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Expenditure Responses to the COVID-19 Pandemic*

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Abstract

We examine how the COVID-19 contagion influences consumer expenditure patterns. We show that the consumption expenditure responses to the spread of the COVID-19 pandemic are significantly different between the older and younger generations. We find that older adults spend less than the younger generation by at least 5% during the pandemic. In fact, those aged above 60 significantly decrease their spending even on food and drink products by 13%. We also find that older adults forgo shopping in favor of the younger generation. These responses might be due to the fear of COVID-19 infection (Immordino et al., 2022).

JEL Classification: D12; E21
Keywords: COVID-19; consumption gap; expenditure; spending behavior

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1 Introduction

The growing literature on the effects of the COVID-19 pandemic on consumer behavior (Brodeur et al. (2021), Teruyama and Kimura (2022), and Castelnuovo (forthcoming)), provide a comprehensive survey on changing consumer choices. In the case of Japan, there are many such studies that explored consumer choices and human mobility under COVID-19. Yamaura and Tsutsui (2022) investigate changes in the preventive behavior and mental health of individuals influenced by the COVID-19 state of emergency declaration between March and June 2020. Shibamoto et al. (2022) explore the dynamics of the COVID-19 infection and human mobility to explain the reality of the pandemic situation via the underlying simultaneous relationship. Hosono (2021) examines the epidemiological and economic effects of two types of lockdowns during the COVID-19 pandemic. Hoshi et al. (2021) investigate the heterogeneous effect of a policy-induced decline in people's mobility on the Japanese labor market outcome during the early COVID-19 period. Kawaguchi and Motegi (2021) examine the determinants of remote work using a unique Japanese survey dataset. Okubo (2022) studies demand-inducing policies targeting travel, and food and beverage industries in the background of COVID-19. Hayakawa et al. (2022) examine how the order shortening business hours of restaurants changed the nighttime light.

However, there is scant evidence that the spread of COVID-19 has differently impacted actual expenditures.[1] The literature such as Baker et al. (2020), Coibion et al. (2020), Kubota et al. (2021), and Kaneda et al. (2021) examines the consumption responses to the 2020 economic stimulus payments and find heterogeneity in spending among consumers. While the research has mainly focused on liquidity constraints as the source of the heterogeneous responses, there is minimal evidence regarding the different consumption expenditures between the older and younger generations.

Our study addresses this research gap. In contrast to the existing literature, we focus on the different reactions to the COVID-19 pandemic of older adults and the younger generation in terms of actual expenditure. Based on expenditure data linked to a survey on the effect of COVID-19 on daily life, this study examines how the pandemic influences consumer choice. We find that the consumption expenditure of older adults is negatively associated with the number of new COVID-19 cases; additionally, they spend less than the younger generation by at least by 5% In fact, those aged above 60 significantly decreased their spending even on food and beverages by 13%. We also find that older adults forgo shopping in favor of the

[1] Goolsbee and Syverson (2021) use mobile location data to show that the fear of infection during the COVID-19 pandemic is important in explaining heterogeneous choice behavior among consumers. However, they do not examine the effect of the impact of COVID-19 on actual expenditure. Watanabe and Yabu (2021a) and Watanabe and Yabu (2021b) show that in response to the information spread about the pandemic, older adults refrained from going out more than younger populations; even so, the study did not examine the heterogenous effects of (voluntary) lockdowns on consumption expenditures.

younger generation.

The remaining of the paper is organized as follows: Section 2 presents the data we use. Section 3 explain the tests we use to verify whether COVID-19 infection influences consumption expenditure and Section 4 shows the results. Section 5 examines whether COVID-19 infection influences the frequency of consumer visits at retail stores. Section 6 concludes.

2 Data

2.1 Data about the consumption expenditure

We used panel data (SCI-personal) on consumption expenditure from January 2019 to December 2020 collected by a marketing company, Intage Inc. Specifically, we used day-to-day shopping information collected on an ongoing basis from consumers aged 15–79 all over Japan. The Family Income and Expenditure Survey (FIES) conducted by the Statistics Bureau of Japan records the consumption expenditure of approximately 6,000 households based on household heads, while the panel data we used records individual expenditure for more than 50,000 consumers. The data capture the profile of these consumers in detail, including aspects such as income, education, and financial assets. Specifically, we could determine who bought what, when, where, how many, and at what price. These data cover items that households purchase frequently, such as food (except for fresh food, prepared food, and lunch boxes), beverages, daily use miscellaneous goods, cosmetics, pharmaceutical products, and cigarettes.[2] [3] We used the data to test whether older adults decreased their expenditure due to COVID-19 compared to the younger generation.

There are two caveats in the data on consumption expenditure. First, from Table 1, women outnumber men. As in Kaplan and Schulhofer-Wohl (2017) and D'Acunto et al. (2021), our data also show that the expenditure by women is greater than that of men. Second, the coverage of the data relative to Japanese households' consumption is not large. Diamond et al. (2020) who also used SCI-personal, report that the items included in the data cover approximately 30% of the weight of the Japanese Consumer Price Index.[4]

Figure 1 presents the development of expenditure based on the panel data we used. First, the expenditure diverges in April 2020, when the nationwide state of emergency was declared. The expenditure levels increased by approximately 7% in February and March 2020

[2]Because our scanner data cover daily necessities, they do not include housing, utilities, durables, clothing, and services.

[3]Table 1 shows the descriptive statistics of the data from January 2019 to December 2020.

[4]D'Acunto et al. (2021) use similar scanner data from U.S. households, and report that the data cover around 25% of the US households' consumption.

compared to January 2020 for all generations.[5] However, they diverge in April 2020: while those aged below 40 significantly increased their expenditure, those aged 70 and above sharply decreased theirs. In fact, the expenditure of the consumers in their 20s surged at 115, while that of those in their 70s reduced to 102 in April. The difference reached up to 18%. Figure 1 shows that during the COVID-19 pandemic, the young spend more and the older populations less. Second, the increase and decrease in the expenditure gaps repeat thrice in the study period with the increase in the number of new COVID-19 cases. Figures 1 illustrates the correlation between the change in the expenditure gaps and the new COVID-19 cases. In fact, while the gap decreased after lifting the nationwide state of emergency in late May, an increase in the number of new COVID-19 cases in late July 2020 seemed to widen the expenditure gap. This was also the case after September 2020: while the gap temporally diminished, there was a divergence between generations along with an increase in the number of new COVID-19 cases in late October 2020.

It should be noted that the government of Japan never prohibited people from going out, even during the state of emergency. While the government of Japan declared the state of emergency in April 2020, it only asked for people to exercise self-restraint from non-essential outings. In response to calls to close their business during the state of emergency, large scale retailers such as department stores and shopping malls ceased operations. However, several restaurants and retailers such as grocery stores, supermarkets, and drug stores remained open. Furthermore, the government of Japan never imposed a lockdown; transportation services such as train, bus, and subway lines functioned as per usual. This means that older adults, as well as the younger generation, were free to go shopping anytime and anywhere even during the state of emergency.

2.2 Survey on the effects of COVID-19 pandemic on daily life

Intage Inc. surveyed the effects of the COVID-19 pandemic on daily life from October 23 to November 4, 2020. A total of 35,389 respondents out of 83,501 completed the online survey, resulting in a response rate of 42.4%. The median time taken to complete the survey was 4.3 minutes.

The survey contributed to identifying how COVID-19 influences consumption expenditure across generations. First, the survey could be matched with the survey on household expenditure. In fact, more than half of those who took the survey were also respondents in the survey on household expenditure in Subsection 2.1. We successfully matched the two surveys' data for 29,864 respondents, which allowed us to examine the different responses of consumption expenditure to the COVID-19 pandemic.

[5]Table 2 summarizes the chronological developments surrounding COVID-19 and the state of emergency declaration in 2020.

Second, the survey allows us to identify idiosyncratic shocks due to the COVID-19 pandemic.[6] It required respondents to provide information about changes in their daily lives. Questions (1)–(17) are about work or school, identifying changes in employment status and income level, worksites (at the office or at home), office (school) closure, and office (school) reopening. The answers to the questions are interpreted as shocks that each respondent faced due to the COVID-19 pandemic. Because the COVID-19 pandemic is completely exogenous and has different effects, the identified changes in employment status, income level, and office closure are idiosyncratic shocks. The identified shocks are vital for controlling idiosyncratic shocks such as unemployment and income shocks.[7]

Third, the survey identifies how respondents lived during the pandemic. Respondents were required to provide information about how they respond to COVID-19. For example, the survey asked them to provide information about changes in opportunities to eat out, cooking at home, and taking trips. The information reflects the endogenous responses of respondents to idiosyncratic shocks and the policy interventions in response to the COVID-19 pandemic. Furthermore, the survey asked respondents to provide information about how family members who lived with them changed their lives in response to COVID-19. Therefore, we use information on not only the respondents but also their family members as a set of comprehensive covariates to control for the endogenous reactions to shocks and the policies that may have influenced the consumption level.[8]

3 Estimation strategy

This section presents how we formally tested whether older adults decreased their expenditure due to COVID-19 compared to the younger generation. To this end, we estimate the following equation based on a dynamic difference-in-differences (DDID) approach:

$$\begin{aligned} \ln \frac{Cons_{i,t}}{Cons_{i,t-12}} = \alpha \times D^{Old} + \sum_j \beta_j \times D^{Month_j} \\ + \sum_j \gamma_j \times D^{Month_j} \times D^{Old} + \mathbf{X}\delta_{\mathbf{x}} + \mathbf{Y}\delta_{\mathbf{y}} + \varepsilon_{\mathbf{i,t}}, \end{aligned} \tag{1}$$

where $Cons_{i,t}$ is the (nominal) consumption expenditure of individual i in month t. D^{Old} is a dummy variable that takes 1 when individual i is 60 or above, and 0 otherwise. D^{Month_j}

[6]The survey questionnaire is available in Appendix A. The survey asked respondents to indicate their situation for each period from: (A) April–May 2020, (B) June 2020, (C) July–August 2020, and (D) September–October 2020. Thus, while the survey was conducted only once, it presents variations in time.

[7]Tango and Nakazono (2021) examined how unemployment and (positive/negative) income shocks affected consumption expenditure during the COVID-19 pandemic using the same survey.

[8]The descriptive statistics of the survey are presented in Table B.1 in Appendix B.

and $\mathbf{X}$ are a calendar (each month-year) dummy variable and control variables such as prefecture fixed effects, gender, income, educational attainments, family size, and (the logarithm of) monthly new cases of COVID-19 at the prefecture level in Japan.[9] [10] Our interest is in the coefficient γ on the cross term between D^{Month} and D^{Old}. A positive γ suggests that those aged above 60 spend more than the young, and vice versa.

Here, $\mathbf{Y}$ is a set of COVID-19-oriented shocks constructed from the survey in Appendix A. We use 16 (eight by two) dummy variables and one categorical variable from the respondent and the family members who live with the respondent, respectively. The dummy variables for the respondent and the family members are $D_t^{Unemployment}$, $D_t^{GettingJob}$, $D_t^{SchoolClose}$, $D_t^{SchoolReopen}$, $D_t^{IncreaseEatout}$, $D_t^{DecreaseEatout}$, $D_t^{IncomeUp}$, and $D_t^{IncomeDown}$. The categorical variables measure how often the respondent and the family members worked from home.[11] These variables allow us to control for the potential effects on the consumption expenditure of school closure, change in employment status, positive and negative income shocks, and the frequency of eating out.

4 Results

First, we present the results from analyzing the entire sample. The top panel in Figure 2 shows the developments of the γ coefficient using January 2020 as 0.[12] The figure shows that the monthly expenditure of older adults in 2020 is negatively correlated to the number of new COVID-19 cases. The expenditure of older adults does not differ from that of consumers below 60 until March 2020. However, they spent less by approximately 5% compared to those aged below 60 during April and May, when the government declared the state of emergency. Once the government lifted the state of emergency, in June, the expenditure of older adults recovered. However, the cycle repeats after June. That is, the expenditure of older adults fell again by 5% in August and bounced back in October.[13]

We also estimate Equation (1) using a subsample from food and drink products. The top

[9] Prefecture fixed effects corresponded with regional fixed effects. Allowing for both time and regional fixed effects made a standard two-way fixed effect differences-in-differences regression.

[10] $\mathbf{X}$ also included a cross term of a calendar dummy variable (D^{Month}) and (the logarithm of) monthly new cases of COVID-19 at the prefecture level. The new cases of COVID-19 was interpreted as a continuous treatment variable. Thus, our estimation was a two-way fixed effect DDID regression: we controlled time and region fixed effects in the estimating regression.

[11] We define the dummy variables in Appendix A. The categorical variables regarding working from home took values of 1, 2, or 3 when a respondent answers "YES" to Questions (13), (14), or (15), respectively in Survey (I) for themselves and in Survey (II) for the family members.

[12] Table B.2 summarizes the estimation results by estimating Equation (1).

[13] The bottom panel in Figure 2 reports the coefficients in the interaction terms between the logarithm of new cases of COVID-19 and D^{Old} dummy. The figure shows no causal effects of new cases of COVID-19 on the expenditure of older adults.

panel in Figure 3 supports the view that those aged above 60 spend less than those below 60 years of age. The top panel present the γ coefficients using the subsample of food and beverages. The top panel shows significant drops in the expenditure of older adults of more than 10% in April, May, and August, compared to January. The impact is at most 13%; those aged above 60 significantly decreased their spending even on food and beverages by 13% in August, compared to January.[14]

We check the robustness of the results using multiple age dummies in the following equation:

$$\ln \frac{Cons_{i,t}}{Cons_{i,t-12}} = \sum_j \beta_j \times D^{Month_j} + \sum_k \gamma_k \times D^{Cohort_k} + \sum_k \sum_j \gamma_{k,j} \times D^{Month_j} \times D^{Cohort_k} + \mathbf{X}\delta_{\mathbf{x}} + \mathbf{Y}\delta_{\mathbf{y}} + \varepsilon_{\mathbf{i,t}},$$

where D^{Cohort_k} is a dummy variable that takes a value of one when individual i belongs to cohort k, and 0 otherwise.[15] $\mathbf{Y}$ is a set of COVID-19-oriented shocks constructed based on the survey in Appendix A. Our interest is in the γ coefficient on the cross term between D^{Month} and D^{Cohort_6} and D^{Cohort_7} for those in their 60s and 70s. A positive γ suggests that those in their 60s and 70s spend more than the younger generation, while a negative γ implies that they spend less.

Figure 4 supports the view that older adults spent less than the young. The top and bottom panels present the coefficients γ on the interaction terms between the month dummies and D^{Cohort_6} and D^{Cohort_7} for those in their 60s and 70s using the entire sample. Both panels show a significant drop in the expenditure of those aged above 60 in April, May, and August, compared to January. Furthermore, Figure 4 suggests that those in their 70s spend less than those in their 60s.[16]

5 Frequency of visiting retail stores

The fact that older adults spend less as the number of new COVID-19 cases increases suggests that they may forgo going out due to an increase in the spread of COVID-19. This implies that older adults go shopping with a lower frequency during the COVID-19 pan-

[14] Similar to Figure 2, the bottom panel in Figure 3 reports the coefficients in the interaction terms between the logarithm of new cases of COVID-19 and D^{Old} dummy. The figure shows no clear effects of new cases of COVID-19 on the expenditure of older adults.

[15] D^{Cohort_k} is a dummy variable at 10-year intervals starting for those in their 20s. Specifically, a set of D^{Cohort_k} $(k = 2, 3, 5, 6, 7)$ corresponds to those in their 20s, 30s, 50s, 60s, and 70s, respectively. Therefore, D^{Cohort_4} for those in their 40s is set as a base dummy.

[16] The above results are robust when the consumption measures are adjusted using the same equivalence scale as in Banks et al. (1998), although we do not report the regression results due to space considerations.

demic. To formally test whether the frequency of shopping at retail stores decreased as COVID-19 spread, we estimate the frequency of visits at retail stores for each consumer.

The transaction-level scanner data on consumption expenditures allow us to count how frequently consumers visit stores per month. As explained in Section 2.1, SCI-personal records when and where respondents make purchases on a daily basis. This allows us to estimate how often respondents visited retail stores per month.[17] We count the number of stores where respondent i goes shopping during day d in month t, $Visit_{i,d,t}$. We sum $Visit_{i,d,t}$ for each month from January to December 2020.[18] Therefore, $Visit_{i,t}$ is the estimated number of visits at retail stores by individual i in a month.

To examine whether older adults visit retail stores less compared to the younger generation, we estimate the following equation:

$$\begin{aligned} \ln \frac{Visit_{i,t}}{Visit_{i,t-12}} =& \alpha \times D^{Old} + \sum_j \beta_j \times D^{Month_j} \\ &+ \sum_j \gamma_j \times D^{Month_j} \times D^{Old} + \mathbf{X}\delta_{\mathbf{x}} + \mathbf{Y}\delta_{\mathbf{y}} + \varepsilon_{\mathbf{i,t}}, \end{aligned} \tag{2}$$

where $Visit_{i,t}$ is the frequency of retail stores visits by individual i in month t. Similar to Equation (1), D^{Month_j} and $\mathbf{X}$ are a calendar (each month-year) dummy variable and control variables such as prefecture fixed effects, gender, income, educational attainments, family size, and (the logarithm of) monthly new cases of COVID-19 at the prefecture level in Japan.[19] $\mathbf{Y}$ is a set of COVID-19-oriented shocks. Our interest is in the γ coefficient on the cross term between D^{Month} and D^{Old}. A positive γ suggests that those aged above 60 spend more than the young, and vice versa for a negative γ.

Figure 5 presents the development of the γ coefficient using January 2020 as 0. The figure shows that the monthly visits of older adults are negatively correlated to the new COVID-19 cases in 2020. However, the frequency of visits at retail stores by those aged above 60 is not different from those of consumers aged below 60 until March 2020. The number of visits then reduces by approximately 4% compared to those aged below 60 in April and May, when the government declared the state of emergency. Once the government lifted the state of emergency, the frequency of visits by older adults recovers by June. However, the cycle repeats after June. That is, the expenditure of older adults falls again by 5% in August, bouncing back in October. Figure 5 supports the view that older adults visited stores less than the younger generations during the COVID-19 pandemic. These different

[17]The survey we use includs data from online shopping. Our estimation results are robust when expenditures from online shopping are excluded, although these are not reported to save space. Using the same data, Tsukawaki et al. (2021) estimated that approximately 13% of expenditure was from online shopping.

[18]Table 1 in Appendix B shows the descriptive statistics for the frequency of visits at retail stores.

[19]Prefecture fixed effects corresponds with regional fixed effects. $\mathbf{X}$ also includes a cross term of a calendar dummy variable (D^{Month}) and (the logarithm of) monthly new cases of COVID-19 at the prefecture level.

responses might be due to the fear of COVID-19 infection (Immordino et al., 2022). Especially, Watanabe and Yabu (2021b) show that the degree to which people refrained from going out is larger for older age groups, who are at a higher risk of serious illness and death, than for younger age groups. The evidence shown in Watanabe and Yabu (2021b) is consistent with our results that older adults visited stores less than the younger during the COVID-19 pandemic.

6 Conclusions

This study examines how the spread of COVID-19 influences the consumption expenditure of Japanese households. Using large-scale monthly panel data collected from more than 50,000 Japanese households, we examine how consumption expenditure changed after the onset of COVID-19. We show that the response to the spread of COVID-19 is significantly different between the older and younger generations. We also find that, during the state of nationwide emergency, the consumption expenditure of older adults significantly decreases when compared to that of the younger generations. In fact, those aged above 60 significantly decrease spending even on food and beverages by 13%. Further, older adults forgo shopping to the young. These responses might be due to the fear of COVID-19 infection. The structural mechanisms behind the evidence will need to be further investigated in future research.

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Table 1: Descriptive statistics of household expenditure (yen) and frequency of visits (# of times) at retail stores

	Purchase amount		Frequency of visits		Observations
	Mean	Median	Mean	Median	
All	22,521	18,923	21.337	20.000	727,853
Female	27,139	24,104	21.381	20.000	421,202
Male	16,761	13,300	21.276	19.000	306,651
High school graduate or below	24,599	21,103	21.662	20.000	190,811
Four-year college graduate or above	20,752	16,888	21.397	19.000	310,357
Household annual income below JPY 4 million	20,928	17,741	20.853	19.000	207,102
Household annual income of at least JPY 7 million	24,330	20,212	21.934	20.000	250,695
Age 20–29	12,626	9,002	15.593	13.000	74,280
Age 30–39	19,826	16,590	19.811	18.000	141,699
Age 40–49	24,535	21,160	22.596	21.000	182,028
Age 50–59	26,194	22,500	24.039	22.000	154,416
Age 60–69	26,744	23,250	22.928	21.000	108,683
Age 70–79	24,883	21,793	20.320	18.000	56,935

Note: The data are from January 2019 to December 2020.

Table 2: Chronological developments surrounding COVID-19 and the state of emergency in 2020

Date	News and policy announcements in response to COVID-19
January 16, 2020	Announcement of the first infected individual in Japan.
January 28, 2020	Announcement of the first infected Japanese.
January 30, 2020	The government of Japan established the Novel Coronavirus Response Headquarters (NCRH).
February 5, 2020	Quarantine on the Diamond Princess.
February 25, 2020	NCRH announced the government's basic policy for COVID-19.
February 26, 2020	Public elementary and junior high school closure requests in Hokkaido.
February 27, 2020	Prime Minister Abe requests schools nationwide to close temporarily.
March 9, 2020	Expert meeting presents "three conditions" for a high risk of infection.
March 12, 2020	WHO certified the outbreak as a "pandemic."
March 25, 2020	Governor of Tokyo Koike requests staying at home on weekends.
April 3, 2020	The number of infected people worldwide exceeds 1 million.
April 7, 2020	The government announced a state of emergency in seven prefectures.
April 16, 2020	The government expands the state of emergency nationwide.
April 18, 2020	The number of infected people in Japan exceeds 10,000.
April 20, 2020	Economic policy: JPY 100,000 to be paid to all citizens.
May 4, 2020	The government decides to extend the state of emergency until May 31, 2020.
May 21, 2020	The government changes the area for the emergency state.
May 22, 2020	An emergency meeting of the Bank of Japan Policy Board (eliminate the prospect of JGB holdings).
May 25, 2020	The government lifts the state of emergency.

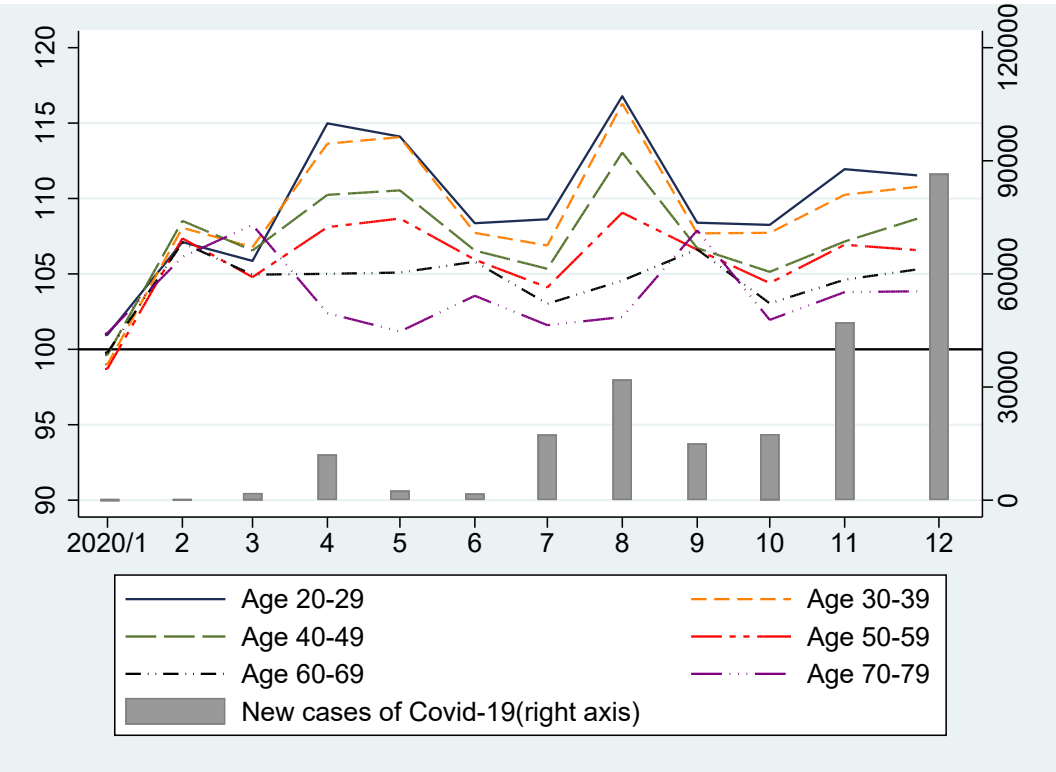

Figure 1: Development of expenditure on daily necessities by ages (left axis) and new cases of COVID-19 (right axis) from January 2020 to December 2020. The data are from home-scanner data collected by Intage Inc. The series of expenditure are seasonally adjusted and standardized using the average expenditure from January 2019 to December 2019 as 100.

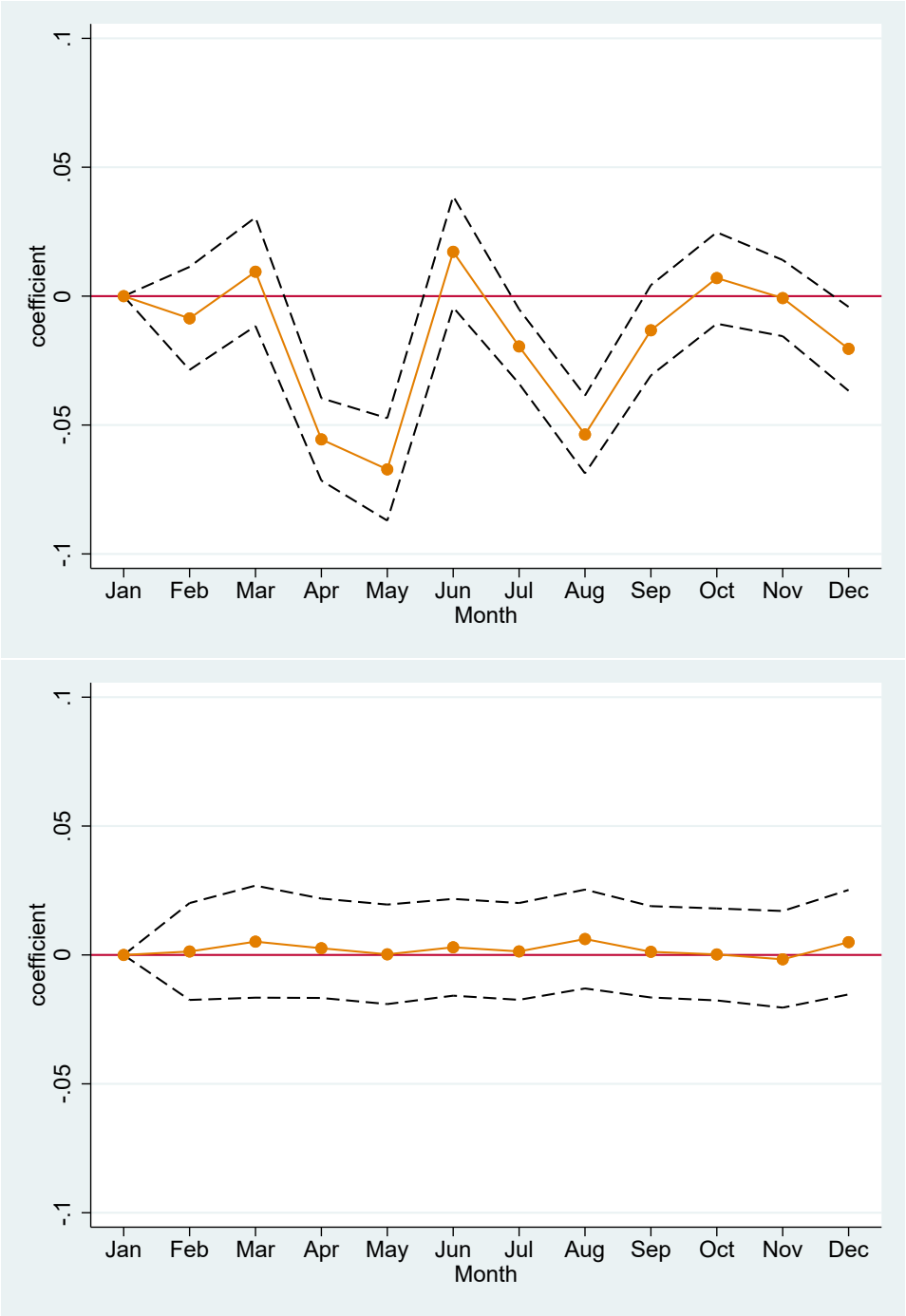

Figure 2: The figures report the γ coefficients on the interaction terms between the month dummies and D^{Old} in the top panel and the coefficients on the interaction terms between (the logarithm of) new cases of COVID-19 and D^{Old} in the bottom panel from estimating Equation (1) using the entire sample. The dotted lines represent the 90% confidence interval bands. The standard errors are clustered at the prefecture level.

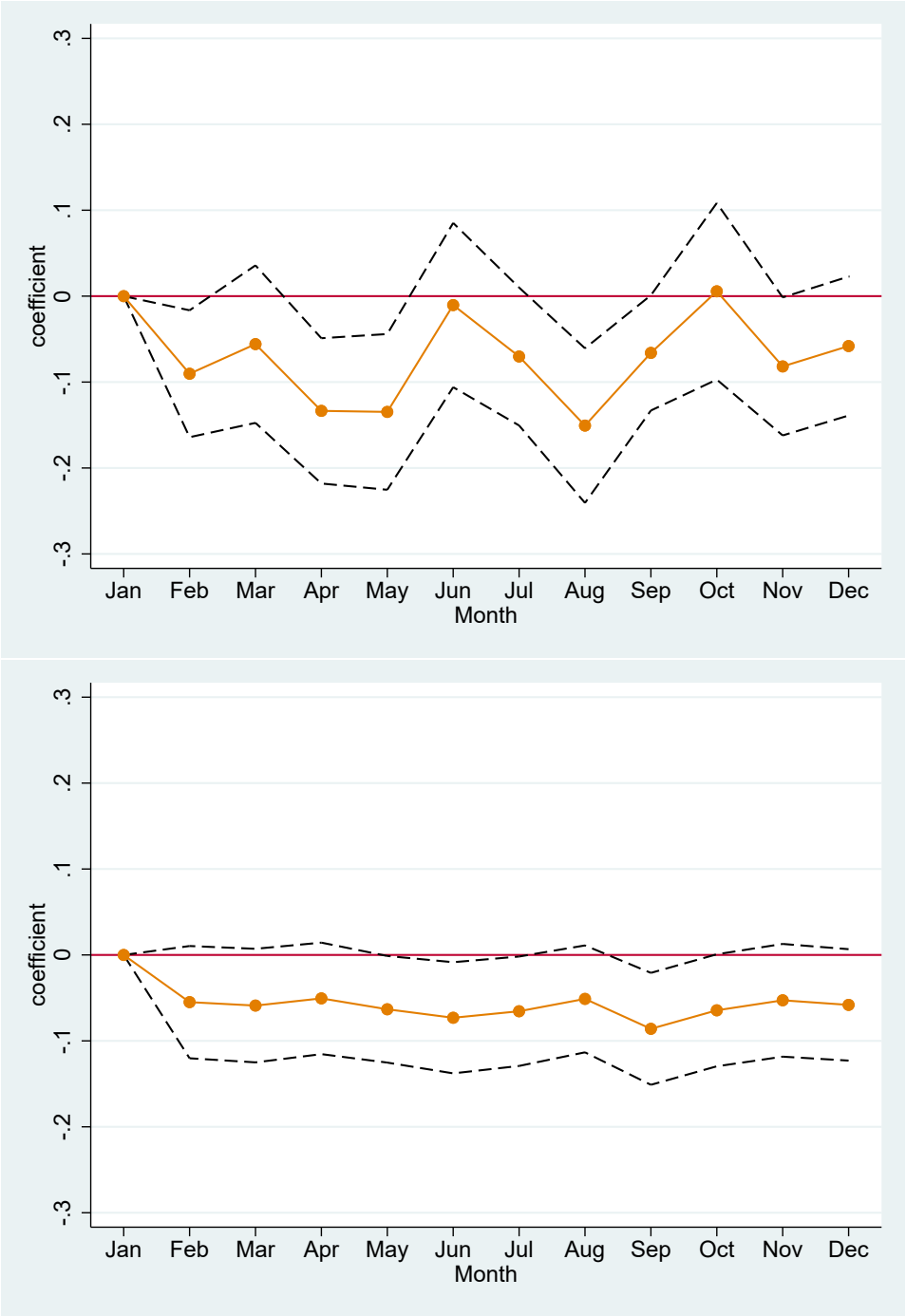

Figure 3: The figures report the γ coefficients on the interaction terms between the month dummies and D^{Old} in the top panel and the coefficients on the interaction terms between (the logarithm of) new cases of COVID-19 and D^{Old} in the bottom panel from estimating Equation (1) using the subsample of food and drink products, respectively. The dotted lines represent the 90% confidence interval bands. The standard errors are clustered at the prefecture level.

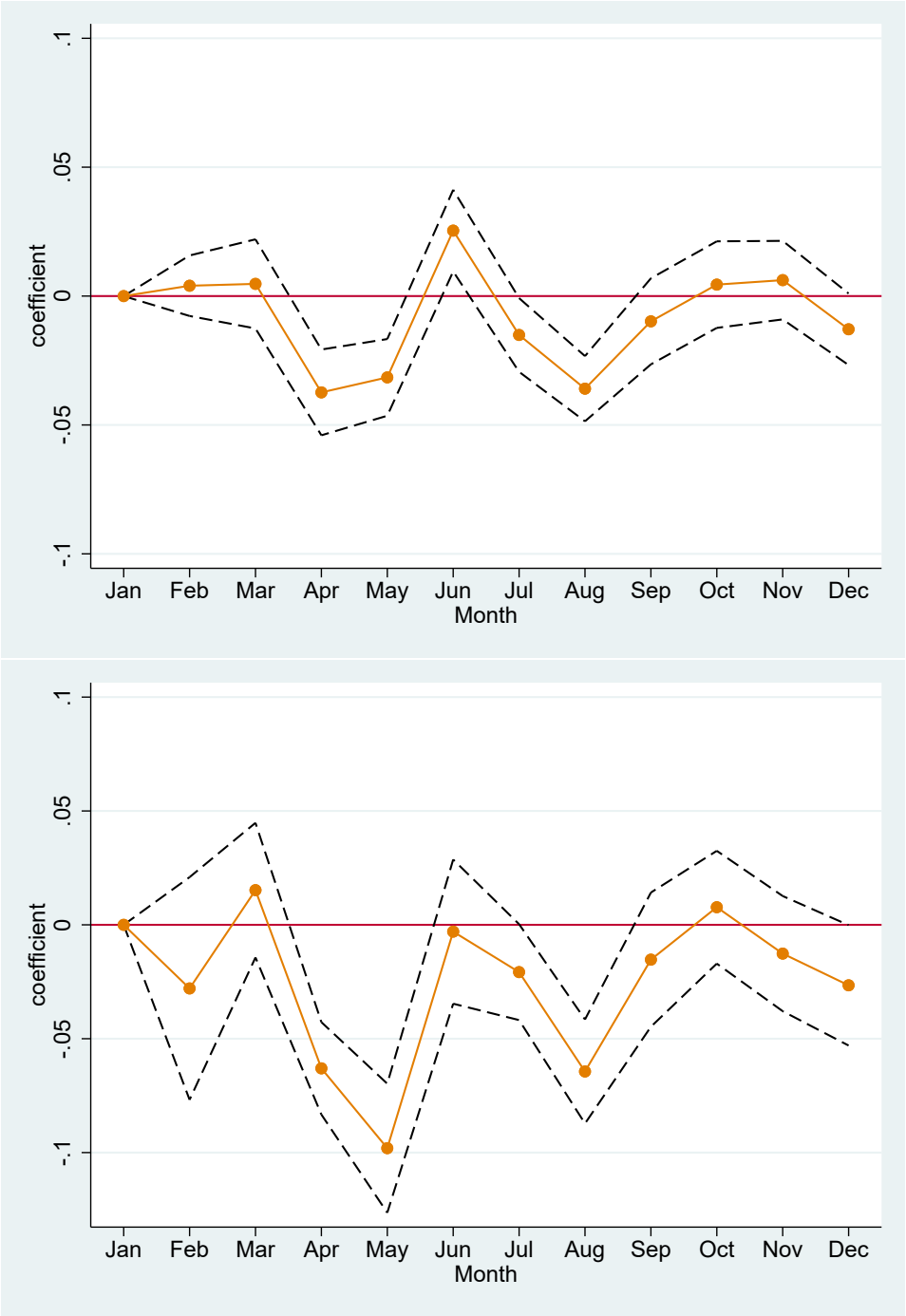

Figure 4: The figures present the development of the γ coefficients on the interaction terms between the month dummies and D^{Cohort_6} in the top panel and D^{Cohort_7} in the bottom panel for those in their 60s and 70s using all products, respectively. The dotted lines represent the 90% confidence interval bands. The standard errors are clustered at the prefecture level.

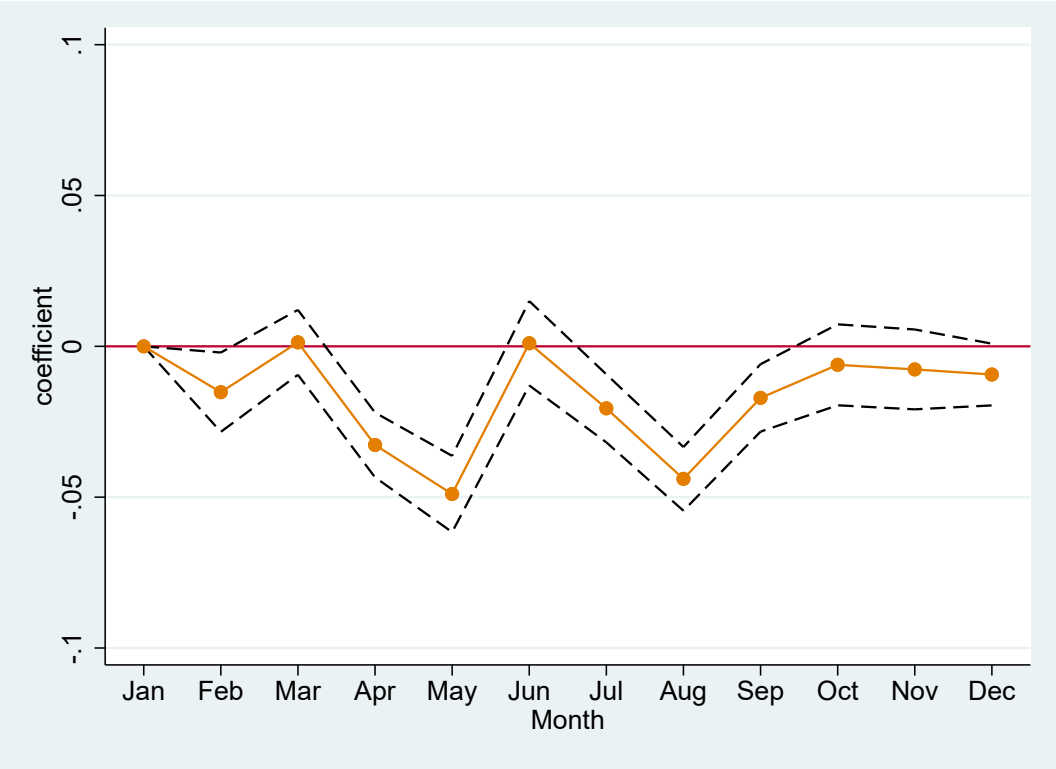

Figure 5: Frequency of visiting retail stores: The figure reports the γ coefficients on the interaction terms between the month dummies and D^{Old} from estimating Equation (2). The dotted lines represent the 90% confidence interval bands. The standard errors are clustered at the prefecture level.

A Questionnaire: Survey on the effects of the COVID-19 pandemic on daily life

Intage Inc. surveys the effects of the COVID-19 pandemic on daily life from October 23, 2020 to November 4, 2020. The questions are as follows.

Survey (I): How has the COVID-19 pandemic affected your daily life? Please indicate the situation for yourself for each period: (A) April–May, (B) June, (C) July–August, and (D) September–Present. If both suspension and resumption occurred during the same period, please select both.

(1) School closed

(2) School reopened

(3) Culture lesson (including tutoring school) closed

(4) Culture lesson (including tutoring school) reopened

(5) Had to take a leave of absence from work (including from part-time job)

(6) Resumed work (including part-time job)

(7) Lost job (including part-time job)

(8) Got a new job (including part-time job)

(9) Income decreased

(10) Income increased

(11) Workload increased

(12) Workload decreased

(13) Worked from home more than 20 days per month

(14) Worked from home around half of the month

(15) Worked from home around one day per week

(16) Changed method of commuting to work (or school)

(17) Staggered commute to work (or school)

(18) Fewer opportunities to eat out

(19) Increased opportunities to eat out

(20) Fewer opportunities to cook at home

(21) Increased opportunities to cook at home

(22) Fewer leisure activities and trips

(23) Increased number of leisure activities and trips

(24) Fewer trips to nearby places such as window shopping

(25) Went out more for window shopping and other local activities

(26) Decreased frequency of wearing make-up or dressing up

(27) Increased frequency of make-up and dressing up

(28) Decreased frequency of skin care

(29) Increased frequency of skincare

(30) Increased time spent with family

(31) Decreased time spent with family

(32) Increased time spent watching TV

(33) Increased time spent on the Internet and similar activities.

(34) Have not been affected at all

(35) Do not want to answer

Survey (II): How has the COVID-19 pandemic affected you daily life? Please indicate the situation for the family members who live with you for each period: (A) April–May, (B) June, (C) July–August, and (D) September–Present. If both suspension and resumption occurred during the same period, please select both.

(1) School closed

(2) School reopened

(3) Culture lesson (including tutoring school) closed

(4) Culture lesson (including tutoring school) reopened

(5) Had to take a leave of absence from work (including from part-time job)

(6) Resumed work (including part-time job)

(7) Lost a job (including part-time job)

(8) Got a new job (including part-time job)

(9) Income decreased

(10) Income increased

(11) Workload increased

(12) Workload decreased

(13) Worked from home for more than 20 days per month

(14) Worked from home around half of the month

(15) Worked from home about one day per week

(16) Changed method of commuting to work (or school)

(17) Staggered commute to work (or school)

(18) Fewer opportunities to eat out

(19) Increased opportunities to eat out

(20) Fewer opportunities to cook at home

(21) Increased opportunities to cook at home

(22) Fewer leisure activities and trips

(23) Increased number of leisure activities and trips

(24) Fewer trips to nearby places such as window shopping

(25) Went out more for window shopping and other local activities

(26) Decreased frequency of wearing make-up or dressing up

(27) Increased frequency of make-up and dressing up

(28) Decreased frequency of skin care

(29) Increased frequency of skincare

(30) Decreased frequency (opportunity) of skin care for family members who live with you

(31) Increased frequency (opportunity) of skin care for family members who live with you

(32) Have not been affected at all

(33) Living alone

(34) Do not want to answer

Based on the answers to Surveys (I) and (II) about school closure in Questions (1) and (2), employment status in Questions (7) and (8), income shocks in Questions (9) and (10), and the frequency of eating out in Questions (18) and (19), we construct 16 (eight by two) dummy variables. The dummy variables for the respondent and the family members correspond to school closure ($D_t^{SchoolClose}$ and $D_t^{SchoolReopen}$), employment status ($D_t^{Unemployment}$ and $D_t^{GettingJob}$), income shocks ($D_t^{IncomeUp}$ and $D_t^{IncomeDown}$), and the frequency of eating out ($D_t^{IncreaseEatout}$ and $D_t^{DecreaseEatout}$). The dummy variables take 1 when a respondent answers "YES" to each question in period t, and 0 otherwise. For example, assuming that a respondent answers "YES" to Question (1) regarding Period (D) in Survey (I), $D_t^{SchoolClose}$ takes 1 from September to November.

B Additional tables and figures

Table B.1: Basic statistics of the survey on the effects of the COVID-19 pandemic on daily life. Source: Intage Inc.

Respondent	Apr.–May 2020	June 2020	July–Aug. 2020	Sept.–Nov. 2020
Unemployment	1.38%	0.82%	0.83%	0.69%
Return to work	1.00%	0.65%	0.92%	1.11%
School close	2.81%	0.46%	0.38%	0.15%
School reopen	0.58%	1.83%	0.50%	0.72%
Eating out more	1.06%	5.10%	5.83%	18.82%
Eating out less	59.35%	40.29%	35.45%	20.49%
Increase in income	1.29%	1.86%	2.04%	2.71%
Decrease in income	16.52%	11.32%	9.79%	7.57%
Work from home ($\geq$ 20 days per month)	5.34%	2.95%	2.56%	2.15%
Work from home ($\geq$ 10 days per month)	5.21%	3.16%	2.52%	2.23%
Work from home (once a week)	4.38%	2.87%	2.61%	2.25%
Observations	32,911	33,358	34,028	46,743
Family members who live with the respondent	Apr.–May 2020	June 2020	July–Aug. 2020	Sept.–Nov. 2020
Unemployment	0.84%	0.43%	0.45%	0.39%
Return to work	0.34%	0.29%	0.34%	0.49%
School close	20.93%	3.37%	2.33%	5.88%
School reopen	2.72%	14.23%	3.00%	2.90%
Eating out more	0.85%	2.70%	4.44%	12.16%
Eating out less	36.16%	25.64%	22.15%	14.23%
Increase in income	0.57%	0.81%	0.88%	1.34%
Decrease in income	11.08%	7.78%	6.42%	4.70%
Work from home ($\geq$ 20 days per month)	5.73%	3.15%	2.69%	2.13%
Work from home ($\geq$ 10 days per month)	5.14%	3.15%	2.51%	1.85%
Work from home (once a week)	4.09%	3.16%	2.39%	2.00%
Observations	32,911	33,358	34,028	46,743

Table B.2: Estimation results from a dynamic difference-in-differences approach

		All products	Food and drink
γ_1:	January (Base month)	0.000	0.000
		(0.000)	(0.000)
γ_2:	February	−0.009	−0.090**
		(0.012)	(0.044)
γ_3:	March	0.009	−0.056
		(0.013)	(0.055)
γ_4:	April	−0.056***	−0.133**
		(0.009)	(0.050)
γ_5:	May	−0.067***	−0.135**
		(0.012)	(0.054)
γ_6:	June	0.017	−0.010
		(0.013)	(0.057)
γ_7:	July	−0.020**	−0.070
		(0.009)	(0.048)
γ_8:	August	−0.054***	−0.151***
		(0.009)	(0.054)
γ_9:	September	−0.013	−0.066
		(0.010)	(0.040)
γ_{10}:	October	0.007	0.006
		(0.011)	(0.061)
γ_{11}:	November	−0.001	−0.082*
		(0.009)	(0.048)
γ_{12}:	December	−0.020**	−0.058
		(0.010)	(0.048)
Observations		306,733	177,254

Notes: The table reports the γ coefficients on the cross term between month dummies and D^{Old}. The standard errors between parentheses are clustered at the prefecture level *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.