administrative sciences

MDPI

Article

Impact of Consumer Awareness and Behavior on Business Exits in the Hospitality, Tourism, Entertainment, and Culture Industries under the COVID-19 Pandemic

Hiroyuki Okamuro [1,2,*], Yasushi Hara [2,3] and Yunosuke Iwaki [1,2,4]

[1] Graduate School of Economics, Hitotsubashi University, Tokyo 186-8601, Japan
[2] Teikoku Databank Center for Advanced Empirical Research on Enterprise and Economy (TDB-CAREE), Hitotsubashi University, Tokyo 186-8601, Japan
[3] Graduate School of Business Administration, Kobe University, Kobe 657-8501, Japan
[4] Teikoku Databank Co., Ltd. (TDB), Tokyo 107-8680, Japan
* Correspondence: okamuro@econ.hit-u.ac.jp

Abstract: Empirical studies on small business survival and exits focus on endogenous firms and top manager characteristics, whereas few studies consider exogenous demand shocks and local consumer awareness and behavior, which are especially important for local hospitality industries. Therefore, this study addresses this research gap by targeting the COVID-19 pandemic and anti-contagion policies as a local demand shock for service industries. We empirically investigate the causal effects of changing local consumer awareness and behavior under COVID-19 on business exits at the prefecture-industry level. Based on a panel fixed-effect estimation using a longitudinal dataset of 32 service industries in 47 prefectures over 10 months in Japan, we demonstrate that an increase in consumers' risk aversion and sympathy for self-restraint from going out, and a decrease in going out with family members, significantly increase the exit ratio in specific service industries in the same prefecture. Moreover, we find that these effects vary by consumer type depending on factors such as gender, age, income level, and household structure.

Keywords: business exit; demand shock; COVID-19; consumer awareness; service industry

Citation: Okamuro, Hiroyuki, Yasushi Hara, and Yunosuke Iwaki. 2022. Impact of Consumer Awareness and Behavior on Business Exits in the Hospitality, Tourism, Entertainment, and Culture Industries under the COVID-19 Pandemic. *Administrative Sciences* 12: 169. https://doi.org/10.3390/admsci12040169

Received: 9 August 2022
Accepted: 12 November 2022
Published: 17 November 2022

1. Introduction

Numerous empirical studies on business survival and exits have been carried out to date, but most focus on the industry, firm, and entrepreneurial factors of business exits (See Parastuty 2018; Cefis et al. 2021; Wennberg 2021 for recent literature reviews). Few studies have investigated the effects of local demand shocks as exogenous factors on local business exits. Campbell and Lapham (2004) examined local demand shocks on retailers' business dynamics in cross-border counties in the United States and Canada due to exchange rate fluctuations. More recently, Kumar and Zhang (2019) measured unexpected demand shocks using inventory data and showed their impact on business exits. Marin and Modica (2021) estimated the impacts of local demand shocks on firm survival in Italy under the Lehman shock across industries and regions. These studies measured local demand shocks and directly estimated their impact on business exits, without considering the changes in local consumers' awareness and behavior under the exogenous shocks.

We regard economic and social changes under COVID-19 as an exogenous demand shock, especially in individual service industries. Since the outbreak of the COVID-19 pandemic in early 2020, the effects of various anti-contagion (public health) and economic policies on small firms' business performance have been researched worldwide (Gourinchas et al. 2020; Fairlie and Fossen 2022; You et al. 2022). However, although the COVID-19 pandemic has drastically changed individual risk awareness and preventive behavior (Muto et al. 2020; Bundorf et al. 2021; Konishi et al. 2021), previous studies do

not directly consider changes in local consumers' awareness (such as risk perceptions) and behavior (such as dining out) that mediate between anti-contagion measures and local business performance. Moreover, although some studies point out that the voluntary reaction to anti-contagion policies differs across consumer types such as those in different age groups (Watanabe and Yabu 2021; Takaku et al. 2022), how its effects on business exits differ across consumer types remains uninvestigated.

To fill this research gap, this study focuses on the causal relationship between the changes in local consumer awareness and behavior and local business exits in specific service industries by using original monthly consumer survey data and monthly business directory data and employing standard empirical methods (panel fixed-effect estimations) to control for any time-invariant, idiosyncratic, regional, and industry characteristics. Moreover, we compare the effects of consumer awareness and behavior on local business exits across consumer types (based on gender, age, household structure, and income level). Our empirical research targets 32 business fields in the hospitality, tourism, entertainment, and cultural industries, which were seriously damaged by COVID-19 infections (Gourinchas et al. 2020), from June 2020 to March 2021 in all prefectures.

The remainder of this paper is organized as follows. The following section reviews previous empirical studies and develops our basic model and hypotheses. Section 3 explains our data sources and the original dataset, as well as how we measured the variables. Section 4 provides the estimation models and presents and discusses the estimation results. Finally, in Section 5, we conclude this study, showing some academic and practical contributions, the limitations of this study, and a future research agenda.

2. Literature Review and Hypotheses

2.1. Literature Review

Recent empirical studies on business survival and exits focus on startups and distinguish between voluntary and involuntary exits, paying attention to successful exit patterns such as IPO and M&A (Cefis et al. 2021; Wennberg 2021). Relatively few studies address the effects of local demand shocks on the exits of existing firms (Kumar and Zhang 2019; Marin and Modica 2021). The recent COVID-19 pandemic opened a new opportunity for empirical studies on the impact of demand shocks on the involuntary exits of local businesses.

As summarized in the previous section, several studies have confirmed the negative economic impact of COVID-19, including anti-contagion measures, but relatively few studies explicitly consider changes in local consumers' awareness and behavior during the pandemic. In their seminal papers, Rogers (1975) and Maddux and Rogers (1983) provided a theoretical concept of how fear appeals may change individual attitudes through self-protection and self-efficacy motivations. The COVID-19 pandemic has provided an opportunity and motivation for empirical research on changing consumer awareness and behavior.

Some recent studies have empirically addressed the relationship between people's fear and risk perception and their protective behavior during COVID-19. Using original survey data from the U.S., Bundorf et al. (2021) investigated the relationship between people's subjective risk beliefs and protective behavior and found that people with higher risk perceptions were more likely to avoid economic activities. In their study, subjective risk was measured as a self-evaluation of infection risk in different economic activities. Using Chinese survey data, Zheng et al. (2021) showed that people felt "travel fear" due to COVID-19 and took various preventive measures against the pandemic (travel avoidance or cautious travel). Park et al. (2021) conducted experiments in the U.S. to find that people tended to prefer non-crowded to crowded options of travel and hospitality during COVID-19.

Based on survey data from China and South Korea, Zhong et al. (2021) explored the determinants of consumers' dining-out activities and the relationship between these determinants. They found that perceived psychological (but not physical) risks, subjective

norms, and the enjoyment of consumers, but not the restaurants' precautionary measures, significantly decreased dining-out activities. In their study, physical risks meant perceived physical harm including infection, whereas psychological risks were related to emotions such as fear, guilt, and empathy. Subjective norms denoted how family, friends, colleagues, medical experts, and the people around them thought about dining out and whether they believed it was safe or fine. All independent variables were constructed via factor analysis of the questionnaire items using five-point Likert scales.

Goolsbee and Syverson (2021) also investigated the determinants of changes in consumers' behavior by comparing the effects of voluntary restraints on fear of infection and legal restrictions. Fear of infection was proxied by the number of deaths at the county level, while legal restrictions were measured weekly as dummies for the county's shelter-in-place (lockdown) orders. Using individual cellular phone record data on customer visits, they demonstrated that the decline in consumer visits depended more on the number of local deaths than on the policies of the counties. They argued that consumers' self-restraint for fear of infection had a stronger impact on economic activities than local government's orders. However, this study did not directly measure the fear of infection.

Recent literature in consumer research demonstrates that COVID-19 and the consequent lockdown in response to the pandemic have significantly changed consumer behavior. Huang and Sengupta (2020) suggest that the severity and immediacy of the COVID-19 threat may have conceivably influenced consumers' product preferences. Campbell et al. (2020) theorized that both short- and long-term consumer behavior can be affected by external threats. Based on a consumer panel data analysis in the United States, Galoni et al. (2020) found that cues of contagious disease had a meaningful and systematic impact on consumer behavior by increasing both fear and disgust. Kim et al. (2021), based on online survey data, explained consumers' self-protective consumption processes under the threat of COVID-19, such as practicing hygienic behavior and giving priority to local restaurants. Additionally, Banerjee et al. (2021), combining consumer location data with state-based economic data, investigated the changes in restaurant visits during the lockdown in the United States and found that they declined significantly all over the country, but much more in urban than in rural areas. However, these studies do not address the impact of the changes in consumer behavior on local business exits.

Moreover, previous studies on consumer behavior during COVID-19 have rarely considered the heterogeneity of local consumers. Among a few studies, Losada-Baltar et al. (2020), using original survey data from 1310 Spaniards during the COVID-19 lockdown period, showed that females and younger people were more distressed than their male and older counterparts. Takaku et al. (2022) analyzed the effects of an anti-contagion policy in Japan (an official request for the early closure of restaurants and bars) at the beginning of the pandemic (February 2020), considering the difference between visitor types. They found that this early-stage measure of anti-contagion significantly restricted visits to restaurants and bars by young male customers, but not by other types of customers (seniors and females), and thus, was not effective enough to prevent infections. Additionally, Watanabe and Yabu (2021) confirmed the difference in age groups regarding reactions to pandemic information. These studies suggest that the effects of an anti-contagion policy may differ significantly across consumer types depending on factors such as gender and age group.

From the above literature review, we may derive a new and important research question on how changes in local consumers' awareness (fear, risk perception, and other emotions) and behavior (dining out and social visits) affect business exits in local individual service industries and how this impact differs across consumer types depending on factors such as gender and age group. In the following part, we present our basic model and hypotheses based on this literature review.

2.2. Basic Model and Hypotheses

Based on the above argument, we present our basic model for the empirical estimation as follows (Figure 1). First, we basically assume that a crisis such as the COVID-19 pandemic and public health (anti-contagion) policies, including temporary closing request and self-restrictions (A), significantly change local consumers' awareness (risk attitude, fear, sympathy for self-restriction, etc.) and behavior (drinking- and dining-out, etc.) toward self-protection and self-restraint (B). These changes in local consumers' awareness and behavior lower local economic activity (incur local demand shock) (C), especially in specific service industries including the hospitality and entertainment industries, and eventually lead to the business owners' decisions to undergo business exits (D). Finally, idiosyncratic regional and industry factors (E) may affect (A), (B), (C), and (D) as confounding factors.

We focus on business exit as the dependent variable because it is an appropriate measure of the impact of local demand shocks (Kumar and Zhang 2019; Marin and Modica 2021). Moreover, we assume that consumer awareness and behavior differ across local consumer types depending on factors such as gender, household structure, age group, and income level, which then differently affects local firms' decisions to undergo exits. Muto et al. (2020) found that for Japan, preventive (hygiene) behavior differed between genders, ages, household structures, and household annual income levels. So, we assume that such differences in preventive behavior are reflected in consumer awareness and behavior, which, in turn, affects business exits.

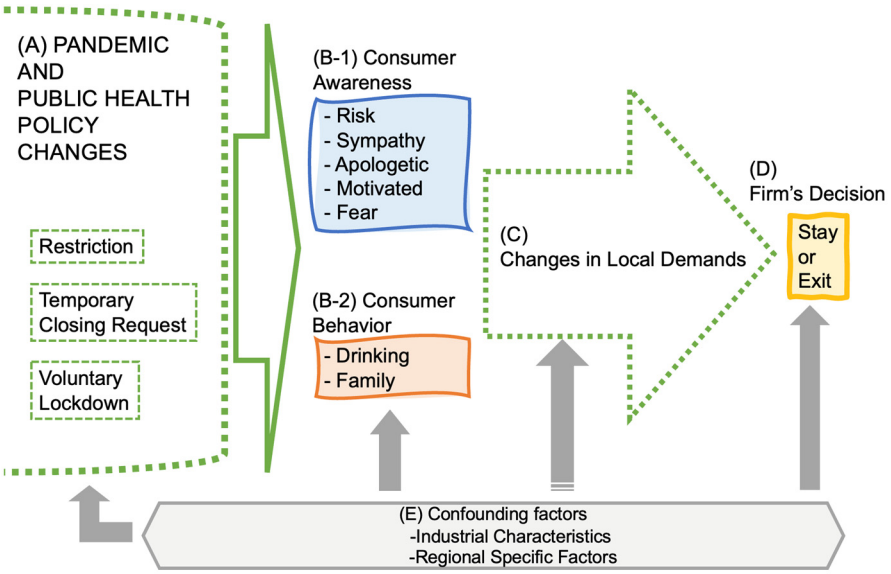

Figure 1. Basic model.

Previous empirical studies directly combined (A) and (C) or (D) without considering (B), mainly because of data constraints. By contrast, this study focuses on (B) and its impact on (D) through (C). Here, we assume that a serious pandemic such as COVID-19 and anti-contagion policies may cause significant changes in consumer awareness and behavior (protection motivation theory: Rogers 1975; Maddux and Rogers 1983). Moreover, we assume that the decision to undergo a business exit may depend on the rational (economic) considerations of business owners. They choose business exit when they expect negative profits from business continuation or when other options (change to other business fields, change to paid employment, or retirement) seem more beneficial[1]. In this sense, a negative local demand shock is an important factor in encouraging business owners to exit, especially in specific service industries that strongly depend on individual demand.

Some industry- and region-specific factors (E) may affect both business exits (D) (Brixy and Grotz 2007; Carree et al. 2011; Falk and Hagsten 2018) and consumer awareness and behavior (B) as the confounding factors. However, as this study targeted a short

period of 10 months (from June 2020 to March 2021), we may assume that these factors may be mostly constant over time. Hence, we can control for the effects of any idiosyncratic industry and regional factors by employing a panel fixed-effect (FE) estimation[2].

Because we measured consumer awareness and behavior at the prefecture level, as we explained in the data section in more detail, we measured the business exit ratio as the dependent variable for each prefecture and business field (industry). We measured the business exit ratio as the ratio of business exits (de-registration from the database) during a month to the number of registered businesses in the previous month from the business telephone directory (NTT Townpage) database.

The independent variables were various measures of consumer awareness and behavior regarding the COVID-19 pandemic and public health policies. These were constructed from various questions in our own monthly consumer survey. As the variables of consumer awareness, we used (1) *Expected Length*: expected duration of the pandemic (Kawaguchi et al. 2021) as a measure of consumers' endurance and uncertainty[3]; (2) *Risk*: general risk aversion (Hanaoka et al. 2018)[4]; (3) *Sympathy*: sympathy for self-restraint from going out (Zhong et al. 2021); (4) *Apologetic* and *Motivated*: feelings of sin and justification regarding self-restraint (Zhong et al. 2021); and (5) *Fear*: fear of infection (Rogers 1975; Bundorf et al. 2021; Zhong et al. 2021).

As suggested above, our independent variables for consumer awareness regarding perceived physical and psychological risks are comparable to those in Zhong et al. (2021). We employed: (6) changes in the frequency of dining out with family members (*Family*) and (7) those in going out for parties and meetings with alcoholic drinks (*Drinking*) as the measures of consumer behavior. Thus, the independent variables in our estimation model are based on those in some previous studies such as Zhong et al. (2021), in which they were used in a different setting, sometimes as dependent variables. More concrete definitions and measurements of these variables are explained in the following section.

Based on the above argument, we present the following hypotheses:

H1a. *Local consumers' awareness (risk, fear, sympathy for self-restraint, etc.) toward the COVID-19 pandemic and anti-contagion policies positively affect the business exit ratio of local individual service industries.*

H1b. *Local consumers' self-protective behavior toward the COVID-19 pandemic and anti-contagion policies positively affect the business exit ratio of local individual service industries.*

Muto et al. (2020) investigated the determinants of preventive behaviors such as avoiding closed and crowded places and close-contact settings, not going to mass gatherings, and wearing surgical masks when going out at the early stage of the COVID-19 pandemic in Japan and found that the probability of such behaviors differed between genders, ages, household structures and household annual income levels. Takaku et al. (2022) suggest that the effects of anti-contagion measures may differ across consumers' genders and ages. This study also considers household structure (living with a spouse, parent, or children under age 12) and household income level because these characteristics may also affect their awareness (fear of infection) and behavior (dining out). Therefore, we assume that the effects of consumer awareness and behavior on business exit may also differ across consumer types, as presented in the following hypotheses:

H2a. *The effects of local consumer awareness and behavior on the business exit ratio differ between males and females.*

H2b. *The effects of local consumer awareness and behavior on the business exit ratio differ across age groups.*

H2c. *The effects of local consumer awareness and behavior on the business exit ratio differ across household structures.*

H2d. *The effects of local consumer awareness and behavior on the business exit ratio differ across household income groups.*

3. Methodology

3.1. Original Survey on Consumer Awareness and Behavior

Independent variable data for our empirical study were collected from the original survey data on consumer awareness and behavior. We planned and conducted a series of consumer surveys that were repeated 10 times every month from June 2020 to March 2021. This survey aimed to systematically explore the changes in consumer awareness and behavior during the COVID-19 pandemic. This survey began shortly after the first wave of infections and the first nationwide "state of emergency declaration" in Japan and ended with the third wave of infections and the second "state of emergency declaration." At the end of July 2020, the Japanese government started the "Go-to-travel Campaign" to support the tourism industry, which ended at the end of December 2020 in light of the third wave of infections (Tagashira 2021).

To elaborate the questionnaire items, we consulted with a behavioral marketing specialist in our research project, referring to previous literature on social psychology (Rogers 1975; Maddux and Rogers 1983), empirical marketing (Ohno 2014), and risk perception (Hanaoka et al. 2018). The surveys were contracted to Macromill, a major online survey service company in Japan, to conduct repeated online surveys every month. They targeted at least 3600 registered monitors over 18 years of age in each survey round, covering all prefectures in Japan, with an equal number of respondents (at least 77 people) in each prefecture[5]. The monitors could anonymously respond to the online surveys using their PCs or smart phones at any time.

Each survey wave was conducted at the end of each month for a few days (from three to seven days), until the target number of respondents was achieved. The respondents who stopped replying to the survey were immediately replaced by new respondents; therefore, we had a constant number of respondents throughout the surveys. Notably, approximately half of the initial respondents (53%) continued to respond to the survey until the final wave. Moreover, to secure plausible responses, Macromill collected six percent more responses than the target number for each prefecture and cut off two percent of the responses for each prefecture as outliers or incorrect answers.

This survey service company held approximately 10 million registered monitors in the whole country as potential respondents, representing 10 percent of the Japanese adult population. These monitors obtained some points by responding to each online survey, which could be changed for money (via bank transfer), gift cards, virtual currency, etc. Macromill recruited many monitors and encouraged them to respond to surveys through these financial incentives. Despite the potential response biases, wherein the respondents were limited to those who often use IT devices such as smartphones and wherein the recruitment of eligible monitors took place according to the "first come, first served" principle, we cannot expect a more representative sample for such online surveys[6].

Table 1 summarizes the structure of the respondents as shares of each characteristic based on the total average of all survey units. Male and female respondents accounted for 53% and 47% of the sample, respectively. The percentage of young respondents under 30 was 8%, whereas that of senior respondents over 60 was 24%. Two thirds of the respondents lived with spouses in the same household, while 25% lived with their father and/or mother and 30% raised children up to 12 years old (elementary school) at home. Only 17% of the respondents lived as "singles"; these are not presented in this table. "High-income" people with an annual household income of over JPY 8 million comprised 20% of the respondents.

We checked the representativeness of the survey respondents by comparing the aggregated survey data from June 2020 to March 2021 with the most recent available 2015 Population Census data. The ratio of females was 47.4% in our survey data and 51.3% according to the Population Census; the ratio of senior people was 24.3% (60 or older) and 26.6% (65 or older); the proportion of married people was 65.1% and 58.5%; and the ratio of single households was 16.6% and 34.5%, respectively[7]. This simple comparison suggests that, despite the overall similarity between these data sources, the respondents in our survey sample were *less* likely to live alone (more likely to live with family members).

Thus, our survey respondents may not be representative of the household structure, but people living alone have a smaller weight in the survey sample. We should be aware of this potential bias.

Table 1. Structure of respondents.

Characteristics	Definition	Share	Count
Male	Male respondents	0.53	19,667
Female	Female respondents	0.47	17,743
Young	Under 30 years old	0.08	3126
Middle	30–59 years old	0.67	25,208
Senior	Over 60 years old	0.24	9076
Spouse	Living with a spouse	0.65	24,344
Parents	Living with the father and/or mother	0.25	9413
Children	Living with child(ren) up to 12	0.30	11,158
Low income	Household income under JPY 4 million	0.36	10,514
Middle income	Household income between JPY 4 and 8 million	0.45	13,245
High income	Household income over JPY 8 million	0.20	5835

Source: authors' own consumer surveys and calculations.

This panel survey comprised several questions about the behavior and awareness of the respondents regarding risk tolerance (aversion), preventive measures such as self-restraint from going out, behavioral changes in going out, and the fear of infection and serious illness. We also asked about household structure (the people with whom they lived in the same household) and income levels in each survey. Macromill provided basic information about the respondents, such as their genders and age groups. Regarding feelings, risk tolerance, and the expected length of the pandemic, we asked for their current opinions. We asked for changes in the previous month compared to the same month in the previous year for behaviors such as frequency of going out for dining or drinking. Most questions were based on five- or seven-point Likert scales, while we had different categories for the questions about the expected length of the pandemic and risk tolerance. In the following section, we explain how each independent variable was defined and measured in our consumer survey.

Expected Length was the expectation of the respondent of how long (at least) it will take for the COVID-19 pandemic to come to an end—defined as a state where there are no new infections for four weeks). The options ranged across eight stages from "within two weeks" to "over 11 months[8]. *Risk* measured consumers' degree of risk tolerance as the maximum reservation price that the respondent was willing to pay for an instant lottery. We asked how much respondents would pay for a lottery that yielded a prize of JPY 100,000 with a probability of 50%. Risk-neutral and rational individuals would pay JPY 50,000 for this lottery. The more risk-averse (risk-tolerant) the respondent, the lower (higher) the price he or she chose from the given options.

Sympathy measured the degree to which a respondent sympathized with the idea of self-restraint from going out for any reason. *Apologetic* and *Motivated* measured feelings regarding self-restraint from going out on a five-point Likert scale that ranged from "I want to apologize" (1) to "I do not want to apologize" (5), and from "We should do it" (1) to "We should not do it" (5), respectively. *Fear* captured the degree to which a respondent was "always afraid of being infected with COVID-19". We measured them using a five-point Likert scale that ranged from "It does not apply at all" (1) to "It applies very much" (5).

Drinking and *Family* were variables for actual behavioral changes. They measured the changes in "going out for meetings and parties with alcoholic drinks" and "going out for lunch or dinner with the family members in the same household", respectively[9], compared to the same month in the previous year using a seven-point Likert scale ranging from "decreased" (1) to "increased" (7). *Income* denoted the evaluation of household income change compared to the same month in the previous year, which varied in nine stages

from a "50% or larger decrease" to a "50% or larger increase." This is a variable neither for consumer awareness nor for consumer behavior, but we regard it as an important control variable as a condition for behavioral changes.

3.2. "Townpage" Business Telephone Directory Database

The dependent variable for our empirical analyses was the business exit ratio in selected service industries that suffered the most from the COVID-19 pandemic. We calculated the business exit ratio from business registration data, which we derived from the "Townpage" Business Telephone Directory database compiled by NTT Townpage. This database covers information about all registrations in local business telephone directories in Japan, including the business field, name, telephone number, and postal address. We purchased the anonym "pinpoint" version, which contains the business field and postal address, but not the business name and telephone number[10]. Overall, our dataset covers the registration data of over 200,000 businesses each month in business telephone directories in 32 business fields in hospitality, tourism, entertainment, and cultural industries from all prefectures in Japan. We now explain the target business fields in more detail.

There are several important reasons for using NTT Townpage data instead of TDB (Teikoku Databank) company data. First, NTT Townpage data are renewed and released every month, so we were able to match them with our monthly survey data. Second, NTT Townpage data cover sole proprietors and the self-employed, which may be dominant in the hospitality and tourism industries, while TDB data comprise incorporated firms. Third, we were able to capture voluntary business exits from NTT Townpage data, which occur much more often than bankruptcies or mergers and acquisitions (M&As), which TDB data can capture. Fourth, by using NTT Townpage data, we were able to easily select very specific business fields that may not be found in TDB industry classification codes, such as karaoke cafés, piano classes, or musicians. However, a major disadvantage of NTT Townpage data is that detailed information about each business cannot be obtained.

According to Gourinchas et al. (2020), who estimated the large impact of the COVID-19 crisis on the business failures of SMEs in 17 countries, accommodation and food services, arts, entertainment and recreation, and education were among the most affected sectors. Using comprehensive administrative data from California, Fairlie and Fossen (2022) reported that while the sales loss in the second quarter of 2020 was 17% on average for all business sectors, it was the largest in businesses affected by mandatory lockdowns, such as accommodations (91%).

The following 32 business fields—comprising many small businesses and sole proprietors and which may have been most seriously damaged by this pandemic—were selected according to the NTT business classification codes: restaurants (general), traditional Japanese-style restaurants ("Kappo/Ryotei"), manga (comic book) cafés, karaoke cafés, internet cafés, Japanese pubs ("Izakaya"), snacks, pub-bistros, beer halls, bars and clubs, and cabarets (11 hospitality industries); traditional Japanese-style hotels ("Ryokan"), B&Bs ("Minshuku"), sightseeing bus services, and travel agents (four tourism and travel industries); pachinko and slot machine parlors, live houses, dance halls, mah-jong parlors, billiards halls, karaoke rooms, show business, theatrical companies, musicians, music classes, piano classes, dancing classes, singing classes, and other culture classes (14 entertainment and cultural industries); and supermarkets and bakeries (retail shops as the baseline reference).

NTT Townpage data were edited and provided for each month. The deadline for the edition of a certain month is the first Saturday of that month, according to NTT Townpage. For example, the March 2021 edition reflects the registration of businesses in the telephone directory as of 6 March, 2021. By comparing business registrations in the February 2021 and March 2021 editions, we were able to identify new registrations and de-registrations between 7 February and 6 March for each prefecture and industry. We regarded business de-registrations in the telephone directory as business exits and calculated the business exit ratio by dividing the number of business exits by the number of registered businesses.

We purchased the NTT Townpage "pinpoint" data from May 2020 to March 2021 (for 11 months), but we used ten editions from June 2020 to March 2021 to calculate the business exit ratio for nine periods from June–July 2020 to February–March 2021. This is because the independent variables from the survey data should precede the dependent variables from the Townpage data.

Notably, the business registrations in the 32 target industries in the Townpage database drastically decreased by 30% from 348,796 in May 2012 to 242,610 in May 2020. This trend continued during the observation period; business registrations in these industries further declined by 7% to 225,591 in March 2021. This long-term trend is in line with the overall decline in the number of firms according to the Economic Census; the number of firms (including sole proprietors) in Japan continuously declined by 25% from 4.85 million in 1999 to 3.59 million in 2016. However, the rate of decline appeared much faster after the pandemic outbreak (7% within 10 months; approximately 50% within eight years) than before (30% within eight years).

3.3. Panel Dataset for Empirical Estimation

We constructed a panel dataset by matching the consumer survey data and the business telephone directory data for each month and prefecture. Because we could not know the address of each respondent in our survey, we could not match these data at a narrower geographical level. Our unit of observation was a combination of prefecture, industry, and month; for example, the business exit ratio of Japanese-style pubs ("Izakaya") in Tokyo Metropolitan Prefecture in June–July 2021. It is noteworthy that the dependent variable (business exit ratio) has variations in three dimensions (prefecture, industry, and month), while the independent variables (consumer awareness and behavior) have variations in two dimensions (prefecture and month).

It was also important to match the timing of data collection between different data sources. As mentioned above, NTT Townpage data in the March 2021 edition reflect business registrations as of 6 March, 2021. We then compared the March 2021 and February 2021 editions to determine business exits (de-registrations) between 7 February and 6 March 2021. Then, we matched the consumer survey data of February 2021 with the Townpage data. In this survey wave, we asked the respondents about their current feelings (as of February 2021) and their behavior in the previous month (January 2021) as compared to those in the same month of the previous year (January 2020).

Therefore, we theoretically had 13,536 observations for our empirical estimations (47 prefectures $\times$ 32 industries $\times$ 9 periods), but because of several missing values (no business registrations in a certain industry in a certain prefecture), our basic sample was reduced to 12,346 observations with 1380 prefecture-industry units.

Table 2 presents the basic statistics for these variables. The data of the independent variables, measured via the original survey, were normalized in the range of 0 to 100 because the scales for the measurement differed across questions (five-point, seven-point, and others). The mean and median of the dependent variable, the business exit ratio, were 0.8% and 0.0%, respectively. Thus, in the majority of the observations, there were no business exits since the previous month. As mentioned before, we can observe distinct differences in the decline of business registrations across service industries, where the decline is the largest among the hospitality industries with alcoholic drinks (bars, nightclubs, cabarets, etc.) and the smallest for everyday retail shops (supermarkets and bakeries).

The unit of observation for the dependent variable (business exit ratio) is an industry in a prefecture. Here, we find that in most of the observation units, the number of business registrations in an industry in a prefecture is less than ten. In some industries, there are no business registrations in some prefectures. These cases were automatically dropped from our original sample because we could not calculate the business exit ratio, but even in the remaining observations, the business exit ratio may have become outliers if the denominator (the number of business registrations in the previous month) was very small. Thus, in the

next section, we provide the estimation results using the full sample as well as those using the reduced sample, excluding observation units with fewer than ten business registrations.

Table 2. Basic statistics of the variables.

Variables	Mean	Median	Std. dev.	Minimum	Maximum	Obs.
Business exit ratio	0.008	0.000	0.020	0.00	0.500	12,346
Income	43.53	43.44	1.92	36.55	48.89	12,346
Expected length	85.94	86.07	2.82	76.85	94.46	12,346
Risk	40.07	40.00	3.32	32.81	52.72	12,346
Sympathy	69.84	70.25	3.93	59.49	78.53	12,346
Drinking	15.69	15.61	2.83	9.07	23.66	12,346
Family	25.06	25.11	3.18	15.40	34.62	12,346
Apologetic	63.84	63.75	2.80	56.25	70.63	12,346
Motivated	31.04	30.94	3.46	20.89	42.09	12,346
Fear	43.95	44.06	4.25	31.96	55.79	12,346

Source: Authors' own consumer surveys and calculations.

As previously mentioned, we were able to identify some basic characteristics of the survey respondents, such as gender, age group, household structure (with whom respondents live in the same household), and income levels. Thus, we classified the respondents into (1) males and females; (2) young (under 30), middle-age (between 30 and 59), and senior (over 60) groups; (3) those who live with spouses and others, those who live with parents and others, and those who live with children under 12 and others; and (4) those with low (under JPY 4 million), middle (between JPY 4 and 8 million), and high (above JPY 8 million) household income levels. Then, we calculated the independent variables of consumer awareness and behavior in each prefecture and month separately for these sub-groups and compared the effects of these independent variables based on these sub-groups. Thus, we were able to consider whether and how the effects of local consumers' awareness and behavior on the local business exit ratio may differ across consumer types. This is a specific advantage of the analysis.

4. Empirical Estimation

4.1. Empirical Strategy and Models

We employed a panel fixed-effect (FE) estimation to control for any time-invariant, unobservable, and idiosyncratic factors regarding prefectures and business fields (industries). This is important because prefecture- and industry-specific factors may often correlate with other independent variables. The unit of observation for the dependent variable was a combination of industry i in prefecture j in period t. The unit of observation for the independent variables was a combination of prefecture j and period t. The estimation model is specified as follows (Equation (1)):

$$\begin{aligned} Business\ Exit\ Ratio_{ijt} & \\ &= constant_{ijt} + \beta_1 (Income)_{it} + \beta_2 (Expected\ Length)_{it} \\ &+ \beta_3 (Risk)_{it} + \beta_4 (Sympathy)_{it} + \beta_5 (Drinking)_{it} \\ &+ B_6 (Family)_{it} + B_7 (Apologetic)_{it} + B_8 (Motivated)_{it} \\ &+ \beta_9 (Fear)_{it} + \gamma_i + \delta_j + \varepsilon_{ijt} \end{aligned} \quad (1)$$

where β_1 to β_9 are the parameters to be estimated, γ and δ are prefecture and industry fixed effects, respectively, and ε is the error term. i, j, and t are subscripts for the prefecture, industry, and period, respectively. We used prefecture and industry dummies (γ_i and δ_j) to control for the fixed effects as the confounders (E) in Figure 1. The Tokyo Metropolitan Prefecture and bakery were used as baseline references for the prefecture and industry dummies.

The dependent variable (D in Figure 1), *Business Exit Ratio*, is defined as the ratio of business exits (de-registrations) in period t in prefecture i and industry j to the number

of registered businesses in the same prefecture and industry at the beginning of this period. Independent variables for consumer awareness (*Expected Length*, *Risk*, *Sympathy*, *Apologetic*, *Motivated*, and *Fear*), consumer behavior (*Drinking* and *Family*) (B-1 and B-2 in Figure 1), which are mostly based on those used in some previous studies including Zhong et al. (2021), and the control variable, *Income*, were derived or calculated from the original survey data. Among several questions from the panel survey, we selected questions that may strongly affect local demand for target industries. It is noteworthy that we did not have any industry or regional (prefecture) variables in the estimation model because of data constraints; we could only control for them using dummy variables.

4.2. Estimation Results with the Full and Limited Samples

Table 3 presents the estimation results for the full sample. The dependent variable is the business exit ratio, which is defined as the number of gross business de-registrations relative to the number of businesses in the previous month in each prefecture and industry (business field). The unit of observation was a certain industry in a certain prefecture in a certain month. We controlled for prefecture and industry fixed effects by including prefecture dummies (baseline: Tokyo Metropolitan Prefecture) and industry dummies (baseline: bakery).

Table 3. Estimation results for full sample.

Variables	(1) All	(2) Male	(3) Female	(4) Young	(5) Middle	(6) Senior
Income	3.08×10^{-5}	0.000107	−0.000115	1.76×10^{-5}	-8.19×10^{-6}	−0.000141
Expected Length	−0.000466 ***	−0.000216 ***	−0.000407 ***	-7.68×10^{-5} ***	−0.000349 ***	-6.74×10^{-5}
Risk	−0.000386 ***	−0.000200 **	−0.000304 ***	-4.99×10^{-5} **	−0.000264 ***	−0.000107 *
Sympathy	0.000169 *	8.83×10^{-5}	0.000115	5.12×10^{-5} **	4.68×10^{-5}	0.000121 **
Drinking	0.000162	-1.80×10^{-5}	0.000110	-1.84×10^{-6}	9.86×10^{-5}	0.000110
Family	−0.000157	-9.64×10^{-5}	−0.000117	1.54×10^{-5}	−0.000163 *	-8.69×10^{-5}
Apologetic	5.98×10^{-5}	7.30×10^{-5}	5.36×10^{-5}	1.36×10^{-5}	0.000102	-5.89×10^{-5}
Motivated	5.98×10^{-5}	-2.55×10^{-7}	8.30×10^{-5}	1.19×10^{-5}	-4.85×10^{-6}	1.81×10^{-5}
Fear	−0.000178 **	−0.000240 ***	-6.09×10^{-5}	2.38×10^{-5}	−0.000163 **	−0.000160 ***
Observations	12,346	12,346	12,346	12,190	12,346	12,346
Number of Units	1380	1380	1380	1380	1380	1380
R-squared	0.006	0.004	0.005	0.002	0.005	0.003
Variables	**(7) Spouse**	**(8) Parents**	**(9) Children**	**(10) Low Income**	**(11) Middle Income**	**(12) High Income**
Income	−0.000178	1.94×10^{-5}	-6.59×10^{-5}	3.57×10^{-5}	−0.000165 *	-1.43×10^{-5}
Expected Length	−0.000287 ***	−0.000187 ***	-2.08×10^{-5}	-9.56×10^{-5} *	-7.68×10^{-5}	−0.000138 **
Risk	−0.000197 **	−0.000242 ***	−0.000234 ***	-5.49×10^{-5}	−0.000159 **	−0.000220 ***
Sympathy	0.000131	5.99×10^{-5}	5.46×10^{-5}	2.49×10^{-5}	5.14×10^{-5}	3.72×10^{-5}
Drinking	0.000159	2.03×10^{-5}	3.42×10^{-5}	8.90×10^{-5}	8.13×10^{-5}	-1.08×10^{-5}
Family	−0.000117	-5.38×10^{-5}	-7.14×10^{-5}	−0.000127 **	−0.000138 **	-9.21×10^{-5}
Apologetic	0.000110	7.93×10^{-6}	1.83×10^{-5}	6.84×10^{-5}	-1.45×10^{-5}	8.12×10^{-5}
Motivated	0.000117	-5.03×10^{-5}	-3.70×10^{-5}	7.93×10^{-5} *	6.79×10^{-5}	3.31×10^{-5}
Fear	−0.000199 ***	-8.54×10^{-5} *	−0.000136 ***	-3.05×10^{-5}	−0.000132 ***	-7.52×10^{-5}
Observations	12,346	12,346	12,346	12,346	12,346	12,346
Number of Units	1380	1380	1380	1380	1380	1380
R-squared	0.004	0.004	0.002	0.002	0.003	0.002

Notes: Levels of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Constant, prefecture, and industry dummies are included in the estimation models but omitted in the table to save space. We also omit the results of the Wald tests and Pesaran tests from the table, which are significant at the 1% level in all models.

Column 1 shows the results for the entire sample (using all respondent data). It suggests that three factors significantly reduce the business exit ratio: (1) the expected shortest period until the settlement of the COVID-19 crisis, (2) risk tolerance measured by the reservation price for an instant lottery, and (3) fear of infection. The only factor that significantly (although weakly) increases the business exit ratio is sympathy for self-restraint from going out. The other variables for local consumers' behavior and feelings regarding going out did not have significant effects on local business exits.

The first result indicates that when people expect *a longer-duration* of the pandemic, the business exit ratio will be *lower*. This contradicts the plausible explanation that when people expect *a longer* pandemic period, they will be more careful about going out; thus, the business exit ratio becomes *higher*. Our interpretation of this interesting result is that when people expect *a longer* pandemic period, they tire of self-restraint and go out, allowing more businesses to survive.

Another puzzle is the fear of infection, which implies a *negative* impact of the fear of infection on the business exit ratio. We expected a positive effect on business exits. A possible interpretation is that when local customers have a strong fear of infection in general, service establishments make more efforts to take preventive measures, which may support their survival. An alternative interpretation is that local public subsidy for severely damaged industries (such as hospitality and tourism industries) is positively correlated with local consumers' fear of infection on the one hand, and prevents business exits on the other (Kawaguchi et al. 2021).

The results of the other variables (*Risk* and *Sympathy*) appear plausible and consistent in that local consumers' higher risk tolerance stimulates local consumption, and thus, reduces business exits, and that higher sympathy for self-restraint from going out increases business exits by reducing local demand. Thus, our first hypothesis (H1a) is only partially (regarding *Risk* and *Sympathy*) supported. H1b is not supported, as *Drinking* and *Family* do not show significant effects.

Regarding H2a, Columns 2 and 3 compare the results using variables from male and female respondents, respectively. Interestingly, we find no major differences between males and females, except for fear of infection, which significantly affects business exit only when we use male respondents' data. Therefore, H2a (gender) is not supported.

Regarding H2b, Columns 4 to 6 compare the results using the same models based on the respondents' different age classes: young (under 30 years), middle (30 to 59 years), and senior (over 60 years). It is common for all age groups that the degree of risk tolerance has negative and significant effects on the local business exit ratio. The minimum expected length of the pandemic for young and middle-aged people has a negative and significant effect, but not for senior people. Sympathy for self-restraint from going out increases the business exit ratio only for young people. Therefore, H2b (age group) is supported only for *Expected Length* and *Sympathy*.

Regarding household (family) structure, Columns 7 to 9 demonstrate how the estimation results differ according to the household (family) structures of the respondents: married (live with a spouse) (Column 7), living with parents (Column 8), and living with children up to 12 years old (elementary school) (Column 9), respectively. We find no significant differences across these household structures, except that the negative effect of the expected length is not significant for those living with small children.

Moreover, we find some common results for households without spouses, parents, or children, which are not shown in Table 3. Sympathy for self-restraint from going out significantly increases the local business exit ratio for the respondents without spouses, parents, or children, and thus, for the singles living separately from their parents. Dining out *alone* in singles living separately from their parents significantly decreases the business exit ratio. Thus, H2c is not supported.

We find some differences according to household income group in Columns 10 to 12: under JPY 4 million (low-income), JPY 4 to 8 million (middle-income), and above JPY 8 million (high-income), respectively. The effect of *Expected Length* is not significant for the middle-income group, whereas that of risk tolerance is not significant for the low-income group. Going out with family members does not significantly decrease business exits for the high-income group. However, we cannot find any effects of consumer awareness and behavior common to all income groups. Thus, H2d is supported. In summary, the estimation results support H2b (age group) (partially) and H2d (income level), but do not support H2a (gender) and H2c (family structure).

We used Stata xttest3 to calculate the modified Wald statistics for group-wise heteroskedasticity in the residuals of the panel FE regression models (Baum 2001). Since they are all significant at the one percent level, we can reject group-wise heteroskedasticity. We also checked the cross-sectional dependence in the panel estimations using the Pesaran test (Stata xtcd2) (De Hoyos and Sarafidis 2006). We can confirm the cross-sectional independence of the panel data because the test statistics are significant at the one percent level in all estimations. The results of these tests are omitted in the table to save space.

It is difficult to discuss the scale of the impact of consumer behavior and awareness on the business exit ratio because independent variables are measured using Likert scales or in different orders (expected length of the pandemic, risk tolerance). The estimated parameters in absolute values are all smaller than 0.001, even when they are highly significant; consequently, their impacts may be quite small. The value of R-squared is at most 0.006, including prefecture and industry fixed effects, suggesting that the omitted (missing) variables, especially those of the characteristics of each business, may have large effects on business exits.

We then checked how the estimation results may (not) change if we excluded those observation (industry-prefecture) units with fewer than ten registrations. Table 4 presents the estimation results for the same model using a limited (reduced) sample. The number of industry-prefecture units decreased from 1380 to 652; thus, the number of observations also decreased from 12,346 to 5841.

Table 4. Estimation results with limited sample.

Variables	(1) All	(2) Male	(3) Female	(4) Young	(5) Middle	(6) Senior
Income	0.000148	0.000221 **	−0.000161 *	-7.64×10^{-6}	0.000113	-7.52×10^{-5}
Expected Length	−0.000283 ***	−0.000147 *	−0.000303 ***	-3.90×10^{-5} *	−0.000155 *	-7.90×10^{-6}
Risk	−0.000422 ***	−0.000375 ***	−0.000123	-4.20×10^{-5} **	−0.000298 ***	−0.000199 ***
Sympathy	0.000147	1.74×10^{-5}	0.000196 ***	5.12×10^{-5} **	0.000107	7.69×10^{-5}
Drinking	0.000188	1.27×10^{-5}	0.000111	1.42×10^{-6}	5.56×10^{-5}	0.000142 **
Family	−0.000371 ***	−0.000261 ***	−0.000217 ***	-1.81×10^{-5}	−0.000312 ***	−0.000213 ***
Apologetic	-7.89×10^{-5}	-6.58×10^{-5}	6.97×10^{-5}	-1.96×10^{-5}	3.54×10^{-5}	-8.82×10^{-5} **
Motivated	-2.21×10^{-5}	-7.48×10^{-5}	6.51×10^{-5}	2.22×10^{-6}	-8.73×10^{-6}	-2.25×10^{-5}
Fear	−0.000299 ***	−0.000239 ***	−0.000183 ***	-1.88×10^{-5}	−0.000281 ***	−0.000151 ***
Observations	5841	5841	5841	5751	5841	5841
Number of Units	652	652	652	652	652	652
R-squared	0.020	0.016	0.013	0.003	0.017	0.010
Variables	**(7) Spouse**	**(8) Parents**	**(9) Children**	**(10) Low Income**	**(11) Middle Income**	**(12) High Income**
Income	-4.67×10^{-5}	1.62×10^{-5}	5.04×10^{-5}	-8.60×10^{-5}	2.68×10^{-5}	6.67×10^{-5}
Expected Length	−0.000198 **	−0.000155 ***	-3.48×10^{-6}	-4.80×10^{-5}	-9.51×10^{-5}	-1.81×10^{-5}
Risk	−0.000230 **	−0.000163 ***	−0.000126 ***	−0.000183 ***	−0.000201 ***	−0.000200 ***
Sympathy	0.000142 *	8.93×10^{-5} *	5.11×10^{-5}	0.000128 **	-6.40×10^{-6}	5.91×10^{-5} *
Drinking	0.000169	-4.57×10^{-5}	2.47×10^{-6}	2.95×10^{-5}	0.000113	0.000106 **
Family	−0.000297 ***	-7.38×10^{-5}	−0.000171 ***	−0.000163 ***	−0.000216 ***	−0.000114 ***
Apologetic	8.09×10^{-6}	-4.61×10^{-5}	6.65×10^{-5}	-4.21×10^{-5}	-7.66×10^{-7}	-7.41×10^{-8}
Motivated	3.72×10^{-6}	-2.93×10^{-5}	6.71×10^{-5}	0.000120 ***	-6.20×10^{-5}	-3.86×10^{-5}
Fear	−0.000301 ***	−0.000155 ***	−0.000116 ***	−0.000151 ***	−0.000118 **	-9.23×10^{-5} **
Observations	5841	5841	5841	5841	5841	5841
Number of Units	652	652	652	652	652	652
R-squared	0.015	0.008	0.010	0.010	0.008	0.011

Notes: Levels of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Constant, prefecture, and industry dummies are included in the estimation models but omitted in the table to save space. We also omit the results of the Wald tests and Pesaran tests from the table, which are significant at the 1% level in all models.

Column 1 shows the main estimation results of the limited sample (observations with at least ten businesses), reflecting all types of respondents. We found that four factors significantly reduced the business exit ratio: (1) the expected length of the COVID-19 crisis, (2) risk tolerance, (3) the frequency of dining out with live-in family members, and (4) the fear of infection. The other variables for local consumers' behavior and feelings regarding

going out did not have significant effects on local business exits. Comparing these results with those in Table 3 (full sample), we find that the effect of dining out becomes significant, but the (weakly) significant effect of sympathy for self-restraint disappears.

Columns 2 and 3 present the results for male and female respondents, respectively. Interestingly, in contrast to the previous results, we found some major differences between males and females. First, the negative effect of risk tolerance on business exits (positive effect on business survival) was significant only for men. Second, the positive effect of sympathy for self-restraint from going out was significant only for women. Third, we found no differences between males and females regarding the effects of the expected length of the pandemic, changes in the frequency of dining out with family members, and fear of infection.

Columns 4 to 6 compare the results reflecting the responses of the different age classes: young, middle, and senior respondents. Risk tolerance has negative and significant effects on all age groups. Sympathy for self-restraint from going out increases the business exit ratio only for young people, while increased dining out with family members decreases the business exit ratio for the middle-aged and senior groups.

Columns 7 to 9 show the results considering the differences in household (family) structure: married (living with a spouse) (Column 7), living with parents (Column 8), and living with children up to 12 years old (elementary school) (Column 9), respectively. Again, we confirmed the negative and significant effect of the expected length of the pandemic and the risk tolerance of those living with spouses and parents, as shown in Table 3. Moreover, we found that sympathy for self-restraint and dining out with family members became partially significant, differing from the results in Table 3.

Finally, Columns 10 to 12 show the results reflecting the low, middle, and high household income classes, respectively. We find negative and significant effects of risk tolerance and dining out with family members for all income classes. It is noteworthy that sympathy for self-restraint from going out has a positive and significant effect on the low- and high-income groups but not on the middle-income group. Finally, the motivation for self-restraint from going out increases business exits only for the low-income group.

Summing up the above results, we can confirm the overall negative and significant effects of risk tolerance and fear of infection on the business exit ratio, which is consistent with the full sample results presented in Table 3. In contrast, we found significant effects of dining out with family members—common to most consumer types but unlike those in Table 3. The values of R-squared are all higher than 0.01 (and 0.02 for the main estimation in Column 1) and even higher than those for the full sample in Table 3.

We again calculated the modified Wald statistics to check the group-wise heteroskedasticity in the residuals of the panel FE regression models using Stata xttest3. Since they are all significant at the one percent level, we can reject group-wise heteroskedasticity. We also checked the cross-sectional dependence in the panel estimations using the Pesaran test (Stata xtcd2). We can confirm the cross-sectional independence of the panel data because the test statistics are significant at the one percent level in all estimations.

Finally, as a robustness check, we excluded from the dataset industry-prefecture units that contained fewer than 10, 20, 50, 200, and 1000 business registrations. Table 5 shows the results based on these reduced samples. By excluding these units, we can focus on the impact on the regional agglomeration of hospitality industries. It is noteworthy that the mean and median numbers of business registrations in the total sample were 156 and 37, respectively. The results suggest that the expected length of time until the end of the pandemic, risk tolerance, and dining out with family members may all significantly decrease the business exit ratio. Sympathy for self-restraint from going out has a positive and significant effect only in the sub-sample excluding units with less than 10 and less than 200 registrations. These results are similar to the main results for the full sample presented in Table 3, suggesting that business exits may increase as local consumers' sympathy for self-restraint increases.

Table 5. Comparison between different sample limitations.

Variables	(1) >10	(2) >20	(3) >50	(4) >200	(5) >1000
Income	0.000148	0.000192	0.000159	7.27×10^{-5}	7.94×10^{-5}
Expected Length	−0.000283 ***	−0.000140 *	−0.000206 ***	-9.09×10^{-5}	−0.000229 **
Risk	−0.000422 ***	−0.000337 ***	−0.000239 ***	-5.98×10^{-5}	−0.000105
Sympathy	0.000147	0.000103	0.000110	0.000178 ***	-2.89×10^{-5}
Drinking	0.000188	0.000229 **	6.44×10^{-5}	0.000174 **	0.000206
Family	−0.000371 ***	−0.000267 ***	−0.000248 ***	−0.000198 ***	−0.000363 ***
Apologetic	-7.89×10^{-5}	−0.000218 ***	−0.000156 **	−0.000122 **	−0.000135
Motivated	-2.21×10^{-5}	−0.000165 **	-3.66×10^{-5}	-4.62×10^{-5}	−0.000239 **
Fear	−0.000299 ***	−0.000431 ***	−0.000291 ***	−0.000256 ***	−0.000234 **
Observations	5841	5124	4130	2101	319
Number of Units	652	575	467	238	37
R-squared	0.020	0.029	0.028	0.045	0.152

Notes: Levels of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Constant, prefecture, and industry dummies are included in the estimation models but omitted in the table to save space. We also omit the results of the Wald tests and Pesaran tests from the table, which are significant at the 1% level in all models.

The overall results in Table 5 are similar to those of the full sample in Table 3, except for the negative and significant effect of going out with family members. This difference suggests that visits to restaurants and pubs with family members may mitigate demand shocks, especially in the agglomeration of hospitality industries.

4.3. Discussion

We investigated the effects of consumer awareness and behavior on local business exits in individual service industries using the original monthly panel data of prefectures and industries. The estimation results of the panel FE models show that, in general, risk tolerance, the expected length of the pandemic, and fear of infection have negative and significant effects on the business exit ratio, while sympathy for self-restraint has positive and significant effects. We also confirmed some differences in the impact of consumer awareness and behavior across consumer types (especially across household income classes).

As mentioned in the literature review section, the independent variables in our estimation models are partially common to those in some previous studies, especially Zhong et al. (2021), who use the variables of perceived physical and psychological risk. However, Zhong et al. (2021) investigated the determinants of these perceptions and used them as dependent variables, whereas we used them as independent variables. Therefore, we could not compare our estimation results with those of Zhong et al. (2021). Other recent studies (Bundorf et al. 2021; Park et al. 2021; Zheng et al. 2021) also used fear of infection (risk perception) as the main independent variable, but they explored the effect of fear on consumers' choice or changes in economic activity, while we estimated its effect on local business exits. Therefore, we could not compare these results with our results.

The other independent variables for consumer awareness (*Expected length* and *Risk*) for which we could confirm negative and significant effects on business exit are our original variables. Therefore, the finding that it is not the perceived risk of infection, but the more general risk tolerance of local consumers that prevents the survival of local service businesses under the pandemic and anti-contagion policy is our original contribution. Another original and interesting finding is that local consumers' expected length of the pandemic does not encourage but discourages local business exits. This may suggest local consumers' tiredness from self-restraint and, thus, the limitation of anti-contagion policies that are based on consumers' self-restraint (voluntary lockdown under the "state of emergency declaration").

Finally, we found significant differences in the effects of consumer awareness (*Expected Length, Risk, Sympathy, and Fear*) and behavior (*Family*) between consumer types. For

example, the fear of infection (*Fear*) in female and young consumers does not significantly affect the business exit ratio. Such differences between consumer types are consistent with the findings of Muto et al. (2020), Watanabe and Yabu (2021), and Takaku et al. (2022), despite the quite different analytical setting. Therefore, this finding can be included as an original contribution.

As we discussed in the introduction, previous studies on business exits or survival have focused on the firm and top manager (founder) characteristics rather than local demand shocks, which were regarded as noise. A few extant studies provide evidence of the impact of unexpected demand shocks on business exit or survival (Campbell and Lapham 2004; Kumar and Zhang 2019; Marin and Modica 2021), without considering the changes in local consumers' awareness and behavior regarding these external shocks. The current study filled this gap by measuring monthly changes in local consumer awareness and behavior under the COVID-19 pandemic using an original consumer survey and estimating the effects of these factors on local business exits. The estimation results are consistent with those in these previous studies on unexpected demand shocks, although only some of the consumer awareness variables (*risk* and *sympathy*) have an expected impact on business exit, whereas consumer behavior variables show no significant effects on business exits.

5. Conclusions

The COVID-19 pandemic has caused serious local demand shocks to economic activities, especially in the hospitality, tourism, entertainment, and cultural industries, by drastically changing consumer awareness and behavior towards risk aversion and self-protection. However, there is little evidence of this negative shock in these business fields because of data constraints. Therefore, this study aims to close this gap and to estimate the effects of consumer awareness and behavior on business exits in these service industries using a unique panel dataset that combines monthly consumer survey data and business telephone directory data.

We assume that even when controlling for prefecture and industry fixed effects, consumer awareness and behavior may affect business exits in target industries, while the effects may depend on consumer characteristics. We confirmed these assumptions using prefecture-industry-level panel data and FE panel estimations. More concretely, we found that while the number of registered businesses decreased in the whole country to a larger extent in specific hospitality industries such as cabarets, snacks, bars, clubs, and dance halls than in other service industries, more (less) sympathy among local consumers for self-restraint from going out significantly increased (decreased) the business exit ratio in the same prefecture. An increase (decrease) in risk tolerance among local consumers significantly lowered (enhanced) the business exit ratio within the same prefecture. An increase (decrease) in dining out with family members significantly decreased (increased) business exits. We also found that consumer awareness and behavior affected business exits differently according to consumer type depending on factors such as gender, age, household structure, and income level.

In summary, this study makes a significant academic contribution to the literature by empirically investigating the effects of the changing awareness and behavior of local consumers on business exits in local individual service industries. Previous studies either did not consider consumer awareness and behavior or investigated the effects of consumer awareness (especially risk perception) on their self-restraint or preventive activity. Under the COVID-19 pandemic and anti-contagion measures, which are exogenous for local firms and different across regions, we identified the causal impact of local demand shocks through consumer awareness and behavior. Moreover, we considered the heterogeneity of consumer types, which has been largely ignored in previous studies. It is also noteworthy that, by using monthly panel data, we could consider short-term (monthly) changes in consumer awareness and behavior and their effects on local business performance, assuming unobservable business characteristics as constant over time.

Our study has several practical implications. First, from the viewpoint of both anti-contagion policy and business support policies, it is important to check how local consumers' awareness and behavior change over time and how they are related to local business performance. Second, in designing related policies or business strategies, public authorities and business owners should consider the heterogeneity of local inhabitants and consumers, that is, the main targets of these policies or strategies (Muto et al. 2020; Takaku et al. 2022). Third, tiredness from self-restraint (for expecting a long pandemic of over a year) may mitigate the effects of anti-contagion policies based on consumers' self-restraint.

The present study has some limitations. First, since we could match consumer survey data and business directory data only at the prefecture level, we do not match the consumers and businesses at the local market level, which would usually be narrower than the prefecture. Second, we measured business exits through telephone directory de-registration. An identification problem in this regard is that we cannot distinguish business exits from relocations or changes in major business fields. However, we do not believe that relocations often occur in our target industries, or more often than in other industries. Third, our sample for the consumer survey comprised only 77 or 78 people in each prefecture. Although our entire sample looks representative of Japanese consumers, it may not be appropriate to further differentiate these prefecture sub-samples. Therefore, we used only rough classifications of the respondents' characteristics.

However, despite these limitations due to data constraints, our current study contributes to finding empirical evidence on the effects of consumer awareness and behavior on business exits in individual service industries during the COVID-19 pandemic in Japan, where a soft anti-contagion policy (the state of emergency declaration) encouraging self-restraint was used instead of a hard policy (lockdown). In future research, we will focus on business exits under agglomerations in downtown areas using geocoding data.

Author Contributions: Conceptualization, H.O.; methodology, H.O.; validation, H.O., Y.H. and Y.I.; formal analysis, Y.H.; investigation, Y.I.; data curation, Y.H. and Y.I.; writing–original draft preparation, H.O.; writing–review and editing, H.O. and Y.H.; visualization, Y.H.; project administration, H.O. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Ethical review and approval were waived for this study due to institutional requirements.

Informed Consent Statement: The authors did not use micro data but aggregated regional data from the consumer survey. NTT Townpage data we purchased were anonymized. Therefore, informed consent statements are not applicable for this study.

Data Availability Statement: Monthly reports of the consumer survey results (in Japanese) are available freely from the following website of TDB-CAREE at Hitotsubashi University, Graduate School of Economics, https://www7.econ.hit-u.ac.jp/tdb-caree/survey/, 8 August 2022, but further details of the survey data and the NTT Townpage pinpoint data cannot be made available.

Acknowledgments: This paper is a part of the research project conducted at the Teikoku Databank Center for Advanced Empirical Research on Enterprise and Economy (TDB-CAREE) at Hitotsubashi University, Graduate School of Economics, to which the authors belong. The authors acknowledge various support from TDB-CAREE, especially the access to data. The authors are also grateful to three anonymous reviewers and the editors of this journal for their valuable comments and suggestions. All remaining errors are of the authors' own responsibility.

Conflicts of Interest: The authors declare no conflict of interest.

Notes

[1] Recent studies on exits distinguish between entrepreneurial exits (from the management or ownership) and business exits (from the market) on the one hand, and between business failures and successful exits via M&A or selling out (Cefis et al. 2021; Coad and Kato 2021; Wennberg 2021) on the other. Yet, this study does not distinguish between the types of exits because economic consideration matters in any type of exit.

[2] Firm- and founder-level factors are important for survival and exits, especially for start-up firms (Harada 2007). This study cannot consider these factors due to data constraints, but as we measured business exit ratio at the prefecture and industry level and observed it short term (within 10 months), we regarded *aggregated* firm- and founder-level factors at the prefecture and industry levels as constant during the observation period, and thus, included them in prefecture and industry fixed effects.

[3] It is noteworthy that Kawaguchi et al. (2021) used the variable of the expected duration of the "state of emergency declaration" by the government, not that of the COVID-19 pandemic. Moreover, they measured the expectations of small business managers (not the consumers). Additionally, they used it not as an independent, but as a dependent variable for managers' uncertainty. In this sense, this variable in our model is a unique one.

[4] We measured the degree of general risk aversion (or tolerance) in local consumers separately from specific risk perception (the perceived infection risk: *Fear*).

[5] This is important because otherwise, the respondents would be concentrated in Tokyo and some other metropolitan areas, and thus, we would have no response data from some prefectures. Consequently, our sample would lose regional variation.

[6] Some previous empirical studies on COVID-19 in Japan (Muto et al. 2020 on consumers' behavior and Kawaguchi et al. 2021 on policy effects on business owners) also contracted their surveys to Macromill. Muto et al. (2020) also used similar consumer type variables to our study (gender, age, marital status, and household annual income level).

[7] With the continuous trend of aging, the ratio of senior people above 65 and that of single households would be even higher according to 2020 Population Census data.

[8] The majority of respondents choose "more than 11 months", suggesting that they expected a long-lasting pandemic.

[9] If the respondent lives alone (single household), this would be "go out *alone* for lunch or dinner".

[10] This constraint makes it difficult to match business registrations in different editions (months) of telephone directories. We matched the registrations using postal addresses and NTT industry codes, but we cannot exclude the possibility that different businesses are regarded as the same one if they have the same address and the same NTT code.

References

Banerjee, Tannista, Arnab Nayak, and HaiYue Zhao. 2021. A county-level study of the effects of state-mandated COVID-19 lockdowns on urban and rural restaurant visits using consumers' cell phone geo-location data. *Zeitschrift fur Gesundheitswissenschaften = Journal of Public Health* 15: 1–10. [CrossRef] [PubMed]

Baum, Christopher F. 2001. Residual diagnostics for cross-section time series regression models. *The STATA Journal: Promoting Communications on Statistics and Stata* 1: 101–4. [CrossRef]

Brixy, Udo, and Reinhold Grotz. 2007. Regional patterns and determinants of birth and survival of new firms in Western Germany. *Entrepreneurship and Regional Development* 19: 293–312. [CrossRef]

Bundorf, M. Kate, Jill DeMatteis, Grant Miller, Maria Polyakova, Jialu L. Streeter, and Jonathan Wivagg. 2021. *Risk Perceptions and Protective Behaviors: Evidence from the COVID-19 Pandemic*. NBER Working Papers Series 28741. Cambridge: National Bureau of Economic Research.

Campbell, Jeffrey R., and Beverly Lapham. 2004. Real exchange rate fluctuations and the dynamics of retail trade industries on the US–Canada border. *American Economic Review* 94: 1194–206. [CrossRef]

Campbell, Margaret C., J. Jeffrey Inman, Anna Kirmani, and Linda L. Price. 2020. In times of trouble: A framework for understanding consumers' responses to threats. *Journal of Consumer Research* 47: 311–26. [CrossRef]

Carree, Martin A., Ingrid Verheul, and Enrico Santarelli. 2011. Sectoral patterns of firm exit in Italian provinces. *Journal of Evolutionary Economics* 21: 499–517. [CrossRef]

Cefis, Elena, Cristina Bettinelli, Alex Coad, and Orietta Marsili. 2021. Understanding firm exit: A systematic literature review. *Small Business Economics* 59: 423–46. [CrossRef]

Coad, Alex, and Masatoshi Kato. 2021. Growth paths and routes to exit: 'shadow of death' effects for new firms in Japan. *Small Business Economics* 57: 1145–73. [CrossRef]

De Hoyos, Rafael. E., and Vasilis Sarafidis. 2006. Testing for cross-sectional dependence in panel data models. *The STATA Journal: Promoting Communications on Statistics and Stata* 6: 482–96. [CrossRef]

Fairlie, Robert, and Frank M. Fossen. 2022. The early impact of the COVID-19 pandemic on business sales. *Small Business Economics* 58: 1853–64. [CrossRef]

Falk, Martin, and Eva Hagsten. 2018. Influence of local environment on exit of accommodation establishments. *Tourism Management* 68: 401–11. [CrossRef]

Galoni, Chelsea, Gregory S. Carpenter, and Hayagreeva Rao. 2020. Disgusted and afraid: Consumer choices under the threat of contagious disease. *Journal of Consumer Research* 47: 373–92. [CrossRef]

Goolsbee, Austan, and Chad Syverson. 2021. Fear, lockdown, and diversion: Comparing drivers of pandemic economic decline 2020. *Journal of Public Economics* 193: 104311. [CrossRef] [PubMed]
Gourinchas, Pierre-Olivier, Sebnem Kalemli-Özcan, Veronika Penciakova, and Nick Sander. 2020. *COVID-19 and SME Failures*. NBER Working Papers Series 27877. Cambridge: National Bureau of Economic Research.
Hanaoka, Chie, Hitoshi Shigeoka, and Yasutora Watanabe. 2018. Do risk preferences change? Evidence from the Great East Japan Earthquake. *American Economic Journal (Applied Economics)* 10: 298–330. [CrossRef]
Harada, Nobuyuki. 2007. Which firms exit and why? An analysis of small firm exits in Japan. *Small Business Economics* 29: 401–14. [CrossRef]
Huang, Yunhui, and Jaideep Sengupta. 2020. The influence of disease cues on preference for typical versus atypical products. *Journal of Consumer Research* 47: 393–411. [CrossRef]
Kawaguchi, Kohei, Naomi Kodama, and Mari Tanaka. 2021. Small business under the COVID-19 crisis: Expected short- and medium-run effects of anti-contagion and economic policies. *Journal of the Japanese and International Economies* 61: 101138. [CrossRef]
Kim, Jiyoung, Kiseol Yang, Jihye Min, and Brechey White. 2021. Hope, fear, and consumer behavioral change amid COVID-19: Application of protection motivation theory. *International Journal of Consumer Studies* 46: 558–74. [CrossRef] [PubMed]
Konishi, Yoko, Takashi Saito, Toshiki Ishikawa, Hajime Kanai, and Naoya Igei. 2021. How did Japan cope with COVID-19? Big data and purchasing behavior. *Asian Economic Papers* 20: 146–67. [CrossRef]
Kumar, Pradeep, and Hongsong Zhang. 2019. Productivity or unexpected demand shocks: What determines firm's investment and exit decisions? *International Economic Review* 60: 303–27. [CrossRef]
Losada-Baltar, Andrés, Lucía Jiménez-Gonzalo, Laura Gallego-Alberto, María del Sequeros Pedroso-Chaparro, José Fernandes-Pires, and María Márquez-González. 2020. We are staying at home. Association of self-perceptions of aging, personal and family resources, and loneliness with psychological distress during the lock-down period of COVID-19. *Journals of Gerontology: Series B* 76: e10–e16. [CrossRef]
Maddux, James E., and Ronald W. Rogers. 1983. Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of Experimental Social Psychology* 19: 469–79. [CrossRef]
Marin, Giovanni, and Marco Modica. 2021. Local demand shocks and firms' survival: An application to the Italian Economy during the Great Recession. *Papers in Regional Science* 100: 745–75. [CrossRef]
Muto, Kaori, Isamu Yamamoto, Miwako Nagasu, Mikihito Tanaka, and Koji Wada. 2020. Japanese citizens' behavioral changes and preparedness against COVID-19: An online survey during the early phase of the pandemic. *PLoS ONE* 15: e0234292. [CrossRef] [PubMed]
Ohno, Sachiko. 2014. Construction of the feeling measures of sin and shame by HTMM. *Marketing Science (Japan)* 22: 47–79. (In Japanese).
Parastuty, Zulaicha. 2018. Systematic review of research on exit: A bibliometric analysis and future directions. *International Review of Entrepreneurship* 16: 587–626.
Park, In-Jo, Jungkeun Kim, Seongseop (Sam) Kim, Jacob C. Lee, and Marilyn Giroux. 2021. Impact of the COVID-19 pandemic on travelers' preference for crowded versus non-crowded options. *Tourism Management* 87: 104398. [CrossRef]
Rogers, Ronald W. 1975. A protection motivation theory of fear appeals and attitude change. *Journal of Psychology* 91: 93–114. [CrossRef] [PubMed]
Tagashira, Takumi. 2021. *The Financial Incentivization and Communication Effects of a Government's Post-Pandemic Measure: The "Go-To-Travel" Campaign And Consumer Behaviors in Japan*. TDB-CAREE Discussion Paper Series E-2021. Tokyo: Hitotsubashi University.
Takaku, Reo, Izumi Yokoyama, Takahiro Tabuchi, Masaki Oguni, and Takeo Fujiwara. 2022. SARS-CoV-2 suppression and early closure of bars and restaurants: A longitudinal natural experiment. *Scientific Reports* 12: 12623. [CrossRef]
Watanabe, Tsutomu, and Tomoyoshi Yabu. 2021. Japan's voluntary lockdown: Further evidence based on age-specific mobile location data. *Japanese Economic Review* 72: 333–70. [CrossRef] [PubMed]
Wennberg, Karl. 2021. Exit. In *World Encyclopedia of Entrepreneurship*, 2nd ed. Edited by L.-P. Dana. Cheltenham: Edward Elgar, chp. 32.
You, Min Hee, Yun Jeong Choi, and Jee Young Kim. 2022. Impact of the COVID-19 social distancing policy on the exit and entry of stores in South Korea. *Korea and the World Economy* 23: 57–75.
Zheng, Danni, Qiuju Luo, and Brent W. Ritschie. 2021. Afraid to travel after COVID-19? Self-protection, coping and resilience against pandemic 'travel fear'. *Tourism Management* 83: 104261. [CrossRef]
Zhong, Yongping, Segu Oh, and Hee Cheol Moon. 2021. What can drive consumers' dining-out behavior in China and Korea during the COVID-19 pandemic? *Sustainability* 13: 1724. [CrossRef]