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Impact of COVID-19 Travel Subsidies on Stock Market Returns: Evidence from Japanese Tourism Companies

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Abstract: This study examines stock market response (SMR) to the Japanese tourism industry (TI) after the government's announcement of travel subsidies (TRSs) during the COVID-19 pandemic in 2020, using a sample comprising 80 listed Japanese firms in the TI and an event study method (ESM) to determine the impact of government policy responses (GPRs) to the pandemic. This study found that investors in the TI reacted positively to the announcement of subsidies; this positive effect persisted for 50 trading days after the announcement but was weaker for transportation firms. The results suggest that TRSs are important for the TI, with a stronger link to travel-related firms, such as airlines and travel agencies, hotels, and amusement services. However, investors in the TI reacted negatively to policies that directly addressed the pandemic, such as social distance policies (SDPs). These results are robustly confirmed when we measure abnormal returns by using a three-factor model. The results offer useful insights for policymakers and practitioners aiming to mitigate economic loss from disasters such as the COVID-19 pandemic.

Keywords: COVID-19; travel subsidies (TRSs); event study method (ESM); three-factor models; tourism industry (TI); Japan

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1. Introduction

The COVID-19 pandemic severely affected economic activities worldwide. The International Monetary Fund (IMF) estimates that "median global GDP dropped by 3.9% from 2019 to 2020" (Oum et al. 2022). The sporadic lockdowns negatively affected stock returns (SRs) (Xiong et al. 2020) and, in the TI, the sudden and sharp shortfall in firms' revenues were prominent. After news broke about the lockdown in Wuhan, China, growing fears over COVID-19 resulted in Japan shrinking tourism to contain the pandemic, such as stricter airport screenings and travel advisories (Japan Times 2020a). On 7 April 2020, the Japanese government announced an economic stimulus package (Prime Minister's Office of Japan 2020). For the TI, it announced TRSs under a 'Go To Travel' campaign (Kanamori et al. 2022), under which travel discount coupons were provided to residents to encourage them to travel within the country. In this study, we examine whether the announcement of TRSs positively affected the SRs of firms in the TI that was severely impacted by the pandemic.

The TI has become the most active and fastest-growing sector in the global economy in the last few decades (Agbola et al. 2020) but remains one of the most susceptible to external shocks such as pandemics and terrorism (Akron et al. 2020; Giusti and Raya 2019; Mariolis et al. 2021; Seraphin 2017). In 2020, the international TI contracted by 74% due to the COVID-19 outbreak (United Nations World Tourism Organization (UNWTO) 2021). During the first stage of the pandemic, the industry required support from local governments, such as travel vouchers for residents (Assaf and Scuderi 2020). Studies found that such TRSs were appropriate for the travel-related industries most affected by the crisis (Blake and Sinclair 2003). Although the pandemic significantly decreased demand for tourism, local markets recovered faster than international ones (United Nations

World Tourism Organization (UNWTO) 2020). Thus, TRSs may be a cost-effective policy to support the TI during disasters (Matsuura and Saito 2022).

There remains an important political issue for both academics and practitioners to clarify the effectiveness of travel subsidies during a pandemic era. From the viewpoint of cost-effectiveness in the tourism industry, travel subsidies would be required to support the travel demand during the pandemic era (Matsuura and Saito 2022). On the other hand, the risk perception of travelers would reduce travel during the pandemic (Neuburger and Egger 2021). In this sense, there might be an important empirical puzzle of whether a travel subsidy would be effective to support the demand of travel and improve stock market returns in tourism industries.

As for the Japanese TRSs, studies have found that these increased demand for local travel during the pandemic (Matsuura and Saito 2022). Thus, announcing the TRSs helped to mitigate the business uncertainty faced by the Japanese TI during the pandemic. However, previous studies did not examine the effect of this campaign, which has continued since 2020, on Japanese tourism firms' SRs. Therefore, this research investigates whether the campaign positively affected SMR for the TI.

Furthermore, we explored how SDPs affected the SMR after the campaign was announced. Indeed, after the announcement, the increasing demand for travel led to an increase in the number of COVID-19 cases (Kanamori et al. 2022). Thus, the Japanese government also needed to strengthen SDPs, owing to the increasing number of confirmed cases after the announcement of the campaign.

This study analyzes the impacts of TRSs on publicly listed firms in the Japanese TI by applying the ESM. The results show that, first, the TRS announcement had positive effects on the tourism firms' stocks. Second, SDPs negatively affected the TI. Third, the positive effect of the subsidies was significantly smaller in the transportation sector. Finally, we also confirmed that our results are same when we use the Fama and French (1993) three factor (FF3) model to apply for ESM as in previous studies (Jin and Zhang 2023; Sakawa and Watanabel 2023). Our results are robust when we apply the alternative FF3 model.

Our study contributes to the literature in several ways. First, it adds to the overall understanding of the COVID-19 crisis in the TI (Carter et al. 2022; Ding et al. 2021; Ramelli and Wagner 2020) by exploring how the new campaign and GPRs to COVID-19 affected investor reactions; we explicitly contribute to Matsuura and Saito's (2022) work by highlighting how the subsidy announcement impacted SMR. Second, by revealing whether TRSs mitigate the negative impact of SDPs, the study also adds to existing research (Sakawa and Watanabel 2022a, 2022b; Wu et al. 2021) that suggest that GPRs, such as the semi-closure of the TI, have a negative relationship with short-term SRs on smaller tourism firms' stocks. Finally, it verifies previous research that indicates COVID-19 may disparately impact different kinds of firms, such as airlines, hotels, and restaurants (Carter et al. 2022; Maneenop and Kotcharin 2020; Poretti and Heo 2022), by examining whether the size of the impact of the subsidies varied across different kinds of firms in the TI.

The rest of the paper proceeds as follows. Section 2 reviews the literature and constructs an empirical hypothesis, Section 3 presents the methodology and data, Section 4 presents the results, and Section 5 discusses the findings and concludes the paper.

2. Literature Review and Hypotheses Development

The COVID-19 pandemic negatively affected investor sentiment and resulted in decreasing stock market liquidity in U.S. firms (Baig et al. 2021). Previous studies examined its short-term impact on different regions using ESM. Ashraf (2020) revealed that the pandemic had a negative impact using major stock indices of various countries. Likewise, Erdem (2020) found that the pandemic decreased SRs and increased volatility in 77 countries. Al-Awadhi et al. (2020) showed that it had a negative impact on SRs in Chinese stock markets.

As global tourism and leisure activities were severely constrained by the pandemic (Sigala 2020), the relationship between COVID-19 and negative SRs in the TI was inves-

tigated for the global airlines industry (Maneenop and Kotcharin 2020) and hotels and restaurants (Poretti and Heo 2022). In Japan, the pandemic negatively impacted SRs in the TI after the announcement of the COVID-19 outbreak in China (Sakawa and Watanabel 2022a). After several COVID-19 cases were discovered on the cruise ship Princess Diamond, the Japanese government closed its borders on 9 March 2020 (Japan Times 2020b), and the news negatively affected Japanese shipping stocks (Sakawa and Watanabel 2023).

During a pandemic, social concerns that tourists might carry the virus to Japan are enhanced (Neuburger and Egger 2021). Thus, an increasing number of confirmed cases at destination cities decreases the number of outbound tourists (Farzanegan et al. 2021; Liu et al. 2021). Thus, the concern that international travelers might spread the virus is highly likely to depress the will to enjoy outbound travel (Matsuura and Saito 2022). Therefore, TRSs provided incentives for travel and enhanced demand during the pandemic (Matsuura and Saito 2022). We argue that TRSs positively affected the returns on the TI, whose revenues were set to increase with the rising travel demand. Thus, we propose the following hypothesis.

Hypothesis 1: *The announcement of TRSs affected the SMR for the TI.*

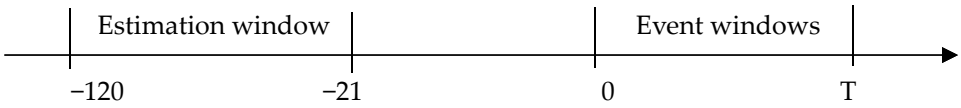
Further, the GPRs to the pandemic affected SRs (Wu et al. 2021; Haldar and Sethi 2020). Government strategies such as stringent SDPs, healthcare policies, and economic support programs effectively mitigated adverse market reactions to the pandemic (Gonzalez-Bustamante 2021). Existing studies find that GPRs had a direct negative effect on SRs due to their adverse impact on economic activity (Ashraf 2020). In tourism, the pandemic spread uncertainty, and GPRs such as SDPs further affected the SRs in the TI (Wu et al. 2021). Therefore, the positive effect of TRSs was expected to be offset by the strong GPRs, including stricter SDPs. Thus, we argue that SDPs had a negative impact on the positive effects of the subsidies on the returns on tourism stocks and propose the second hypothesis.

Hypothesis 2: *SDPs had negative impact on the positive effects of TRSs on SMR in the TI.*

3. Methodology and Data

3.1. Methodology

This study analyzed whether the announcement of TRSs affected SRs movements of listed tourism firms during the COVID-19 outbreak. We adopted ESM to investigate the SMR in Japan. This method is useful for analyzing the impact of an event on SRs (Campbell et al. 1997; Brown and Warner 1985; Graf 2009; Nicolau and Sharma 2022; Fama et al. 1969). Figure 1 shows the timeline of this study.



(T= +3, +5, +10, +20, +30, +50)

Figure 1. Timeline of the ESM. *Note:* Based on previous studies (Campbell et al. 1997; Brown and Warner 1985), we set ([−120, −21]) as the estimation window (i.e., 120–21 days prior to the event date). We set the event date as 7 April 2020 (day = 0), the day of the announcement of TRSs (Matsuura and Saito 2022). We chose 0 to T days as the event window ([0, +T]). This study shows several event windows ([0, +3], [0, +5], [0, +10], [0, +20], [0, +30], and [0, +50]) to compare the effects of this event.

This study implemented ESM to capture SMR in the following three steps. At first, we estimated the parameters derived from Equation (1) during the estimation period ([−120, −20]).

$$R_{it} = \beta_0 + \beta_1 R_{mt} + \varepsilon_{it} \quad (1)$$

where $E[\varepsilon_{it}] = 0, \mathrm{Var}[\varepsilon_{it}] = \sigma_{it}$.

In Equation (1), R_{it} represents the daily closing SRs at time t and R_{mt} is the daily SRs in a value-weighted market index for Japan. Using the estimated parameters ($\widehat{\beta_0}$, $\widehat{\beta_1}$) in Equation (1), we calculated abnormal returns (ARs) for each firm's SR to compare the effective SRs on a given day with the expected return in the following equation:

$$AR_{it} = \widehat{\varepsilon_{it}} = R_{it} - E(R_{it}) = R_{it} - (\widehat{\beta_0} + \widehat{\beta_1} R_{mt})$$

Second, we calculated the average abnormal returns (AAR_t) and the cumulative abnormal returns ($CAR_i[t]$s) as the sum of ARs in a given event window ([0, +T]):

$$AAR_t = \sum_{i=1}^{N} \frac{AR_{i,t}}{N} \text{ and } CAR_i[t] = \sum_{t=0}^{T} AR_{it}$$

When the sign of $CAR_i[t]$s is significantly positive, the impact of TRSs is positive for TI. In this case, we can interpret that TRSs moderated the negative impacts of the COVID-19 outbreak on the TI.

Thirdly, we investigated how other policy responses to the pandemic affected the announcement effect on TRSs in Japanese tourism stocks. The government implemented several measures to prevent the spread of the disease, including movement restrictions. We adopted the following model to analyze the effects of GPRs on SRs (Al-Awadhi et al. 2020):

$$AR_{it} = \alpha_0 + \beta_1 (SI/GRI)_{it-1} + \beta_2 Sector + \sum_j \gamma_j Contorl_{it-1} + \varepsilon_{it} \quad (2)$$

In Equation (2), SI represents the government stringency index and GRI represents the government response index (Wu et al. 2021). We adopted the sector dummies (Sector) to consider the sectoral differences within the TI, such as Transportation, Hotels, Airlines and Travel, and Amusement (Carter et al. 2022). We introduced a typical firm from each sectors. Both the Central Japan Railway Company (JR Central, 9022:JP) and the East Japan Railway Company (JR East, 9020:JP) belong to Transportation sector. Resorttrust Inc. (4681:JP) is included in the Hotels sector. Japan Airlines Co. Ltd. (9201:JP) and ANA Holdings Inc. (9202:JP) are known as typical firms of Airlines and Travel sector. Oriental Land Co. Ltd. (4661:JP) is famous in the Amusement sector.

Fourthly, we also used the FF3 model to confirm the robustness of our results, similar to previous studies (Jin and Zhang 2023; Sakawa and Watanabel 2023). To use the alternative methodology of the FF3 model, we investigated whether the conclusion of ESM based on two different models are robustly confirmed. The FF3 models (Fama and French 1993) are shown in Equation (3) as follows.

$$R_{it} = \beta_0 + \beta_1 R_{mt} + \beta_2 SMB_t + \beta_3 HML_i + \varepsilon_{it} \; where \; E[\varepsilon_{it}] = 0, \mathrm{Var}[\varepsilon_{it}] = \sigma_{it} \quad (3)$$

In Equation (3), SMB_t represents the difference in returns between small and large stock firms on day t. HML_i is the difference in return between high and low book-to-market ratio of stocks. Using this Equation (3), we also calculate ARs based on the FF3 model.

In addition, we controlled the daily growth rate of COVID-19 confirmed cases (Case), firm size (Size), and price-to-book ratio (PBR). We assumed that the confirmed cases (Case) were negatively associated with the SRs of each firm (Al-Awadhi et al. 2020). We adopted firm size (Size) as the logarithm of market capitalization. The growth opportunity of the firm is used as price-to-book ratio (PBR) (Wu et al. 2021).

3.2. Data

We focused on all tourism firms available in the Astra Manager database. We used the Standard Industrial Classification codes to identify the TI (Wu et al. 2021). We excluded data with missing information on sector classification during the event window. We collected daily SR data from the NPM database of Financial Data Solutions Inc. Our sample comprised 80 tourism stocks in Japan. Next, we gathered data on the number of confirmed

COVID-19 cases and deaths from the website of the Ministry of Health, Labour, and Welfare and related data from government indexes from the OxCGRT website.

4. Empirical Results

4.1. Descriptive Statistics and ESM

We introduce the descriptive statistics of the variables in Table 1. The mean value of ARs was 0.597; this confirms that TRSs was good news for investors in tourism firms, consistent with H1. The GRI and SI values indicated that governments responded with significant policy changes. The average value of daily growth of COVID-19 cases was about 3.4%. The average size and PBR were approximately 627 billion JPY and 2.160, respectively.

Table 1. Summary statistics.

Variable	Number	Mean	SD	Q1	Median	Q3
ARs	2480	0.597	3.164	−1.092	0.242	1.797
GRI	2480	−0.001	0.034	0.000	0.000	0.000
SI	2480	−0.388	2.047	0.000	0.000	0.000
Case	2480	0.034	0.038	0.003	0.018	0.061
Size	2480	6.276	2.074	4.517	5.849	7.862
PBR	2449	2.160	2.463	1.045	1.369	2.075

Note: ARs is abnormal returns. GRI and SI were obtained from the Oxford COVID-19 Government Response Tracker (https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker) (accessed on 28 September 2023). COVID-19 represents the daily growth rate of COVID-19 confirmed cases calculated as $((Case_t - Case_{t-1})/Case_{t-1})$ (https://www.mhlw.go.jp/stf/covid-19/open-data_english.html) (accessed on 28 September 2023).

Table 2 shows the results of AARs across all tourism firms in the event window ([0, +30]). The positive values of ARs can be observed on trading days 0 to 2, 6, 9, 12, 15 to 16, 19 to 20, 26 to 27, and 29 to 30. This shows that the TRSs announcement had significant and positive effects on the Japanese TI, supporting H1.

Table 2. Average abnormal returns (AARs).

Day	AARs		T-Value	Day	AARs		T-Value
0	2.07	**	(4.73)	16	1.47	**	(3.39)
1	2.54	**	(6.98)	17	0.54	+	(1.99)
2	1.84	**	(3.37)	18	−1.14	**	(−3.90)
3	−1.60	**	(−5.55)	19	1.21	**	(4.19)
4	0.59		(1.51)	20	3.40	**	(7.05)
5	−0.12		(−0.34)	21	−0.06		(−0.21)
6	0.80	*	(2.40)	22	−0.22		(−0.79)
7	0.48	+	(1.67)	23	0.13		(0.52)
8	−0.42		(−1.33)	24	−0.55	*	(−2.12)
9	1.86	**	(5.24)	25	0.53		(1.39)
10	0.05		(0.15)	26	0.67	*	(2.27)
11	−1.42	**	(−4.96)	27	0.45	*	(2.03)
12	0.56	*	(2.12)	28	0.02		(0.11)
13	−0.07		(−0.37)	29	1.28	**	(5.27)
14	−0.11		(−0.45)	30	2.10	**	(4.56)
15	1.63	**	(4.30)				
Number	80						

Note: t statistics in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

Table 3 presents the results of the CARs across all tourism firms in the event window. First, column (1) shows that significant and positive CARs were observed in all event windows ([0, +3], [0, +5], [0, +10], [0, +20], [0, +30], and [0, +50]). This suggests that the positive effect of the announcement of TRSs on the Japanese TI continued for a relatively long time, i.e., 50 trading days, which is consistent with H1. This result is consistent with

previous studies, where market investors perceived TRSs as an appropriate measure to stimulate recovery in the TI (Blake and Sinclair 2003; Matsuura and Saito 2022).

Table 3. Cumulative abnormal returns (CARs).

	(1)		(2)		(3)		(4)		(5)	
Windows	**All**		**Transportation**		**Hotels**		**Airlines and Travel**		**Amusement**	
[0, +3]	4.85	**	0.59		7.70	**	10.78	**	5.84	**
	(5.98)		(1.16)		(8.40)		(3.12)		(3.66)	
[0, +5]	5.32	**	0.19		9.91	**	10.07	**	7.02	**
	(5.99)		(0.33)		(7.37)		(3.76)		(3.25)	
[0, +10]	8.09	**	2.00	*	13.82	**	11.71	**	11.09	**
	(7.65)		(2.25)		(7.00)		(6.49)		(4.03)	
[0, +20]	14.17	**	2.27	+	20.53	**	24.31	**	22.03	**
	(7.74)		(2.00)		(6.20)		(5.60)		(5.09)	
[0, +30]	18.52	**	3.88	*	27.52	**	31.82	**	26.75	**
	(8.19)		(2.64)		(5.63)		(5.05)		(6.00)	
[0, +50]	16.30	**	−0.57		29.05	**	27.60	**	26.30	**
	(6.81)		(−0.36)		(5.97)		(4.42)		(5.88)	
Number	80		32		16		12		20	

Note: t statistics in parentheses. Based on the four digits of the SIC codes, we classify the TI into four sectors, namely Transportation (4011, 4111, 4119, 4121, 4131), Hotels (7011, 7041), Airlines and Travel (4512, 4724), and Amusement (7948, 7991, 7992, 7993, 7996, 7997, 7999). + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

Next, we investigate the differences in the effects on the TI. In column (2), we can observe significant and positive CARs in two windows ([0, +10] and [0, +30]) and insignificant and negative CARs in one window ([0, +50]). In other words, the positive effects of TRSs on transportation firms continued for 30 trading days. However, columns (3), (4), and (5) show significant and positive CARs in all event windows ([0, +3], [0, +5], [0, +10], [0, +20], [0, +30], and [0, +50]). This result shows that the positive effects of TRSs on airlines and travel agencies, hotels, and amusement activities lasted for 50 trading days after the event. The findings suggest that the positive effect of TRSs was smaller for transportation firms than for other areas of the TI (hotels, airlines and travel, and amusement).

Figure 2 shows the results of AARs from each of the TI sectors in the event window ([0, +10]). The figure shows that the positive effects tend to be smaller in the Transport industry. Thus, we can also confirm the differences between industry sectors in Figure 2.

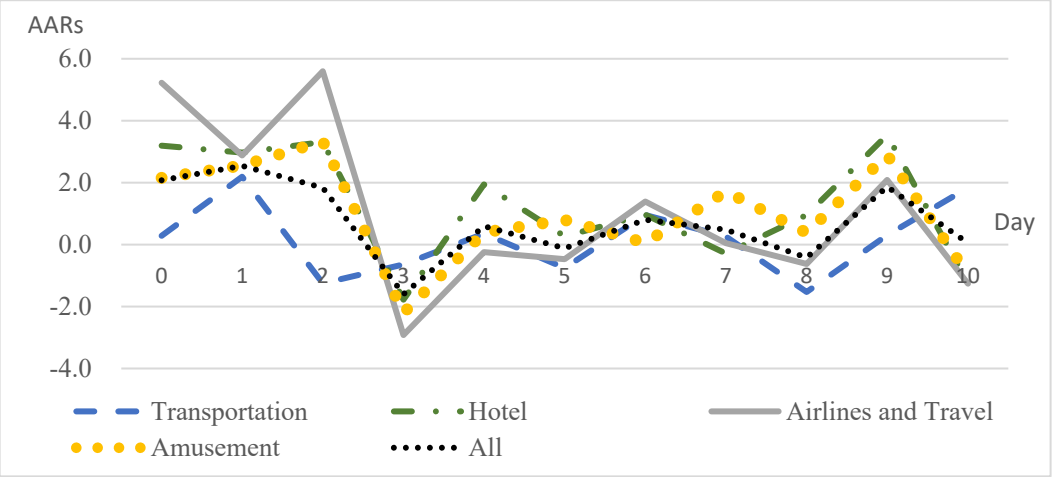


Figure 2. Average abnormal returns in the TI (AARs).

4.2. Estimation Results

Table 4 shows the estimated results of Equation (2), which helps with the analysis of the relationship between GPRs and SRs. First, we found that SI was significantly negative for ARs in columns (2), (4), and (6); this evidence supports H2. We could not obtain a significant result for GRI. These results support the idea that the implementation of SDPs, which helps mitigate an outbreak, is directly linked to safety in the tourism businesses. Therefore, strong SDPs would mitigate the positive effect of TRSs.

Following Carter et al. (2022), we also estimated the effect of the sectoral difference in ARs. The ARs indicate significant and negative value for transportation firms in columns (3), (4), (5), and (6). This suggests that the subsidies may have had a weaker impact on transportation firms like JR Central and JR East because large amounts of their revenue are derived from commuter services. In other words, TRS support is required for firms which provide for travelers' needs, such as Resorttrust Inc., ANA Holdings, and Oriental Land Co. We can interpret that a subsidy is considered a driver of recovery regarding the demands of travel and is only weakly effective for transportation firms whose main services are for commuters. As for the control variables, Size was significantly negative and the PBR was significantly positive for ARs.

Table 4. The impact of GPRs on SRs.

	(1)		(2)		(3)		(4)		(5)		(6)	
Transportation					−0.644	**	−0.644	**	−0.644	**	−0.644	**
					(−4.11)		(−4.11)		(−4.11)		(−4.11)	
Hotels					0.063		0.063		0.063		0.063	
					(0.32)		(0.32)		(0.32)		(0.32)	
Airlines and Travel					0.057		0.057		0.057		0.057	
					(0.27)		(0.27)		(0.27)		(0.27)	
GRI	−3.659	+			−3.659	+			−2.714			
	(−1.85)				(−1.85)				(−1.51)			
SI			−0.087	**			−0.087	**			−0.072	*
			(−2.65)				(−2.65)				(−2.38)	
Case	2.589		2.809	+	2.589		2.809	+				
	(1.59)		(1.77)		(1.59)		(1.77)					
Size	−0.072	**	−0.072	**	−0.004		−0.004		−0.004		−0.004	
	(−3.17)		(−3.17)		(−0.16)		(−0.16)		(−0.16)		(−0.16)	
PBR	0.131	**	0.131	**	0.096	**	0.096	**	0.096	**	0.096	**
	(3.65)		(3.65)		(2.95)		(2.95)		(2.95)		(2.95)	
Constant	0.681	**	0.642	**	0.571	**	0.533	**	0.660	**	0.634	**
	(3.97)		(3.70)		(3.63)		(3.35)		(4.39)		(4.24)	
Number	2449		2449		2449		2449		2449		2449	
Adj R^2	0.013		0.014		0.020		0.021		0.019		0.021	
F	6.18	**	7.70	**	11.89	**	12.96	**	12.94	**	14.05	**

Note: t statistics in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

4.3. Further Analyses

We next estimate the ARs, using FF3 factor models to control for size and value effects (Fama and French 1993), which is another method provided in previous sub-sections. The estimated ARs of three factor models improve on the single market model, which does not account for size and value effects (Nicolau and Sharma 2022). Thus, we also estimate the CAARs using the FF3, as shown in Table 5 as follows. Through Table 5, we can observe that the CARs for all sectors, as well as Firms, Airlines and Travel, Hotels, and Amusement, are significantly positive, which is consistent with H1. In addition, we do not obtain significant results for Transportation in column (4), which is similar to the results in Table 3.

Table 5. Cumulative average abnormal returns (CAARs) of the three-factor model.

	(1)		(2)		(3)		(4)		(5)	
Windows	**All**		**Transportation**		**Hotels**		**Airlines and Travel**		**Amusement**	
[0, +3]	3.57	**	−0.11		5.98	**	9.23	*	4.11	*
	(4.50)		(−0.22)		(6.57)		(2.70)		(2.43)	
[0, +5]	3.91	**	−0.41		7.81	**	8.07	**	5.22	*
	(4.63)		(−0.74)		(5.17)		(3.58)		(2.33)	
[0, +10]	5.10	**	0.65		9.47	**	7.63	**	7.22	*
	(4.97)		(0.80)		(3.95)		(4.61)		(2.50)	
[0, +20]	9.60	**	0.03		14.13	**	18.39	**	16.01	**
	(5.56)		(0.03)		(3.99)		(5.41)		(3.47)	
[0, +30]	12.17	**	1.01		18.30	**	23.14	**	18.54	**
	(5.86)		(0.65)		(3.78)		(4.60)		(3.79)	
[0, +50]	10.65	**	−2.98	+	20.70	**	19.60	**	19.05	**
	(4.87)		(−1.80)		(4.41)		(3.94)		(3.91)	
Number	80		32		16		12		20	

Note: We estimate the ARs by using the Fama and French three-factor model (FF3). T statistics are in parentheses. Based on the four digits of the SIC codes, we classified the tourism industry into four sectors, namely Transportation (4011, 4111, 4119, 4121, 4131), Hotels (7011, 7041), Airlines and Travel (4512, 4724), and Amusement (7948, 7991, 7992, 7993, 7996, 7997, 7999). + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

In Table 6, we also demonstrate that Equation (2) can obtain the estimated ARs of the FF3. Using this table, we also find that SI was significantly negative for columns (2), (4), and (6), which is consistent with H2. In other words, our estimated results are robustly confirmed using another method.

Table 6. The impact of government's response on the ARs of the three-factor model.

	(1)		(2)		(3)		(4)		(5)		(6)	
Transportation					−0.594	**	−0.594	**	−0.594	**	−0.594	**
					(−3.42)		(−3.42)		(−3.42)		(−3.42)	
Hotels					0.044		0.044		0.044		0.044	
					(0.21)		(0.21)		(0.21)		(0.21)	
Airlines and Travel					0.079		0.079		0.079		0.079	
					(0.35)		(0.35)		(0.35)		(0.35)	
GRI	−11.780	**			−11.780	**			−10.280	**		
	(−5.64)				(−5.64)				(−5.35)			
SI			−0.140	**			−0.140	**			−0.125	**
			(−4.20)				(−4.20)				(−4.03)	
Case	4.103	*	2.787	+	4.103	*	2.787	+				
	(2.54)		(1.75)		(2.54)		(1.75)					
Size	−0.025		−0.025		0.037		0.037		0.037		0.037	
	(−1.05)		(−1.05)		(1.24)		(1.24)		(1.24)		(1.24)	
PBR	0.074	+	0.074	+	0.042		0.042		0.042		0.042	
	(1.84)		(1.84)		(1.07)		(1.07)		(1.07)		(1.07)	
Constant	0.249		0.247		0.151		0.150		0.292		0.250	
	(1.36)		(1.35)		(0.81)		(0.80)		(1.62)		(1.39)	
Number	2449		2449		2449		2449		2449		2449	
Adj R^2	0.016		0.009		0.022		0.015		0.020		0.015	
F	11.18	**	6.92	**	9.75	**	8.54	**	10.80	**	9.56	**

Note: We estimate ARs using the Fama and French three-factor model (FF3). t statistics are in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

5. Discussion and Conclusions

This study implemented an ESM to uncover the impact on Japanese tourism stocks by the announcement of TRSs and other GPRs to the COVID-19 outbreak. We found that the

subsidies positively affected the TI. Our findings suggest that market investors perceived the TRSs as an appropriate measure to stimulate recovery in the TI in Japan, which is consistent with previous studies (Blake and Sinclair 2003; Matsuura and Saito 2022). Next, we examined whether SDPs influenced SRs. Our results revealed that these negatively affected the positive effect of TRSs on the returns of Japanese tourism stocks. Finally, we found that the positive effect of TRSs was significantly lower in the transportation sector, indicating that this effect was weaker for transportation firms than for directly travel-related ones. After controlling for size and valuation effect (Fama and French 1993), we obtained robust results.

Overall, these results corroborate the works of Matsuura and Saito (2022) and Kanamori et al. (2022) by demonstrating tourism investors' positive reactions to TRSs. Previous research (Matsuura and Saito 2022) only focused on the effects of subsidies on travel flows and did not investigate stock market reactions to the subsidy news. Our approach is unique as we investigated positive market reactions to the subsidies in the tourism industry. As a result, this study demonstrated that positive CARs for tourism firms persisted for a long period after the introduction of TRSs. Further, SDPs negatively affected market responses after the subsidies were announced, which could indicate that the market saw these as a dampening or contradictory effect on the performance of the travel industry.

This study makes several contributions. First, it investigated how the cost-effective policy of travel subsidies affected stock market responses in the tourism industry. The result implies that travel subsidies mitigate worsened stock market responses during the pandemic era in the tourism industry. Second, this study reveals that the social distancing policies decreased the positive effects of travel subsidies during the pandemic era. This implies that the risk perception of customers in the travel industry is enhanced by strict regulations such as social distancing policies.

This study has several limitations. First, it does not analyze how the damage caused by the pandemic affected the SMR to tourism firms, especially because after the announcement of the TRSs, the number of confirmed cases and deaths increased. Therefore, it may be interesting to investigate how TRSs affected the SMR toward tourism firms over a longer period. Second, the effects of TRSs are likely to be lower when pandemic fallouts are more severe. Third, our study only focuses on the subsidy effects of 2020. After December 2020, the 'Go To Travel' campaign was stopped. In this sense, travel subsidies for the travel industry stock market was limited to the year 2020. The longer effects of policies around the COVID-19 crisis in travel industry is an important research topic. The analyses of these three points would be important and interesting topics for future research.

There remain future research avenues regarding stock market responses in the tourism and leisure industry. Recent studies have revealed the effects of COVID-19 on stock markets in several countries (Ghosh 2022; Hailemariam et al. 2023; Helmi et al. 2023; Ji et al. 2024; Kalinowski 2024; Murashima 2022). In addition, the effect of COVID-19 on stock returns would be higher in firms with higher ESG ratings (Murashima 2022). The findings of these studies could be connected to the effects of subsidies on leisure companies in Japan.

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