n_h)

N'_h: Number of benchmark establishments in h-th stratum

x_{hi}: Value for i-th establishment in h-th stratum

(3) Changing benchmark establishments

In the Annual Survey, the results are estimated by using the number of establishments based on the latest Economic Census available at the time of calculation as a benchmark. Thus, the result of the year when the benchmark is changed includes the variation due to this change.

3 Sampling Error of the Estimates

Sampling errors for total sum of annual sales is estimated by the following formula. The results are shown in the table.

The standard error rate (%): $\hat{\sigma}_{T_x}\ /\ \hat{T}_x\ \times 100$

Estimates of total sum of annual sales: $\hat{T}_x = \sum_{h=1}^{L} \hat{X}_h \qquad L : \text{number of strata}$

Standard error of total sum of annual sales: $\hat{\sigma}_{T_x} = \sqrt{\sum_{h=1}^{L} N'_h \left(N'_h - n_h\right) \frac{s_h^2}{n_h}}$

Sampling variance of annual sales in h-th stratum: $s_h^2 = \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (x_{hi} - \bar{X}_h)^2$

Mean of annual sales in h-th stratum: $\bar{X}_h = \frac{1}{n_h} \sum_{i=1}^{n_h} x_{hi}$

Table Sampling Error for Annual Sales of the Estimates by Industry (Detailed Groups)

Industry (Detailed groups)	Industry of Business Activity	Industry of Establishment and Enterprise,etc.
Total	0.4	-
Service industry	0.4	0.4
H Transport and postal activities	0.9	0.9
42 Railway transport	-	-
43 Road passenger transport	1.6	1.6
432 Common taxicab operators	3.1	3.1
43a Miscellaneous road passenger transport	1.4	1.4
44 Road freight transport	2.2	2.0
45 Water transport	1.7	1.7
47 Warehousing	1.7	1.8
48 Services incidental to transport	2.1	1.9
4* Air transport, postal activities, including mail delivery	-	-
K Real estate and goods rental and leasing	0.9	0.8
68 Real estate agencies	1.3	1.4
681 Sales agents of buildings and houses and land subdividers and developers	1.4	1.6
682 Real estate agents and brokers	2.9	2.8
69 Real estate lessors and managers	1.4	1.3
691 Real estate lessors, except house and room lessors	1.2	1.2
692 House and room lessors	3.6	3.6
693 Automobile parking	3.5	4.3
694 Real estate managers	3.0	2.4
70 Goods rental and leasing	1.8	1.6
704 Automobile rental	1.6	1.6
70a Miscellaneous goods rental and leasing	2.0	1.9
L Scientific research, professional and technical services 1)	1.0	0.9
72 Professional services, n.e.c.	2.2	2.0
724 Certified public accountants' and auditors' offices	4.0	4.0
72* Lawyers' offices etc.	4.1	4.1
721 Lawyers' and patent attorneys' offices	5.8	5.8
722 Notaries public's, judicial scriveners' and land and house surveyors' offices	6.7	6.7
723 Administrative scriveners'offices	15.3	15.3
725 Certified social insurance and labor consultants' offices	11.5	11.5
728 Business consultants and pure holding companies 2)	1.0	0.9
72# Design services and miscellaneous professional services	5.7	5.7
726 Design services	3.3	3.2
7291 Detective agencies and credit bureaus	4.3	4.3
72a Miscellaneous professional services	7.1	7.2
73 Advertising	1.7	1.6
74 Technical services, n.e.c.	1.4	1.4
741 Veterinary services	4.2	4.2
742 Engineering and architectural services	2.3	2.3
7421 Architectural design services	2.9	2.9
7422 Surveying services	3.4	3.4
7429 Miscellaneous engineering and architectural services	4.0	3.9
743 Mechanical design services	3.1	3.1
744 Commodity inspection and non-destructive testing services	4.6	4.6
745 Surveyor certification	11.2	11.9
746 Photographic studios	6.7	6.6
749 Miscellaneous technical services	2.3	2.3
M Accommodations, eating and drinking services	0.9	0.9
75 Accommodations	2.4	2.1
76 Eating and drinking places	1.1	1.1
761 Eating places, except specialty restaurants	1.7	1.9
762 Specialty restaurants	1.8	1.8

Industry (Detailed groups)	Industry of Business Activity	Industry of Establishment and Enterprise,etc.
7621 Japanese restaurants	3.3	3.3
762a Chinese and "ramen" (Chinese noodles) restaurants	3.3	3.3
762b Miscellaneous specialty restaurants	2.7	2.7
76a "Soba" and "udon" (Japanese noodles) restaurants and "sushi" bars	3.5	3.4
76b Miscellaneous eating and drinking places	1.9	1.9
77 Food take out and delivery services	2.1	2.2
N Living-related and personal services and amusement services	1.0	1.0
78 Laundry, beauty and bath services	2.4	2.3
781 Laundries	4.4	4.2
782 Barbershops	4.5	4.5
783 Hair-dressing and beauty salon	3.3	3.3
78a Miscellaneous laundry, beauty and bath services	6.2	6.2
79 Miscellaneous living-related and personal services 3)	1.4	1.4
791 Travel agency	1.8	1.8
796 Ceremonial occasions	2.4	2.5
7961 Funeral services	3.7	3.5
796a Miscellaneous ceremonial occasions	2.4	3.0
7962 Wedding ceremony halls	2.6	3.3
7963 Ceremonial occasion mutual aid society	6.4	6.8
79a Miscellaneous living-related and personal services	4.8	4.1
80 Services for amusement and hobbies	1.4	1.4
801 Cinemas	1.1	1.0
802 Perfomances (except otherwise claasified), theatrical companies	4.0	3.7
803 Bicycle, horse, motorcar and motorboat race track operations and companies	0.2	0.2
804 Sports facilities	2.2	2.1
8043 Golf courses	3.9	3.8
8044 Golf driving range operations	3.6	3.4
8045 Bowling alleys	4.2	2.4
8048 Fitness centers	3.5	3.2
804a Miscellaneous sports facilities	6.1	6.9
805 Public gardens and amusement parks	2.3	1.5
806 Amusement and recreation facilities	2.0	2.0
8064 "Pachinko" parlors	2.1	2.1
806a Miscellaneous amusement and recreation facilities	3.4	3.4
809 Miscellaneous amusement and recreation services	4.7	4.3
O Education, learning support 4)	3.1	3.0
82 Miscellaneous education, learning support	3.1	3.0
82a Social education and vocational and educational support facilities	3.8	3.7
821 Social education	3.0	2.8
822 Vocational and educational support facilities	9.5	10.3
82b Supplementary tutorial schools and instruction services for arts, culture and technicals	4.7	4.7
823 Supplementary tutorial schools	7.8	7.6
824 Instruction services for arts, culture and technicals	3.9	4.1
8245 Foreign language instructions	3.7	4.0
824a Miscellaneous instruction services for arts, culture and technicals	4.8	4.9
829 Educational and learning support services, n.e.c.	3.5	3.5
P Medical, health care and welfare	0.9	0.9
83 Medical and other health services	0.6	0.6
831 Hospitals	0.6	0.6
832 Clinics of medical practitioners	1.7	1.7
833 Dental clinics	2.7	2.7
83a Miscellaneous medical and other health services	3.9	4.1
84 Public health and hygiene 5)	4.3	4.4
85 Social insurance and social welfare 6)	2.9	2.9

Industry (Detailed groups)	Industry of Business Activity	Industry of Establishment and Enterprise, etc.
854 Welfare services for the aged and care services, except home care help services	3.1	3.1
854a Day care short stay services for the aged and home-visit care services	6.0	5.6
854b Miscellaneous welfare services for the aged and care services	3.6	3.7
85a Miscellaneous social insurance, social welfare and care services	7.2	7.2
R Services, n.e.c. 7)	1.2	1.2
88 Waste disposal business	3.2	3.1
881 Domestic waste disposal business	4.0	3.9
88a Miscellaneous waste disposal business	4.7	4.5
89 Automobile maintenance services	5.1	5.1
90 Machine, etc. repair services, except otherwise classified	2.2	2.1
901 Machine repair shops, except electrical machinery, apparatus, appliances and supplies	3.1	3.0
902 Electrical machinery, apparatus, appliances and supplies repair shop	2.2	2.1
90a Miscellaneous repair services, including paper hangers	6.9	6.8
91 Employment and worker dispatching services	2.3	2.2
911 Employment services	3.6	3.3
912 Worker dispatching services	2.6	2.5
92 Miscellaneous business services	2.0	2.0
921 Stenographic, entree document and copy services	4.6	4.0
922 Building maintenance services	3.2	2.9
923 Guard services	5.3	5.4
929 Business services, n.e.c.	2.9	2.9
95 Miscellaneous services	3.6	3.7
951 Meeting halls	4.2	4.4
95a Slaughterhouses, Services, n.e.c.	6.1	6.0
Others	−	−

*1 For the census group, Sampling Error is calculated as 0.

*2 "Service industry" excludes information and communications industries because enterprises, etc. and establishments engaged in "G Information and communications" are not surveyed in the Annual survey (Expanded survey) in contrast to Monthly survey. "Others" includes business activities other than "Service industry." "Total" is defined as "Service industry" plus "Others."

1) Excluding "scientific and development research institutes"

2) Excluding "pure holding companies"

3) Excluding "domestic services"

4) Excluding "school education"

5) Excluding "public health centers"

6) Excluding "social insurance organizations" and "welfare offices"

7) Excluding "political, business and cultural organizations," "religion" and "foreign governments and international agencies in Japan"