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Business Demography and Data Products from the Business Registers

Analysis of the effective utilization of the Business Register in Japan

1 Introduction

If we link Business Register data to website information, we can create new tabulations. As an experiment, we propose new tabulations that can be developed by using Economic Census data and restaurant guide website information. A restaurant guide website is a website by which people search online for restaurants when they eat out. It contains rich information about restaurants which is not covered in detail by Economic Census data.

2 Restaurant guide website information

First, we propose geographical tabulations based on the merged dataset of Economic Census data and restaurant guide website information. The major characteristics of restaurant guide website information are that 1) everyone can access it at no cost, 2) it is updated frequently and 3) it contains rich information about restaurants' locations, including longitude and latitude (Table 1). In the Economic Census, such information was not collected. The coverage of restaurant guide website information is less than that of the Business Register. For example, the coverage of boxed lunch stores is lower, because, as they do not offer service for people who are going to eat out, they do not have an incentive to register restaurant guide website information.

By using restaurant guide website information, statistical survey respondents can receive more information than they supply from geographical tabulations based on the merged dataset of Economic Census data and restaurant guide website information.

Table 1 The data items of restaurant guide website information

name / URL / type of cuisine / business category / area / nearest station / address / longitude and latitude / TEL / FAX / E-mail / access / business hours / regular holiday / average budget / credit card / total number of seats / banquet maximum persons / chartered occupancy / parking lot / private room / equipment and services.

[1] The views expressed in this paper are those of the author and do not necessarily reflect the policies of the Statistical Research and Training Institute. This work was supported by JSPS KAKENHI Grant Number 15K03400.

The restaurant guide website information contains longitude and latitude information of restaurants. Business Register contains longitude and latitude information of census tracts, but not of establishments. Figure 1 displays the geographical distribution of restaurants. Black dots indicate restaurants, and areas where black dots do not exist are parks, rivers, farmland areas, sea port areas and residential areas. There is a multitude of restaurants in the center of Tokyo. In the suburbs, restaurants are near railroad lines.

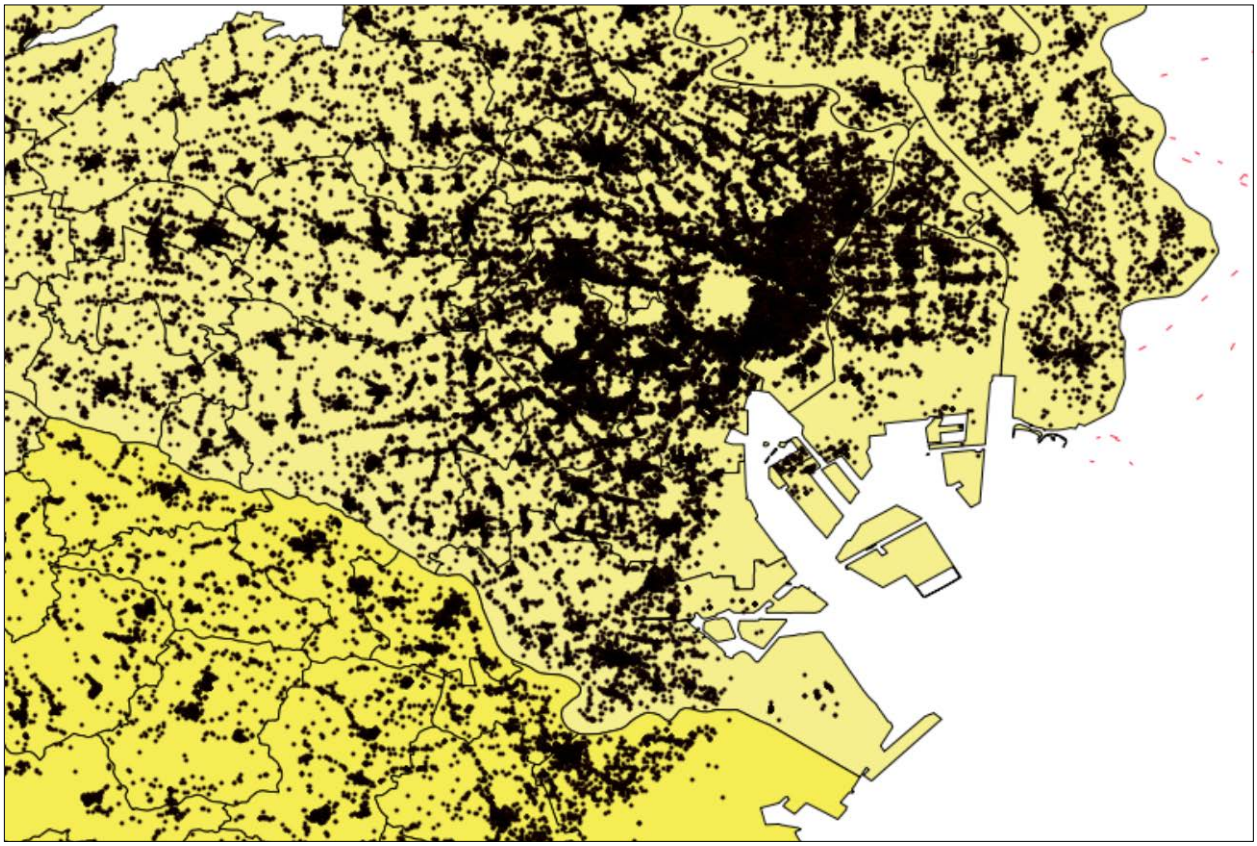

Figure 1 Geographical distribution of restaurants (black dots)
Area: Tokyo and Kanagawa prefecture Time period: 2016 January
Source: Restaurants guide website information

Table 2 shows aggregate numbers of restaurants in Shinjuku ward by type of cuisine and by time period from restaurant guide website information. We obtained the restaurant guide website information for five time periods: September 2014, February, June and October 2015, and January 2016. Economic Census for Business Frame was conducted in July 2014, and Economic Census for Business Activity was conducted in June 2016. When the survey results of Economic Census for Business Activity 2016 are disseminated, restaurant guide website information for the five time periods will be able to bridge the two censuses.

Table 2 The aggregate numbers of restaurants in Shinjuku ward
Source: Restaurant guide website information

Type of cuisine	2014 Sep	2015 Feb	2015 Jun	2015 Oct	2016 Jan
Asian or ethnic cuisine	360	379	353	354	323
Italian or French cuisine	443	453	446	445	429
Organic food	0	0	0	1	0
Cafe, Sweets	627	648	604	624	534
Curry	63	67	64	71	65
Bar, Dining bar	917	912	902	871	778
Buffet	22	22	23	22	16
Family restaurant - Fast food	130	129	121	124	108
Ramen noodles	305	313	302	294	266
Banquet, Karaoke	206	222	214	215	217
Tavern	1244	1235	1199	1188	1153
Sushi	201	209	193	194	165
Yakiniku-Hormone-Teppanyaki	290	304	296	304	302
Shokujidokoro	14	12	10	9	6
Shokudo or teishoku (set menu)	105	107	105	103	81
Creative cuisine	12	13	10	14	12
Multinational cuisine	2	2	2	2	1
Chinese	381	380	359	353	328
Hot pot	168	182	168	179	202
Boxed lunches	0	0	1	1	1
Fusion food	32	19	23	24	21
Vegetable dishes	5	4	3	2	1
Western, western cuisine	196	204	196	190	180
Japanese food	1288	1259	1201	1184	1084
Unknown	39	22	31	42	47
Total	7050	7097	6826	6810	6320

Table 3 The number of employment and sales of restaurants by type of cuisine in Shinjuku ward 2012
Source: Merged dataset of Economic Census data and restaurant guide website information

Type of cuisine	The number of restaurants matched	The number of employment	Sales (million JPY)	Sales per restaurant (million JPY)	Sales per employment (1000 JPY)
Asian or ethnic cuisine	13	92	229	18	2489
Italian or French cuisine	18	110	616	34	5598
Cafe, Sweets	51	512	3682	72	7191
Curry	7	47	159	23	3379
Bar, Dining bar	86	285	628	7	2203
Family restaurant - Fast food	11	158	665	60	4206
Ramen noodles	34	320	999	29	3123
Banquet, Karaoke	7	66	240	34	3635
Tavern	107	388	922	9	2376
Sushi	44	300	839	19	2797
Yakiniku-Hormone-Teppanyaki	22	322	2069	94	6426
Shokujidokoro	3	4	25	8	6373
Shokudo or teishoku (set menu)	20	130	410	21	3155
Creative cuisine	2	8	12	6	1498
Chinese	41	268	1325	32	4943
Hot pot	5	16	5	1	319
Western, western cuisine	19	129	267	14	2073
Japanese food	168	964	2665	16	2765
Total	658	4119	15757	24	3825

In the Economic Census for Business Activity, the number of employment (total of paid executives, non-paid family workers and paid employees) and sales were surveyed, but type of cuisine served at restaurants were not surveyed in such detailed classification, because of the response burden. In restaurant guide website information, there is no information about the number of employment and sales, because that is not necessary for people selecting a restaurant. Table 3 shows the number of employment and sales by type of cuisine. The table is made from the merged dataset of Economic Census data and restaurant website information. "Yakiniku-Hormone-Teppanyaki" (Korean and Japanese style beef grill) is the largest in terms of sales per restaurant. "Cafe, sweets" are the largest in terms of sales per employment.

3. Entry and Exit rate

By using restaurant guide website information, we can calculate the entry and exit rate of restaurants by type of cuisine. Table 4 shows entry rates, Table 5 shows exit rates of four intervals and their average. Here, "entry" is defined as a restaurant that did not exist at the beginning period or before but existed at the end of the period. "Exit" is defined as a restaurant that existed at the beginning of the period, but does not exist at the end of period or after. Restaurants that ceased to exist but appeared again are defined as "cessation" in the period they did not exist and "reactivate" in the period they appeared again.

Table 4 Entry rates by type of cuisine
Source: Restaurant guide website information Area: total of 23 wards of Tokyo prefecture

Type of cuisine	2014 Sep - 2015 Feb	2015 Feb -2015 Jun	2015 Jun -2015 Oct	2015 Oct -2016 Jan	Average
Asian or ethnic cuisine	16.3%	12.5%	10.2%	7.5%	11.6%
Italian or French cuisine	16.5%	13.8%	10.9%	8.1%	12.3%
Organic food	32.5%	14.3%	18.4%	12.6%	19.5%
Cafe, Sweets	13.9%	10.2%	6.7%	6.9%	9.4%
Curry	18.1%	14.7%	10.1%	8.6%	12.9%
Bar, Dining bar	14.9%	15.1%	10.0%	7.6%	11.9%
Buffet	25.9%	17.5%	18.1%	6.1%	16.9%
Family restaurant - Fast Food	8.2%	4.0%	1.8%	1.7%	3.9%
Ramen noodles	9.1%	10.1%	5.2%	6.4%	7.7%
Banquet, Karaoke	17.9%	15.5%	13.4%	9.2%	14.0%
Tavern	12.8%	13.2%	9.7%	7.1%	10.7%
Sushi	6.5%	5.4%	2.9%	3.6%	4.6%
Yakiniku-Hormone-Teppanyaki	13.2%	14.2%	10.4%	8.6%	11.6%
Shokujidokoro	17.9%	3.9%	1.3%	1.3%	6.1%
Shokudo or teishoku (set menu)	7.0%	6.2%	3.0%	3.6%	5.0%
Creative cuisine	10.0%	6.8%	12.4%	6.3%	8.9%
Multinational cuisine	25.0%	20.0%	8.5%	8.5%	15.5%
Chinese	8.6%	9.2%	5.1%	4.4%	6.8%
Hot pot	15.1%	23.8%	10.3%	9.1%	14.6%
Box lunches	11.1%	50.0%	8.3%	8.0%	19.4%
Fusion food	2.6%	4.1%	1.8%	1.2%	2.4%
Vegetable dish	10.4%	18.3%	7.4%	1.8%	9.5%
Yakuzen cuisine	9.1%	9.1%	18.2%	8.3%	11.2%
Western, western cuisine	12.1%	9.5%	7.2%	6.4%	8.8%
Japanese food	8.2%	10.2%	4.3%	4.6%	6.8%
Unknown	11.3%	24.6%	17.1%	26.2%	19.8%
Total	11.7%	11.7%	7.5%	6.6%	9.4%

Note: Sep. 2014 - Feb. 2015 is the entry and reactivate rate.

Table 5 Exit rates by type of cuisine
Source: restaurant guide website information Area: total of 23 wards of Tokyo prefecture

Type of cuisine	2014 Sep - 2015 Feb	2015 Feb -2015 Jun	2015 Jun -2015 Oct	2015 Oct -2016 Jan	Average
Asian or ethnic cuisine	11.4%	16.7%	8.5%	8.1%	11.2%
Italian or French cuisine	10.5%	16.2%	9.1%	7.9%	10.9%
Organic food	20.0%	14.3%	9.2%	6.3%	12.4%
Cafe, Sweets	7.9%	14.2%	5.6%	5.8%	8.4%
Curry	11.3%	16.4%	8.1%	6.5%	10.6%
Bar, Dining bar	10.5%	15.0%	8.6%	8.1%	10.5%
Buffet	15.2%	20.2%	13.8%	15.6%	16.2%
Family restaurant - Fast Food	3.9%	9.3%	3.0%	6.8%	5.7%
Ramen noodles	5.2%	12.5%	5.0%	5.7%	7.1%
Banquet, Karaoke	10.9%	16.4%	10.6%	8.2%	11.5%
Tavern	8.6%	14.9%	8.6%	7.3%	9.9%
Sushi	4.9%	9.5%	2.8%	4.6%	5.5%
Yakiniku-Hormone-Teppanyaki	8.8%	17.5%	7.8%	7.4%	10.4%
Shokujidokoro	4.3%	18.9%	6.3%	5.8%	8.8%
Shokudo or teishoku (set menu)	4.4%	9.4%	3.5%	5.9%	5.8%
Creative cuisine	5.6%	11.9%	7.6%	9.1%	8.6%
Multinational cuisine	16.7%	20.0%	8.5%	8.5%	13.4%
Chinese	5.9%	13.1%	4.8%	6.0%	7.4%
Hot pot	7.5%	28.8%	7.8%	7.0%	12.8%
Box lunches	33.3%	10.0%	0.0%	8.0%	12.8%
Fusion food	30.8%	26.0%	4.2%	4.1%	16.3%
Vegetable dish	5.2%	20.2%	7.4%	7.1%	10.0%
Yakuzen cuisine	9.1%	9.1%	9.1%	0.0%	6.8%
Western, western cuisine	8.2%	12.0%	6.0%	6.9%	8.3%
Japanese food	6.3%	13.1%	4.3%	5.5%	7.3%
Unknown	29.3%	17.9%	9.3%	12.0%	17.1%
Total	8.3%	14.3%	6.5%	6.7%	8.9%

Note: Oct. 2015 - Jan. 2016 is the cessation and exit rate.

"Entry rate" is defined as the number of entries divided by the average number of restaurants that existed at the beginning and end of the period. "Exit rate" is calculated in a similar manner. For the September 2014 to February 2015 interval, we calculated the entry and reactivate rate, because we cannot distinguish entries from reactivate. Similarly, for the October 2015 to January 2016 interval, we calculated the cessation and exit rate, because we cannot distinguish cessations from exit.

In existing Business Register, it is impossible to capture the entry and exit rates of restaurants in such short frequency. It is surprising that the entry and exit rates of restaurants are very high. It means that there is strong competition among restaurants in Shinjuku ward, the largest amusement are in Japan.

Figure 2 shows the correlation between entry and exit rates by type of cuisine. The entry rates and exit rates have a weak positive correlation (correlation coefficient is 0.649). It means that the types of cuisine with a high entry rate tend to have a high exit rate.

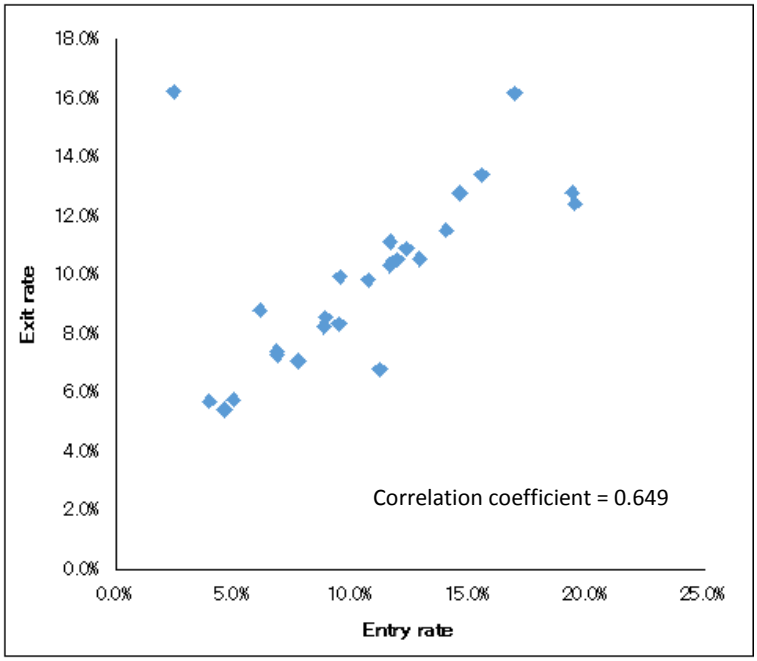

Figure 2 Correlation between entry and exit rates
(Dots indicate types of cuisine)

4. Tabulation based on railway lines

Second, we propose geographical tabulation based on railway lines. In Japan, administrative districts are used for geographical tabulation of business data, and this is thought to be conventional. However, the boundaries of many administrative districts were determined before modernization, and today, people tend to move along the railways or motorways that connect their homes, work places and shopping areas. Rather than staying inside the administrative districts in which they live, they freely move across administrative boundaries, and their actual behavioral spaces do not match administrative districts. If respondents saw geographical tabulation based on their actual behavioral spaces, they might say it is realistic and useful. We used QGIS, a cross-platform free and open-source desktop geographic information system (GIS) application that provides data viewing and editing. We applied QGIS for the restaurant guide website information and tabulated it by area along with railway lines.

We selected the Toyoko and Minatomirai Lines as examples. The Toyoko and Minatomirai Lines connect Shibuya (Tokyo) to Yokohama. From February 1, Tokyu Toyoko Line trains started a through service from Yokohama to the Minatomirai Line. Figure 3 shows the 800 meter buffer (circle with a radius of 800 meters) along with this railroad line (rail road station). In Figure 4, restaurants as black dots are overlapped with Figure 3.

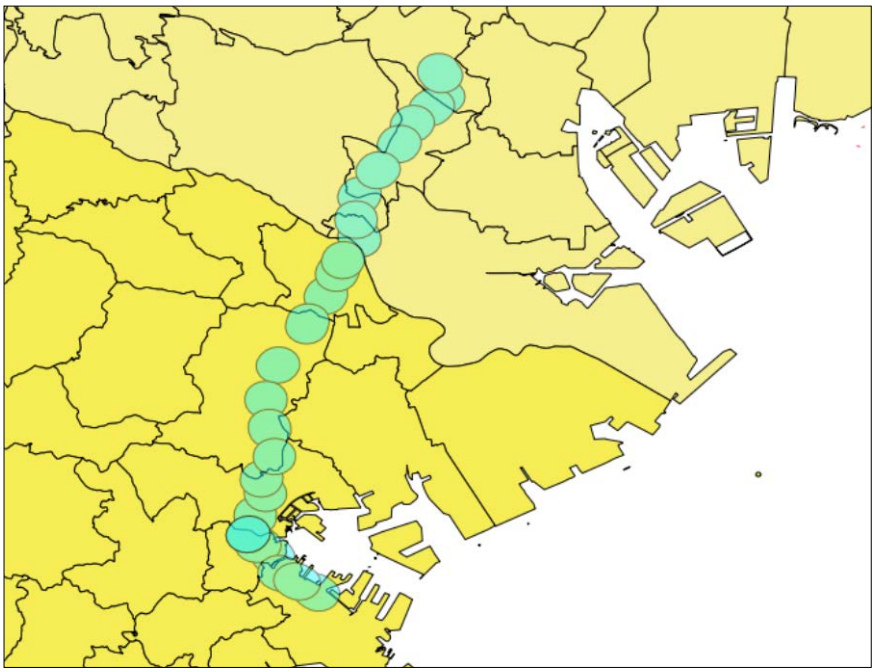

Figure 3 800 meter buffer along with Toyoko and Minatomirai Lines

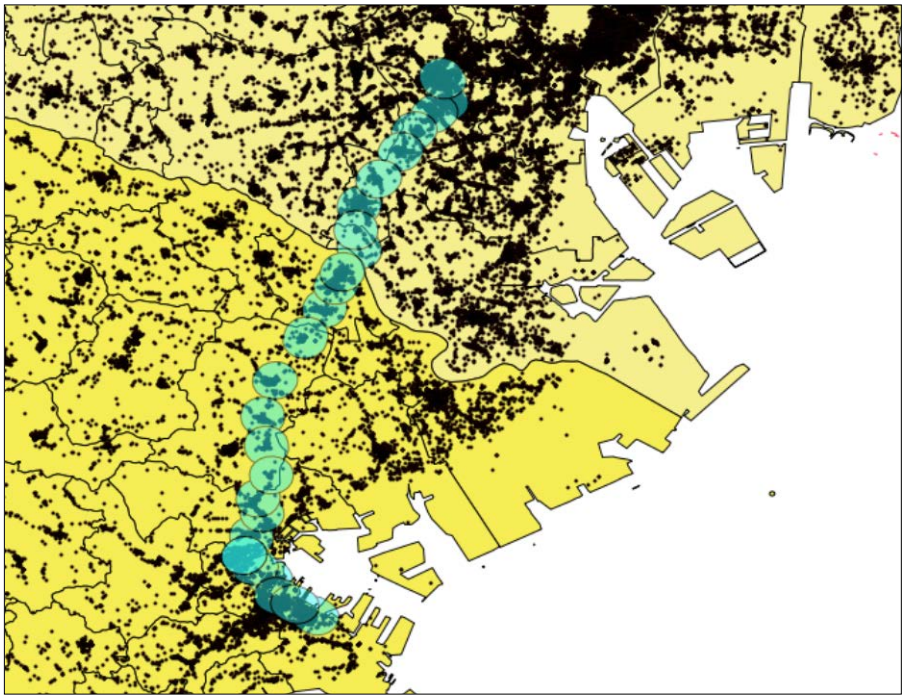

Figure 4 800 meter buffer along the Toyoko and Minatomirai Lines and restaurants (black dots)

We aggregated the number of restaurants within the 800m buffer along the Toyoko and Minato Mirai Lines by ward (Table 6). The outstanding feature is the large number of Chinese restaurants in Naka ward. It is well known that there is a large Chinatown in Naka ward, Yokohama City. One of the stations on the Minatomirai Line is “Motomachi-Chinatown.” People can compare their own experience with the information in the table, which may be interesting to respondents and other people.

Table 6 The aggregated numbers of restaurants along the Toyoko and Minato Mirai Lines
Source: restaurant guide website information Year: 2016 January

Type of cuisine	Toyoko Line									Minatomirai Line			
	Shibuya ward	Meguro ward	Setagaya ward	Ota ward	Nakahara ward	Kohoku ward	Kanagawa ward	Nishi ward	Total	Kanagawa ward	Nishi ward	Naka ward	Total
Asian or ethnic cuisine	73	43	3	1	18	10	14	14	176	5	22	38	65
Italian or French cuisine	374	179	30	9	43	26	35	83	779	20	125	177	322
Organic food	8	2	1			2	1	1	15		2		2
Cafe, Sweets	400	230	37	13	74	62	62	110	988	19	173	233	425
Curry	32	11	2		8	6	6	5	70	1	10	13	24
Bar, Dining bar	509	204	17	1	38	42	54	74	939	32	89	306	427
Buffet	5							8	13		12	18	30
Family restaurant - Fast food	49	26	2	1	23	21	16	18	156	5	27	25	57
Ramen noodles	106	45	3	3	34	38	36	25	290	5	33	55	93
Banquet, Karaoke	174	25			7	9	12	28	255	8	33	77	118
Tavern	551	182	8	2	130	94	131	174	1272	69	198	326	593
Sushi	81	64	10	9	21	21	21	20	247	5	28	55	88
Yakiniku-Hormone-Teppanyaki	161	67	7	2	26	15	22	32	332	11	37	67	115
Shokujidokoro	5	1			2	2	2		12	1		12	13
Shokudo or teishoku (set menu)	24	27			14	15	13	2	95	2	5	32	39
Creative cuisine	7	2	2			1		1	13		3	8	11
Multinational cuisine	1	1		1					3				0
Chinese	95	64	10	6	43	41	43	41	343	11	59	302	372
Hot pot	95	31	4		10	11	9	21	181	6	24	40	70
Boxed lunches		1							1			1	1
Fusion food	5	5			3	1		2	16		2	15	17
Vegetable dish	3	3	1		1	1	1		10			1	1
Yakuzen cuisine		1							1				0
Western, Western cuisine	115	48	2	4	21	19	20	29	258	8	40	79	127
Japanese food	479	270	40	18	136	121	116	130	1310	32	182	314	528
Unknown	36	10	1		1	4	3	5	60	1	8	30	39
Total	3388	1542	180	70	653	562	617	823	7835	241	1112	2224	3577

5. Conclusion

Our experiment of linking Economic Census data to restaurant guide website information seems to be successful. The general public’s understanding of statistical surveys is clearly critical to survey quality. To achieve such an understanding, it would be effective to attest that statistical data are useful not only for data users but also for survey respondents. The development of new tabulations by using the merged dataset of Business Register data and website information may interest respondents and thereby lead to improvement in the quality of statistical surveys, and finally improvement in the quality of Business Register.