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Master's Thesis

The Impact of the THAAD Retaliation on Chinese Visitors to Korea

사드(THAAD)보복이 방한중국인에
미치는 영향에 관한 연구

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Abstract

Economic sanction gives a negative impact on a targeted country. This paper examines the impact of THAAD retaliation on Chinese visitors to Korea. For analysis, difference-in-differences (DID) and DID with heterogeneous effects are employed. By analyzing the number of Chinese visitors based on age, gender, purpose, and the port of entry, heterogeneous impacts are found. During the THAAD crisis, about 40% of Chinese visitors decreased. For gender, both female and male Chinese visitors are affected negatively by the THAAD retaliation. Except for the 50s, all age groups are affected negatively by the THAAD retaliation. Considering the purposes of Chinese visitors, not only tourists but also Chinese coming to Korea for the public and business are negatively affected. Among ports of entry, the number of Chinese visitors dropped in all airports. In port cases, Chinese visitors who came through Busan port and especially Jeju decreased a lot.

Keywords Economic Sanction; Tourism; Tourists; China; THAAD crisis;
Difference-in-Differences (DID)

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Chapter 1. Introduction

The Korean government had announced the deployment of THAAD (Terminal High Altitude Area Defense). Because of missile provocations from North Korea, the U.S. had proposed the deployment of THAAD on the grounds of peace on the Korean Peninsula, and the Korean government had discussed the issue. However, China strongly opposed the deployment of THAAD for its national security. China argued that THAAD is harmful to its national defense security because the X-brand radar for THAAD can monitor Chinese military activities. Despite China's strong opposition, the South Korean government decided to deploy THAAD. The first deployment was on April 20th in 2017.

The decision for THAAD resulted in economic retaliation from the Chinese government, which damaged the Korean economy. Tourism and *Hallyu* restrictions are examples of economic retaliation. In November, the Chinese authority's restrictions on *Hallyu*, called *Hanhanyeong*. They banned Korean artists are shown on Chinese TV programs and rejected Korean artists' concerts or schedules. In addition, anti-Korean sentiment and boycotts occurred in China. South Korean government decided on Seongju as a place for THAAD, and Lotte corporation agreed to provide the land for THAAD deployment. As a result, Chinese people boycotts the products and Lotte Mart, and finally, Lotte corporation became one of the most victims of THAAD retaliation.

During the THAAD dispute, the most noticeable sector was tourism because of direct restrictions on travel to Korea. For example, the authority's verbal instructions to reduce travel to Korea by 20% in October 2016. In December 2016, the Chinese government did not allow charter flights to Korea during the lunar New Year holiday. In January 2017, cruises to Incheon, Busan, and Jeju had been restricted. In figure 1, the number of Chinese tourists increased from 2010, but in 2017, the number of Chinese visitors had largely dropped. Bank of Korea reported that more than 21 trillion won had been lost in the Korean tourism sector due to

THAAD retaliation (Cho, 2020). Also, Hyundai Research Institute estimated that there would be a loss of 18.1 trillion won in 2017 (Jeon, 2017a). Hence, focusing on the impact of Chinese tourists during the THAAD dispute is necessary.

This paper focuses on Chinese visitors from 2013 to 2019. This study aims to examine the impact of the THAAD dispute on Chinese visitors to Korea, considering heterogeneous factors such as age, gender, purpose of visiting Korea, and the ports of entry. Setting July 2016 as the event date, the consequences of the event are estimated by two methods. Difference-in-differences (DID) is conducted to identify the impacts of THAAD retaliation on Chinese visitors compared to non-Chinese visitors. DID with heterogeneous effect is conducted to investigate the different impacts of THAAD dispute on Chinese visitors depending on age group, gender, purpose of visiting Korea, and the port of entry. There are some reasons for conducting DID with the heterogeneous model. First, investigating demographic factors, such as age, gender, and the purpose of visit, can be a proxy for purchasing power. For example, in duty-free shops, a woman is more likely to have more purchasing power than a man. The young generation is more likely to visit Korea because of *Hallyu*. Thus, analysis by demography can be a good proxy for finding purchasing power in certain industries or sectors. Second, analyzing the port of entry can be a proxy for regional impact. It is possible to estimate the possible regional economic impact when the visitors' trend is estimated by the port of entry.

DID results show that during the THAAD retaliation, the number of Chinese visitors decreased by about 30-40 percent. In addition, when measuring different times, the shorter the periods are measured, the greater impacts are shown. The result of DID with heterogeneous analysis for gender shows that both female and male visitors are affected negatively by THAAD retaliation and statistically significant results are shown. The result for the Chinese age group shows that only the age group 50s presents a positive impact with no statistical significance, while the other age groups present statistically significant negative impacts. The result for

purpose indicates that Chinese tourists and visitors for public and business decreased, and Chinese people who came to Korea for education increased during the THAAD dispute. The result for the port of entry shows that THAAD retaliation causes a decrease in Chinese people entering airports. In port cases, Busan port and Jeju port are negatively affected by Chinese visitors during the THAAD dispute.

The paper is organized as follows. Section 2 explains the institutional backgrounds of economic sanctions, THAAD dispute, THAAD retaliation on tourism, and previous studies regarding THAAD. Section 3 introduces the data and methodology in this analysis. Section 4 presents the results of the empirical analyses. Section 5 shows robustness check results. Section 6 discusses the implications of the results. Section 7 concludes.

Chapter 2. Institutional Background

2.1. Economic Sanction

Economic sanction is frequently implemented by countries. Economic sanction enforces economic punishment on a targeted country to comply with the country's wants or changed the behavior of the targeted country (Hackenbroich & Chugh, 2022). Economic sanction negatively affects targeted economies. It hurts trade, investment, and even the economic growth of the targeted country (Kim & Lee, 2021). Sometimes, political conflict becomes the cause of economic sanctions.

China has implemented economic sanctions when political conflict occurred or when China judges its interests are violated. For example, in 2010, China and Japan had a sovereignty dispute over Senkaku Islands. China banned its exports of rare-earth elements to Japan and restricted tourism (Gu, 2018). In 2012, China and the Philippines had a territorial dispute over the South China Sea. Responding to the territorial disputes, China banned imports of bananas from the Philippines (Gu, 2017). In 2014, China and Vietnam had a territorial dispute over the South China Sea, and China strengthened customs for imported agricultural products from

Vietnam and imposed sanctions on Vietnamese tourism (Gu, 2017). In 2016, there was a political conflict with Taiwan because of the inauguration of an independent government (Jeon, 2017b). As a result, China strengthens its economic sanctions on Taiwan. In 2016, China imposed economic retaliation, including the establishment of border customs duties, because of Mongolia's invitation to Dalai Lama (Jeon, 2017b). As with these examples, China used economic retaliation as a weapon for its own interests.

2.2. China's Economic Sanction on Korean Economy

THAAD dispute is a complex and controversial issue related to political and diplomatic conflict. The U.S. Obama administration had focused on Asia to check China's rise and maintain its dominance in the Asia region (Lee, 2018). In particular, military cooperation with allies was expanded (Lee, 2018). In response, China sought to balance the U.S. checks on China. China strengthened partnerships and established strategic relations with neighboring countries (Lee, 2018). The international situation was under tension between the United States and China. China has opposed THAAD by arguing the threat to its national security. However, some people argued that the reason why China opposes is that THAAD is developed by the U.S. and the deployment of THAAD could strengthen the power of the U.S. military in Korea. Thus, China disagreed with South Korea's deployment of THAAD for balance with the U.S. Under this complicated situation, South Korea decided to deployment of THAAD in Korea. As a result, China inflicted THAAD retaliation on the Korean economy.

China's THAAD retaliation was a huge threat to the Korean economy because of its high dependency on the Chinese economy. The Korean economy is highly reliant on trade. The trade dependency is very high, but the problem is that Korean trade is highly dependent on China. In Figures 2 and 3, China is the largest trade partner of Korea. Export to China occupies 25% of total export. The import from China is also large and even increasing. The trade dependency of China is still

increasing. Yang (2019) found that more than 10% of Korean GDP was Korean exports to China from 2010 to 2014. Thus, China's THAAD retaliation was a serious threat to the Korean economy.

During the THAAD dispute, there had been various economic measures related to trade, such as launching an anti-dumping investigation of Korean cosmetics or launching an investigation for safeguards on Korean sugar (Bae & Yang, 2017). There was a relatively negative effect on exports where those were not closely related to the Chinese domestic industry (Song, 2020). For example, China banned some Korean cosmetic brands' imports so 11 tons of cosmetics were sent back to Korea (Yang, 2019). China authorities strengthen its customs on food products as well. In March 2017, Lotte Chilsung beverage could not pass the customs due to insufficient documentation in response to THAAD retaliation. In addition, many firms' sales are damaged because of the THAAD dispute. Orion's sales, a Korean food company, in the second quarter of 2017 were halved compared to the 3rd quarter of 2016 (Yang, 2019). Because of the ban on Korean artists and entertainment events, Korean entertainment companies' stock values plummeted over three days. CJ E&M dropped 8.99% and YG dropped 11.98% (Yang, 2019). Therefore, the retaliation affected negatively the Korean economy.

2.3. THAAD Dispute and Tourism

One of the most direct retaliation focused on the tourism industry. There was a direct retaliation against tourism such as travel agencies suspending Korean travel packages or canceling cruise trips. The problem was that Korea's tourism industry relied heavily on Chinese tourists. Figure 4 shows the proportion of Chinese tourists among foreign tourists visiting Korea. The number of Chinese visiting Korea has 12 times increased from 2003 to 2019. Also, Korean tourism is largely dependent on not only the number of Chinese tourists but also Chinese tourists' expenditure. In figure 5, the average expenditure per person of major countries is presented. China

spends the most during the tour in Korea among other countries. Despite the decrease in the Chinese average expenditure in 2016, the average expenditure had decreased from 2015, but China still ranked first in expenditure. Hence, many researchers analyzed the impact of tourism and tourists.

KDB report (2017) classified the cosmetic industry, duty-free stores, and tourism industries as the most dependent industries in China, and expected that those industries are hurt the most due to the THAAD retaliation. Yuxian Juan et al (2017) examined the characteristics of Chinese tourists who canceled their travel to Korea during the THAAD dispute using Q-methodology. They collected respondents and articulated them into four groups based on patriotism, risk awareness, external dependency, and Lotte sanctions. They found that the THAAD issue greatly influenced personal values, beliefs, and identities, which affected Chinese tourists' decisions to visit Korea. Kim (2019) analyzed the impact of THAAD on the demand for Chinese visitors to Korea using OLS regression. The dependent variable is the number of Chinese visitors and the explanatory variables are GDP, THAAD restrictions, real exchange rates, and global oil prices. He considered both total prohibition and partial ban caused by THAAD retaliation. He found that the coefficient of total prohibition was twice higher than the partial ban. He argued that based on the result, the Chinese visitors responded immediately based on the intensity of the policy. Yi and Kang (2019) found that the impact of THAAD retaliation caused a 4% drop in Korean tourism and lodging industries' productivity because of the decrease in Chinese tourists. Also, Jung and Choi (2019) evaluated the impact of THAAD on the price stickiness of the Korean lodging industry using cost accounting research. They found that the price stickiness in the Korean lodging industry was alleviated during the THAAD dispute because of the decrease in Chinese tourists and the pessimistic situation.

2.4. Empirical Analysis of THAAD Dispute

There are some previous studies that used the difference-in-differences (DID) model or triple-differences (DDD) model to measure the impact of THAAD retaliation. First, Kim and Lee (2021) used the synthetic control method to find the impact of THAAD on Chinese tourists. The outcome variable is the number of tourists from each country (49 countries). They found that Chinese tourists had a negative effect after the announcement of the THAAD but the effect persisted for about 18 months. For robustness check, they used DID model and found the THAAD deployment decreased the growth rates of tourists by 45-63 percentage points. Their study shows the negative impact of the THAAD dispute on the number of Chinese tourists.

Second, Wei-Na Kong (2021) used DID and DDD models for examining the impact of THAAD on Korean export to China. The dependent variable is South Korean exports to China. Five categories of trading goods, which are boycotted by Chinese consumers, are selected as a treated group and other trading goods are chosen as a control group. DID found that THAAD political conflict decreased Korean exports. DDD model added Korea-China FTA (free trade agreement) as a new dimension and analyzed the impact of THAAD retaliation on Korea's exports of FTA products. The result of DDD shows that FTA alleviated the negative impact on Korean exports.

Third, Shin et al (2019) conducted the DID analysis to find the impact of Chinese consumers' boycotts on South Korean cosmetics and apparel products during the THAAD dispute. The result shows that THAAD reduced the Chinese consumption of Korean products. Also, they found the voluntary boycott reduced the consumption of Chinese products. In addition, another DID analysis is conducted for finding the difference between the two groups, who recognized the political conflict or not, and the result shows that the higher the animosity group is, the stronger boycott has shown.

Chapter 3. Methodology

3.1. Data

This paper focuses on foreign visitors who came to South Korea from 2013 to 2019. The main outcome variable is foreign visitors to Korea from country i at month t . The foreign visitor data are collected by nationality and monthly frequency. It is collected from January 2013 to December 2019. The year 2020 and 2021 are excluded because of the COVID-19 pandemic. The source of the data is the Korean Tourism Organization. The summary statistics are shown in Table 1.

Because this study conducts two different DID models, there are two different datasets. First, for the basic DID model, the total number of foreign visitor data includes 102 countries. Thus, the maximum number of observations is 8,568 (102 countries \times 84 months). Second, for the DID model with heterogeneous effects, the foreign visitor data are collected by gender, age, the purpose of visit, and the port of entry. Likewise, the monthly data from January 2013 to December 2019 is used, but in this model, only 58 countries' data are available. Therefore, the maximum number of observations for each subgroup is 4,956 (58 countries \times 84 months). For gender, there are two subgroups which are male and female. Age data are divided into six subgroups, which are 10s (under the 20s), 20s, 30s, 40s, 50s, and above 60. The purpose of visit data is divided into four subgroups which are tour, business, public (official), and education. Lastly, ports of entry are divided into nine subgroups which are Incheon airport, Gimhae airport, Gimpo airport, Jeju airport, other airports, Busan port, Incheon port, Jeju port, and other ports. Also, Table 2 presents the portion of visitors from the top 5 foreign countries by year, which shows that China is the major country of foreign visitors to Korea from 2013 to 2017.

3.2. Method

Difference-in-Differences (DID)

This study used a difference-in-differences (DID model) as a basic model to empirically find the impact of THAAD retaliation on Chinese visitors to Korea compared to non-Chinese visitors. DID model is useful when there is a policy or external shock affecting a certain group, called a treatment group. In this study, the treatment group is Chinese visitors because the Chinese government restricted tourism toward Korea after the Korean government's announcement of THAAD deployment. The equation is written as follows:

$$Y_{it} = \alpha + \beta_1 China_i + \beta_2 THAAD_t + \beta_3 China_i * THAAD_t + \mu_t + \gamma_i + \epsilon_{it} \quad (1)$$

The outcome variable is the logarithm of the total number of visitors from country i in month t . Compared to other variables, the outcome variable's value is large enough to take the logarithm to find the coefficient and relationship easily. $China_i$ is a dummy variable for treatment; the value is one if the visitors are Chinese and the value is zero if the visitors are non-Chinese. Chinese and non-Chinese are grouped based on nationality. $THAAD_t$ is a dummy variable for showing pre- and post-THAAD retaliation; the value is one when the month is after July 2016 and the value is zero when the month is before July 2016 (July 2016 includes pre-THAAD retaliation). The interaction term $China_i * THAAD_t$ captures the impact of the THAAD dispute on Chinese visitors, and β_3 is the parameter of interest. μ_t is a time fixed effect, γ_i is a country effect, and ϵ_{it} is an error term.

Difference-in-Differences (DID) with Heterogeneous Effect

In this model, a new subscript i is added for finding impacts based on different demographic factors and regional information. The equation is written as follows:

$$Y_{i,c,t} = \alpha + \beta_1 China_{c,i} + \beta_2 THAAD_{t,i} + \beta_3 China * THAAD + \mu_t + \gamma_c + \epsilon_{i,c,t} \quad (2)$$

The outcome variable is the logarithm of the total number of visitors from country c

in month t and cell ' i '. Cell i is defined by gender (2 groups), age (6 groups), purpose (4 groups), and port of entry (9 groups). $China_i$ is a dummy variable for treatment; the value is one if the visitors are Chinese and the value is zero if the visitors are non-Chinese. Chinese and non-Chinese are grouped based on nationality. $THAAD_t$ is a dummy variable for showing pre- and post-THAAD retaliation; the value is one when the month is after July 2016 and the value is zero when the month is before July 2016 (July 2016 includes pre-THAAD retaliation). The interaction term $China_i * THAAD_t$ captures the impact of the THAAD dispute on Chinese visitors, and β_3 is the parameter of interest. μ_t is a time-fixed effect, γ_i is a country effect, and ϵ_{it} is an error term.

Chapter 4. Result

4.1. Difference-in-Differences (DID)

For finding short-term and medium-term impacts, four different models are differentiating the period. Because the announcement for THAAD deployment was in July 2016, August 2016 is regarded as a time when the retaliation began. The first model used the timeline from January 2013 to December 2019, which is the baseline period (full-time). The second model used the timeline from August 2013 to August 2019, three years before and after the retaliation. The third model is from January 2014 to January 2019, two years and a half before and after the retaliation. The fourth and last model is from August 2015 to August 2017, considering one year each before and after the treatment. All models are fixed by time and country and clustered by country.

Before presenting the results for DID, let me check the common trends assumption first. For difference-in-differences(DID), a parallel trend test is the first step in finding the impact of an event. This is significant because the common trend assumption shows the validity of the comparison between the treated group and the control group. In this study, the treated group is Chinese visitors, and the control

group is non-Chinese visitors. The common trend test measures whether Chinese visitors and non-Chinese visitors had a similar trend before the THAAD dispute occurs. If common trends are satisfied, it means that the two groups are comparable for DID model. Table 3 provides the results of the parallel trend test. Each column shows different periods. In table 3, all coefficients are insignificant, which supports the validity of the parallel trends between treated and control groups. Based on this test, I proceed with the DID model for finding the impacts of the THAAD dispute.

Table 4 presents the results for equation (1). Based on the observation numbers, columns (1) is the base period (full-time), columns (2) and (3) are the medium period, and column (4) is a relatively short period sample. First, the coefficient for the full period is -0.304 and shows a statistically significant result. The coefficients for the second and third periods are -0.362 and -0.428, respectively, and show statistically significant results. These results show that the effect of THAAD retaliation by the Chinese government caused about a 30-40 percent decrease in Chinese visitors to Korea. Second, the coefficient for the short term is -0.432 with a statistically significant result. The result in short term shows the largest drop due to THAAD retaliation. When the different time periods are conducted, it is found that the shorter period shows a more severe drop in the number of Chinese visitors than the longer periods. In other words, the short-term impact is larger than the medium- or full-period.

4.2. Difference-in-Differences (DID): Hong Kong and Macao

I conduct another DID model for finding whether the impact of THAAD retaliation affects visitors from Hong Kong and Macao as well. When collecting data, the number of visitors from Hong Kong and Macao are collected separately from the Chinese because Hong Kong and Macao have their own passports. Thus, it is a good opportunity to find the impact of THAAD retaliation on visitors from Hong Kong and Macao. As with the previous section (4.1), the short-term result is also

considered. Full-time and short-term effects are measured.

The first step for DID is parallel trend assumption. Table 5 provides the result of the common trends assumption. Columns (1) and (2) show Hong Kong and Macao's full-time parallel trend test and columns (3) and (4) show the results for the short-term. In all cases, there is no statistical significance in the interaction term. It proves that the trend of Hong Kong and Macao's visitors was identical to the control group (other countries). Table 6 presents the results of DID including Hong Kong and Macao dummy variables. The result is remarkable. The coefficients for Hong Kong and Macao from columns (1) and (2) are 0.0963 and 0.243, respectively. It indicates that Hong Kong and Macao visitors increase while Chinese visitors decreased by 30% in table 4. Columns (3) and (4) show the short-term effects. Macao's visitors still increased in the short term. However, Hong Kong does not have a statistically significant result. Therefore, contrary to Chinese visitors from the mainland, Hong Kong and Macao are not negatively affected by THAAD retaliation.

4.3. Difference-in-Differences with Heterogeneous Effect

In this study, time and country are controlled in all DID models. In addition, the standard error is clustered by country. This is because the data is collected and analyzed by country so that the different trends within the country should be controlled. Also, clustering by country helps control unobserved similar traits within the group. Therefore, all model is fixed by time and country, and the standard errors are clustered by country. The results are explained by different subgroups such as gender, age, purpose, and port of entry. The results are shown as follows.

Gender

Table 7 presents the DID result for gender. Two findings have to focus on. First, the coefficients of China×THAAD in both genders show negative values. The coefficient of China×THAAD for males is -0.197 and for females is -0.480. Both

results are statistically significant at the 1% level. Second, the coefficient of China×THAAD for females has a larger negative value. This result explains that after the THAAD retaliation, the number of Chinese women drops about 48% while men drop about 20%. It suggests that the impact of THAAD retaliation decreases both Chinese male and female visitors, but the impact on females is larger than on males.

Age

Table 8 presents the DID result for age. There is an interesting finding. All age groups except the 50s show negative coefficients with statistically significant results. The coefficients of age 10s, 20s, 30s, 40, and 60s are -0.662, -0.198, -0.15, -0.494, and -0.351, respectively. However, the coefficient of age 50s is 0.146, but there is no statistical significance. Except for the 50s, the number of Chinese visitors in all age groups decrease because of THAAD retaliation. Among the age groups, 10s is the most negatively affected during the THAAD dispute. Also, when compared to young people (20s and 30s) and older people (40s and 60s), young people are relatively less affected by the THAAD retaliation.

Purpose

Table 9 is a DID result for purpose of visiting Korea. There are two interesting results. The coefficients of DID results for tourism and public purpose indicate -0.383 and -0.477, respectively with a statistically significant at 1% level. However, the result for business has a relatively small negative coefficient, which is -0.126, with a statistically significant at 10 percent. In contrast, the coefficient of education indicates a positive sign, which is 0.267 with a statistical significance at 1% level. These results show that the impacts of THAAD retaliation are different based on the purpose of visiting Korea. Tourists and visitors for public purposes are strongly affected by the THAAD dispute.

Ports of entry

Tables 10 and 11 are DID results for the port of entry. Table 10 shows airports in Korea, and table 11 shows ports in Korea. When focusing on our interest parameter (DID interaction), an interesting result is found. Considering airports cases, all airports in Korea have negative coefficients which are -0.148, -0.280, -0.113, -0.889, and -2.235. It indicates that the THAAD dispute affects negatively Chinese visitors taking an airplane to visit Korea. In port cases, the coefficients for Busan port and Jeju port are significantly negative signs which are -1.470 and -3.725. Incheon port and other ports show positive coefficients which are 0.361 and 0.483. Among airports and ports, the most damaged place is Jeju port, which drops by 372%. These results indicate that THAAD retaliation impacts differently on Chinese visitors entering Korea through the port based on the destination.

Chapter 5. Robustness Checks

5.1. Short-Term Effect

For robustness checks, different periods are used. Results show the short-term effect of THAAD retaliation on Chinese visitors analyzed by subgroups. The results for previous models are from January 2013 to December 2019. In this section, two different periods are used: August 2015 to August 2017 and from 2015 to 2017. The results are explained by the subgroups and shown as follows.

Gender

Table 12 presents the DID result for gender in the short term. The coefficients of $\text{China} \times \text{THAAD}$ in both genders and both periods show negative values. The impact of THAAD retaliation leads to around 27.5% for males and 55% for females, which shows that in the short term, there are greater drops in both males and females than in the previous result. In the full time (from 2013 to 2019), the drop is around 20% and 48% for males and females, respectively. Thus, it suggests that

the impact of THAAD retaliation decreases both Chinese male and female visitors greater in the short term.

Age

Table 13 presents the DID result for the age group in the short term. Compared to the previous result (table 8), ages 10 and 40 show a similar drop in the short term. However, other age groups have different results. Age 20s, 30s, and 60s show a greater drop in the short term. For age 20s, the coefficients from columns (3) and (4) are -0.377 and -0.346, respectively, almost doubled from the previous result which is -0.198. Even for age 30s, the coefficients of short-term, which are -0.362 and -0.355, have more than twice larger negative values compared to the full-time result which is -0.150. In addition, for age 60s, the coefficients for short-term have a greater negative value than the full-time result shown in table 8. However, the most interesting finding is the age group 50s. In the previous section, age 50 is the only age group having a positive value. Surprisingly, the coefficients become negative values in short term but do not have statistical significance. Therefore, age groups 10s and 40s are the most affected by THAAD retaliation in both the long and short term, and for other age groups, the negative impacts caused by THAAD retaliation are larger in the short term than a longer period.

Purpose

Table 14 is a DID result for purpose of visiting Korea in the short term. There are different patterns based on the purpose of visiting. For tourism and the public, the coefficients for the short-term show a greater decrease than the previous result. Even, for the public, the coefficients for the short term almost double. The coefficient is -0.477 for full-time, but the coefficients for short-term are -0.827 and -0.791. However, the results of business and education do not have statistically significant results in the short term. Therefore, the short-term impact of THAAD

retaliation has greater effects on people visiting for tourism and public but does not have effects on Chinese visiting Korea for business and education.

Ports of entry

Tables 15 and 16 are DID results for Chinese visitors' port of entry in the short term. Table 15 shows airports, and table 16 shows ports in Korea. Considering airport cases, different patterns are shown. For Incheon, Gimhae, and Gimpo cases, the short-term impacts of THAAD retaliation show the greater negative impacts. The coefficients for Incheon become from -0.148 to -0.295 and -0.283. The coefficients for Gimhae become from -0.28 to -0.367 and -0.335, but the coefficients in the short term lose strong statistical significance. The coefficients for Gimpo become doubled but lose statistical significance. For Jeju airport, the short-term effects are similar to the result of the full-time effect, shown in columns 7 and 8, but still Jeju port is the most damaged airport during THAAD retaliation. On the other hand, the short-term effects in other airports are smaller than the result of the full-time effects, shown in columns 9 and 10.

Next, there are interesting patterns in port cases. In Busan, Jeju, and other ports cases, the short-term effects are smaller than the full-time effect, as shown in Table 16. The coefficients of Incheon port do not have statistically significant results. Short-term effects of THAAD retaliation are easily found in airport cases because most airports have a greater negative impact in the short term compared to the previous result. However, still, Busan and Jeju ports are one of the most negatively affected places among all airports and ports. In addition, the decline in the number of Chinese visitors to Jeju port is the most overwhelming.

5.2. Different Treated Period

In this study, the post-treated period is after August 2016, when after the announcement of THAAD deployment by the Korean government (in equations (1)

and (2)). However, in this section, it is measured how the THAAD deployment affects Chinese visitors to Korea after the THAAD deployment. Thus, another treated (affected) period is defined for DID model. The first THAAD deployment took place in April 2017, so the period after April 2017 become a treated period for Chinese visitors. The only difference with equation (2) is that value for the THAAD dummy variable is one when the month is after April 2017. As with previous models, time and country are fixed, and the standard error is clustered by country.

Gender

Table 17 is DID results for gender. After the deployment of THAAD, both male and female visitors drop. Compared to the DID previous result, the negative values of both males and females show larger decreases. Thus, it suggests that the greater negative impact of THAAD retaliation on both male and female visitors is shown after the THAAD deployment than after the announcement.

Age

The result of age groups is shown in Table 18. There are larger drops after THAAD deployment in all age groups except the 50s. In the case of age 50s, the positive value is shown as with the previous result, but the value becomes smaller. The previous coefficient is 0.146 in Table 8, but the coefficient becomes 0.0628. In other words, even though the age group 50s still comes to Korea during the THAAD dispute, after the deployment, there is a negative response from Chinese visitors. Therefore, all age groups are negatively affected by THAAD retaliation after the Korean government deploy the THAAD.

Purpose

Table 19 presents the result of visitors based on the purpose of visit to Korea. There are interesting results. A greater negative effect is shown in Chinese tourists

after THAAD deployment. Visitors for the public purpose have still negative coefficients, which is -0.364, but the value becomes smaller than the previous result shown in Table 9. The coefficient for business does not have a statistically significant result. The result of education in column (4) has a similar result with the previous result, which is after the announcement of THAAD deployment. Therefore, when the treated period changes into the deployment of THAAD, the most affected subgroup is tourism.

Ports of entry

Tables 20 and 21 present the result for ports of entry. Incheon, Gimpo, and Jeju airports have larger negative coefficients. Even, the coefficient of Jeju airport indicates over -1. On the other hand, in the case of Gimhae, it is seen that the value becomes smaller after the THAAD deployment even though the value is still negative. Busan and Jeju ports, which are one of the most damaged places, have greater negative coefficients. The coefficient of Jeju port becomes over -4.5. In contrast, in the case of the Incheon and other ports, still, the coefficients are positive values as same the previous result. Moreover, the coefficient of Incheon has a much larger positive value compared to the previous result. Therefore, Jeju airport is the most negatively impacted place among airports. Among ports, Busan port and Jeju port are negatively affected by THAAD retaliation. Interestingly, when the treated period is changed, Jeju port is still the most damaged place.

Chapter 6. Discussion

6.1. Implication

In 2015 and 2016, the number of female tourists was over 10% higher than that of males, and the expenditure of female tourists was higher than males (Lee, 2017). The proportion of women among Chinese visiting Korea has steadily increased, and it accounted for 65% of all Chinese visiting Korea in 2015 (Shen,

2016). This is because women are relatively more interested in Hallyu, cosmetics, and shopping than men (Shen, 2016). In the case of duty-free shops, the proportion of Chinese sales is 63% of the total sales. Park et al (2014) found that Chinese women have a higher preference in most major consumption items than men using the Ordered Probit model. Thus, Chinese females' purchasing power is important. The result has shown that Chinese female visitors are affected by THAAD retaliation more than males. Hence, it is expected that the decrease in female tourists affects negatively Korean duty-free shops, department stores, and the cosmetic industry.

The pattern of consumption varies depending on the age group. The young generation, who were born after 1980, has a high preference for cosmetics, apparel, and beauty services (Park et al, 2014). In addition, due to the interest in the Hallyu, the preference for Korean artists' concerts or cultural experiences is high (Park et al, 2014). An older generation born after 1980, has a high interest in purchasing Korean food and health supplement such as red ginseng (Park et al, 2014). Also, in case of services, spa and massage services are popular (Park et al, 2014). The result has shown that the decrease in Chinese visitors in age 40s and 60s is greater than in other age groups and in Chinese young people (age 20s and 30s) is relatively less than the older generation. Thus, it is expected that the sales of items and services that the older generation was interested in had decreased.

Among airports, all airports have negative coefficients. Daegu Airport is a good example of supporting this result. Daegu Airport benefited from chartered flights. In 2016, about 70,000 Chinese tourists arrived at Daegu Airport by chartered flights (Lee, 2017). However, it seems that Daegu Airport had been damaged by the Chinese government's prohibition of chartered flights to Korea. Another example is Yang-yang airport. In July and August of 2016, the total number of Chinese visitors coming to Korea through Yang-yang airport was about 26,000, but after March 2017, there was no air route from China (Choi, 2017).

The most damaged port of entry is Jeju Port. Jeju port had recorded No.1

port performance and became the center of the cruise route in Northeast Asia (Hur & Shin, 2018). However, the problem was the high dependency on China. In 2016, 97% of Jeju Island's cruise was from China (Hur & Shin, 2018). Therefore, THAAD retaliation has caused serious damage to Jeju port. Since March 15, 2017, all Chinese cruises had not arrived at Jeju Port, and only 20 non-Chinese cruises had arrived for 9 months. It was significant suffering compared to the 507th arrival in 2016 (Hur & Shin, 2018).

6.2. Impact on Korean Tourism Economy

Then, did THAAD retaliation affect negatively the whole Korean Tourism industry? This section tries to answer this question. The data from Statistics Korea (National Statistical Office) show some interesting findings. In figure 6, the total revenue in the tourism industry did not decrease during the THAAD retaliation. Even between 2016 to 2017, the total revenue increased. The travel business and lodging industry are the top two sectors in the tourism industry. In figure 7, even the travel business and lodging industry had not decreased the total revenue. Also, when considering the employment in the tourism industry, total employment increased, which is shown in figure 8. According to those data, it is hard to say that the decrease in the number of Chinese visitors to Korea caused by THAAD retaliation hurts the overall tourism industry in Korea.

There are two possible reasons for it. First, this is because Chinese people spend relatively little on tourist attractions and tourism services. It is found that Chinese visitors spent 58.4% of their total travel cost on shopping (Park et al, 2014). The amount of spend on entertainment related to tourism, tourism attractions, and tourism services was 4.2%, 2.1%, and 1.2%, respectively, which were very small compared to shopping (Park et al, 2014). Therefore, it may be difficult that the decrease in Chinese visitors directly harms Korean tourism. The second reason is the compensation effect. There might have a compensation effect for foreign visitors

(non-Chinese) and domestic (Korean) visitors during the THAAD dispute. The best example is Jeju Island. While the number of Chinese tourists decreased, the number of Korean visiting Jeju Island increased. As a result, the number of domestic flights on Jeju routes increased by 7.1% in the first half of 2017 (Park, 2017). Thanks to the increase in domestic tourists, the car rental industry had benefited. From January to May 2017, Jeju Island's short-term rental car revenue increased by more than 15% on average (Jeon, 2017c).

Chapter 7. Conclusion

Economic sanction negatively impacts on targeted country. In the THAAD retaliation case, the direct retaliation occurred, which was the prohibition of tourists. Such retaliation damaged the Korean tourism industry. The most notable impact was a decrease in the number of Chinese tourists. Due to the high dependency on Chinese tourists, the large decrease in tourists has been an issue for the Korean tourism industry. Thus, this study investigates the impact of THAAD retaliation on Chinese tourists from January 2013 to December 2019. I conduct difference-in-differences (DID) and DID with heterogeneous empirical models for estimating the impact.

The DID result indicates that the impact of the THAAD retaliation decreased Chinese visitors by about 41%. Also, it is found that the negative effects were greater in the medium and short term. In addition, compared to the mainland of China, THAAD retaliation did not negatively affect visitors from Hong Kong and Macao. Thus, the result indicates a negative effect only on the Chinese from mainland.

The DID results by subgroups present the heterogeneous effect of different demographic factors and by port of entry. Compared to males, female visitors have more affected negatively by THAAD retaliation. In the age group, except for age 50s, all coefficients of age groups show negative value. Depending on the purpose, the coefficients of Chinese visitors for tourism, business, and public purpose are

negative, while the coefficient for education is positive. The results of DID by port of entry indicate that all international airports in Korea, Busan port, and Jeju port are affected negatively by THAAD retaliation. The most damaged place was Jeju port.

The results have some implications. First, because the THAAD retaliation hurts women and tourists, it is estimated that tourism-related industries that depended on women were more damaged. Second, it can be seen that there were differences between regions depending on the result of the port of entry. In the case of Jeju, the damage was the worst because it was a tourist city and had a high dependency on Chinese tourists. Third, however, the damage to the tourism industry due to the decrease in Chinese tourists is expected to be different. For example, some industries have benefited from the compensation effect of Koreans.

Before closing this paper, the limitations and future research issues are pointed out. First, this paper does not analyze the spillover effect (compensation effect) which is briefly mentioned in the discussion section. Accordingly, it would be another interesting study to see whether there was an increase in the number of domestic and non-Chinese foreign travelers, which results in a compensation effect.

Second, similar to previous studies, this paper does not measure the economic cost of the Korean tourism industry suffered by THAAD retaliation. Based on this result, it would be interesting to estimate the economic costs resulting from THAAD retaliation.

Third, it would be a good future study to find out the recovery trend after 2017. It is hard to find whether, after 2017, there was a recovery in Chinese tourists and visitors because of the COVID-19 crisis in 2020. The tourism industry has continued to suffer due to COVID-19. Therefore, it would be good to study in the future how the trend of Chinese tourists will change after COVID-19.

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Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Total Visitors	8568	11809.41	53940.82	5	917519
Male	4956	8057.605	25381.489	5	304229
Female	4956	10547.299	40888.846	1	579659
Tour	4956	16750.295	60355.248	5	884293
Business	4956	298.665	975.758	0	25012
Public	4956	73.68	279.634	0	3763
Education	4956	359.021	2307.91	0	44291
Age 10	4956	1864.483	7848.556	0	214101
Age 20	4956	4702.238	17844.288	2	205834
Age 30	4956	4189.729	15199.953	0	188557
Age 40	4956	3257.578	10862.804	0	139337
Age 50	4956	6724.508	25562.846	0	246692
Age 60	4956	1901.666	7416.169	0	109544
Incheon airport	4956	12681.356	36498.528	6	394089
Gimhae airport	4956	1401.019	4402.465	0	46845
Gimpo airport	4956	1447.203	7552.994	0	80767
Jeju airport	4956	1349.432	9181.37	0	133979
Other airports	4956	382.693	2968.891	0	65071
Busan port	4956	746.182	2838.678	0	57937
Incheon port	4956	733.689	5175.037	0	72200
Jeju port	4956	907.796	7907.676	0	147127
Other ports	4956	764.245	3457.654	0	47626

Table 2. The Portion of Visitors in Korea from Foreign Countries by Year

	2013		2014		2015		2016		2017	
1	CHN	35.5%	CHN	43%	CHN	45.23%	CHN	46.79%	CHN	31.3%
2	JPN	22.6%	JPN	16%	JPN	13.89%	JPN	13.33%	JPN	17.3%
3	USA	5.9%	USA	5%	USA	5.80%	USA	5.02%	TWN	6.9%
4	TWN	4.5%	TWN	4.5%	HKG	3.96%	TWN	4.83%	USA	6.5%
5	PHL	3.3%	HKG	3.9%	TWN	3.92%	HKG	3.77%	HKG	4.9%

Table 3. Parallel Trend Test for DID

	(1)	(2)	(3)	(4)
Period	2013. 01 -2016.07	2013.08 -2016.07	2014.01 -2016.07	2015.08 -2016.07
China	-2.046 (16.38)	0.163 (21.68)	2.119 (27.49)	-8.064 (127.2)
Time	0.00406 (0.00247)	0.00291 (0.00325)	0.00429 (0.00411)	0.00829 (0.0187)
Time × China	0.0128 (0.0249)	0.00952 (0.0329)	0.00659 (0.0415)	0.0218 (0.189)
Observations	4,284	3,570	3,060	1,122
R-squared	0.095	0.096	0.097	0.097

Note: the outcome variable is the logarithm of the total number of visitors from country i in month t . China is a dummy variable. Time is monthly data.

Table 4. The Result of DID for Chinese Visitors after THAAD Retaliation

	(1)	(2)	(3)	(4)
Period	2013. 01 -2019.12	2013.08 -2019.08	2014.01 -2019.01	2015.08 -2017.08
China×THAAD	-0.304*** (0.0234)	-0.362*** (0.0219)	-0.428*** (0.0186)	-0.432*** (0.0143)
Fixed effect				
Time	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Observations	8,568	7,854	6,222	2,550
R-squared	0.979	0.980	0.981	0.985

Note: the outcome variable is the logarithm of the total number of visitors from country i in month t . China and THAAD are dummy variables. Standard errors are clustered by country in parentheses.

***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 5. Parallel Trend Test for DID (Hong Kong and Macao)

	(1) Hong Kong	(2) Macao	(3) Hong Kong	(4) Macao
Period	2013. 01 -2016.07	2015.08 -2016.07	2013. 01 -2016.07	2015.08 -2016.07
Country	0.111 (16.90)	-4.123 (17.19)	-11.50 (131.4)	-32.68 (133.6)
Time	0.00413 (0.00255)	0.00411 (0.00259)	0.00828 (0.0194)	0.00801 (0.0197)
Time×Country	0.00582 (0.0257)	0.00807 (0.0262)	0.0232 (0.196)	0.0506 (0.199)
Observations	4,284	4,284	1,122	1,122
R-squared	0.036	0.004	0.037	0.004

Note: the outcome variable is the logarithm of the total number of visitors from country i in month t . Country is dummy variables for Hong Kong and Macao. Time is monthly data.

Table 6. The Result for DID (Hong Kong and Macao)

	(1) Hong Kong	(2) Macao	(3) Hong Kong	(4) Macao
Hong Kong×THAAD	0.0963*** (0.0236)		-0.00194 (0.0149)	
Macao×THAAD		0.243*** (0.0234)		0.141*** (0.0148)
Fixed effect				
Time	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Observations	8,568	8,568	2,550	2,550
R-squared	0.979	0.979	0.985	0.985

Note: the outcome variable is the logarithm of the total number of visitors from country i in month t . China, Hong Kong, Macao, and THAAD are dummy variables. Standard errors are clustered by country in parentheses. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 7. The Result for DID by Gender

	(1) male	(2) Female
China × THAAD	-0.197*** (0.0280)	-0.480*** (0.0258)
Fixed effect		
Time	Yes	Yes
Country	Yes	Yes
Observations	4,956	4,956
R-squared	0.978	0.980

Note: The outcome variable is the logarithm of the total number of visitors by gender from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 8. The Result for DID by Age

	(1) age10	(2) age20	(3) age30	(4) age40	(5) age50	(6) age60
China × THAAD	-0.662*** (0.0335)	-0.198*** (0.0272)	-0.150** (0.0322)	-0.494*** (0.0329)	0.146 (0.111)	-0.351*** (0.0305)
Fixed effect						
Time	Yes	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,924	4,956	4,955	4,954	4,955	4,954
R-squared	0.941	0.976	0.979	0.976	0.874	0.966

Note: The outcome variable is the logarithm of the total number of visitors by age group from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 9. The Result for DID by Purpose

	(1) tour	(2) business	(3) public	(4) education
China × THAAD	-0.383*** (0.0290)	-0.126* (0.0619)	-0.477*** (0.0454)	0.267*** (0.0483)
Fixed effect				
Time	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Observations	4,956	4,876	4,117	4,779
R-squared	0.973	0.937	0.887	0.921

Note: The outcome variable is the logarithm of the total number of visitors by purpose from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 10. The Result for DID by Port of Entry (Airport)

	(1) Incheon	(2) Gimhae	(3) Gimpo	(4) Jeju	(5) Other airports
China × THAAD	-0.148*** (0.0262)	-0.280** (0.0948)	-0.113*** (0.0288)	-0.889*** (0.0723)	-2.235*** (0.141)
Fixed effect					
Time	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	4,956	4,919	4,842	4,424	3,642
R-squared	0.981	0.931	0.958	0.888	0.798

Note: The outcome variable is the logarithm of the total number of visitors by airport from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 11. Result for DID by Port of Entry (Port)

	(1) Busan	(2) Incheon	(3) Jeju	(4) Other ports
China × THAAD	-1.470*** (0.0471)	0.361*** (0.0649)	-3.725*** (0.134)	0.483*** (0.0422)
Fixed effect				
Time	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Observations	4,647	3,894	3,245	4,344
R-squared	0.887	0.807	0.779	0.909

Note: The outcome variable is the logarithm of the total number of visitors by port from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 12. Robustness Checks: Result for DID by Gender in the Short-Term

	(1) Male	(2) Male	(3) Female	(4) Female
Period	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017
China × THAAD	-0.272*** (0.0812)	-0.284*** (0.0736)	-0.541*** (0.111)	-0.560*** (0.0965)
Fixed effect				
Time	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Observations	1,475	2,124	1,475	2,124
R-squared	0.985	0.981	0.983	0.981

Note: The outcome variable is the logarithm of the total number of visitors by gender from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 13. Robustness Checks: Result for DID by Age Group in the Short-Term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	age10	age10	age20	age20	age30	age30	age40	age40	age50	age50	age60	age60
Period	2015m8- 2017m8	2015- 2017	2015m8- 2017m8	2015- 2017	2015m8- 2017m8	2015- 2017	2015m8- 2017m8	2015- 2017	2015m8- 2017m8	2015- 2017	2015m8- 2017m8	2015- 2017
China	-0.606**	-	-	-	-	-	-	-	-0.106	-0.118	-0.464**	-
×THAAD		0.674***	0.377***	0.346***	0.362***	0.355***	0.448***	0.493***				0.530***
	(0.202)	(0.169)	(0.102)	(0.0903)	(0.0819)	(0.0752)	(0.0913)	(0.0817)	(0.0925)	(0.0832)	(0.144)	(0.123)
Fixed effect												
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,467	2,111	1,475	2,124	1,475	2,124	1,475	2,124	1,475	2,124	1,474	2,123
R-squared	0.944	0.942	0.981	0.978	0.986	0.983	0.984	0.981	0.988	0.986	0.969	0.967

Note: The outcome variable is the logarithm of the total number of visitors by age group from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 14. Robustness Checks: Result for DID by Purpose in the Short-Term

	(1) tour	(2) Tour	(3) business	(4) business	(5) public	(6) public	(7) education	(8) education
Period	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017
China × THAAD	-0.498*** (0.0951)	-0.528*** (0.0857)	-0.0372 (0.121)	0.0552 (0.112)	-0.827*** (0.229)	-0.791*** (0.191)	0.0674 (0.205)	0.131 (0.171)
Fixed effect								
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,475	2,124	1,436	2,076	1,219	1,756	1,435	2,052
R-squared	0.984	0.981	0.972	0.965	0.908	0.906	0.929	0.924

Note: The outcome variable is the logarithm of the total number of visitors by purpose from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 15. Robustness Checks: Result for DID by Port of Entry (airport) in the Short-Term

Airport	(1) Incheon	(2) Incheon	(3) Gimhae	(4) Gimhae	(5) Gimpo	(6) Gimpo	(7) Jeju	(8) Jeju	(9) Other	(10) other
Period	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017
China ×THAAD	-0.295*** (0.0826)	-0.283*** (0.0752)	-0.367* (0.156)	-0.335* (0.143)	-0.227 (0.160)	-0.222 (0.142)	-0.770** (0.291)	-0.861*** (0.253)	-1.579*** (0.350)	-1.751*** (0.317)
Fixed effect										
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,475	2,124	1,467	2,112	1,443	2,075	1,346	1,920	1,073	1,526
R-squared	0.986	0.983	0.961	0.951	0.964	0.959	0.905	0.897	0.843	0.814

Note: The outcome variable is the logarithm of the total number of visitors by airport from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 16. Robustness Checks: Result for DID by Port of Entry (port) in the Short-Term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Port	Busan	Busan	Incheon	Incheon	Jeju	Jeju	other	other
Period	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017	2015m8- 2017m8	2015-2017
China × THAAD	-0.957*** (0.248)	-0.781*** (0.229)	-0.390 (0.379)	-0.0350 (0.318)	-2.009*** (0.362)	-2.279*** (0.330)	0.179 (0.269)	0.210 (0.220)
Fixed effect								
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,404	2,006	1,212	1,721	1,086	1,487	1,295	1,860
R-squared	0.917	0.897	0.808	0.804	0.864	0.839	0.920	0.924

Note: The outcome variable is the logarithm of the total number of visitors by ports from country i in month t . China and THAAD are dummy variables. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 17. Robustness Checks: Result for DID by Gender after THAAD Deployment

	(1) Male	(2) female
China × THAAD	-0.275*** (0.0284)	-0.572*** (0.0262)
Fixed effect		
Time	Yes	Yes
Country	Yes	Yes
Observations	4,956	4,956
R-squared	0.978	0.980

Note: The outcome variable is the logarithm of the total number of visitors by gender from country i in month t . China and THAAD are dummy variables. The treated period begins in May 2017. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 18. Robustness Checks: Result for DID by Age after THAAD Deployment

	(1) age10	(2) age20	(3) age30	(4) age40	(5) age50	(6) age60
China× THAAD	-0.822*** (0.0354)	-0.294*** (0.0268)	-0.192*** (0.0316)	-0.540*** (0.0340)	0.0628 (0.0922)	-0.499*** (0.0321)
Fixed effect						
Time	Yes	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,924	4,956	4,955	4,954	4,955	4,954
R-squared	0.941	0.976	0.979	0.976	0.874	0.966

Note: The outcome variable is the logarithm of the total number of visitors by age group from country i in month t . China and THAAD are dummy variables. The treated period begins in May 2017. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 19. Robustness Checks: Result for DID by Purpose after THAAD Deployment

	(1) tour	(2) Business	(3) public	(4) education
China × THAAD	-0.482*** (0.0287)	-0.0634 (0.0658)	-0.364*** (0.0441)	0.238*** (0.0461)
Fixed effect				
Time	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Observations	4,956	4,876	4,117	4,779
R-squared	0.973	0.937	0.887	0.921

Note: The outcome variable is the logarithm of the total number of visitors by purpose from country i in month t . China and THAAD are dummy variables. The treated period begins in May 2017. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 20. Robustness Checks: Result for DID of Airport after THAAD Deployment

	(1)	(2)	(3)	(4)	(5)
Airport	Incheon	Gimhae	Gimpo	Jeju	Other airport
China ×THAAD	-0.181*** (0.0265)	-0.233** (0.0871)	-0.137*** (0.0335)	-1.026*** (0.0782)	-2.524*** (0.139)
Fixed effect					
Time	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	4,956	4,919	4,842	4,424	3,642
R-squared	0.981	0.931	0.958	0.888	0.799

Note: The outcome variable is the logarithm of the total number of visitors by ports from country i in month t . China and THAAD are dummy variables. The treated period begins in May 2017. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Table 21. Robustness Checks: Result for DID of Port after THAAD Deployment

	(1)	(2)	(3)	(4)
Port	Busan	Incheon	Jeju	Other ports
China × THAAD	-1.990*** (0.0464)	0.527*** (0.0814)	-4.635*** (0.192)	0.441*** (0.0360)
Fixed effect				
Time	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Observations	4,647	3,894	3,245	4,344
R-squared	0.888	0.807	0.786	0.909

Note: The outcome variable is the logarithm of the total number of visitors by port from country i in month t . China and THAAD are dummy variables. The treated period begins in May 2017. Standard errors in parentheses are clustered by country. ***, **, and * indicate the significance level at 1, 5, and 10 percent, respectively.

Figure 1. The number of Chinese Tourists from 2000 to 2019 (source: Korean Tourism Organization)

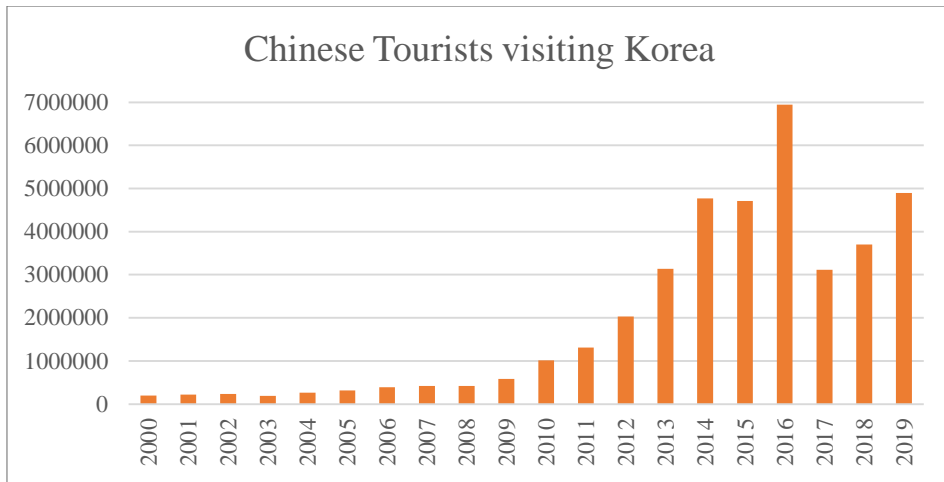
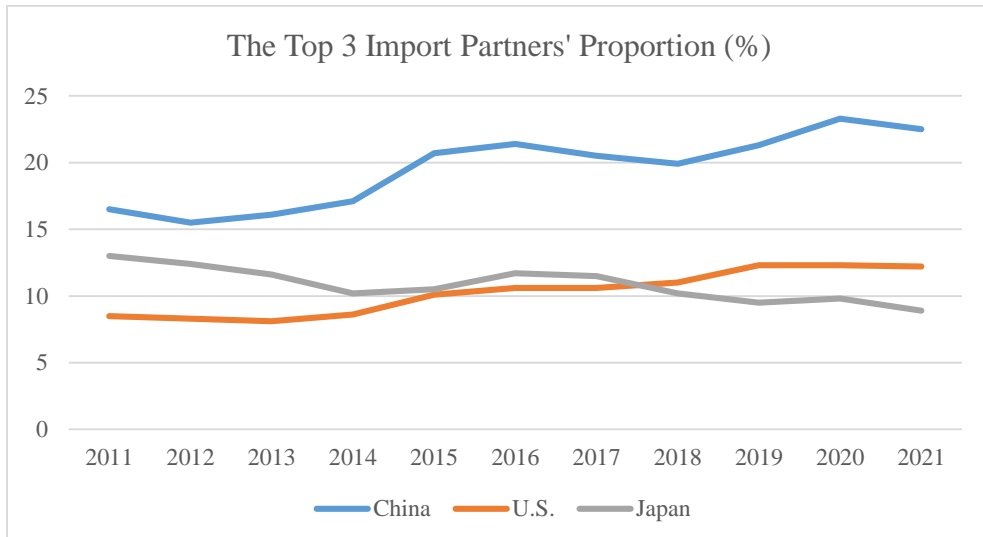
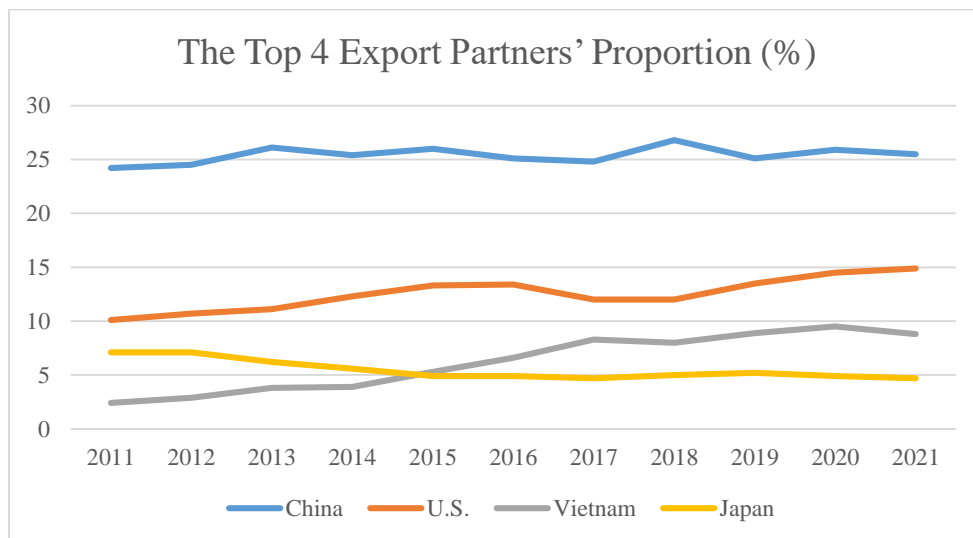


Figure 2. The top 3 Korean Import Partners' Proportion (source: KITA)



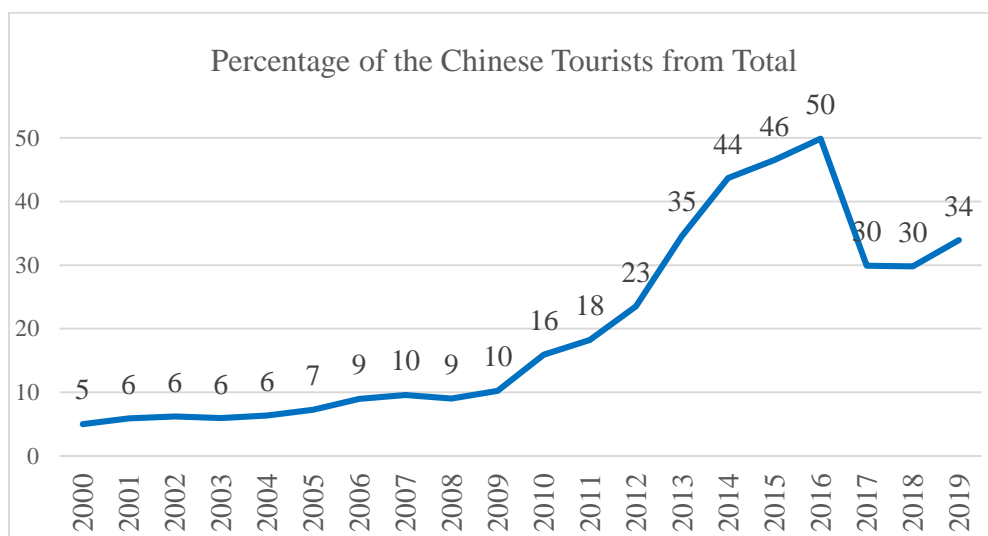
Note: The unit is percentage. The proportion is calculated by (import from a country)/(total volume of Korean import).

Figure 3. The Top 4 Korean Export Partners' Proportion (source: KITA)



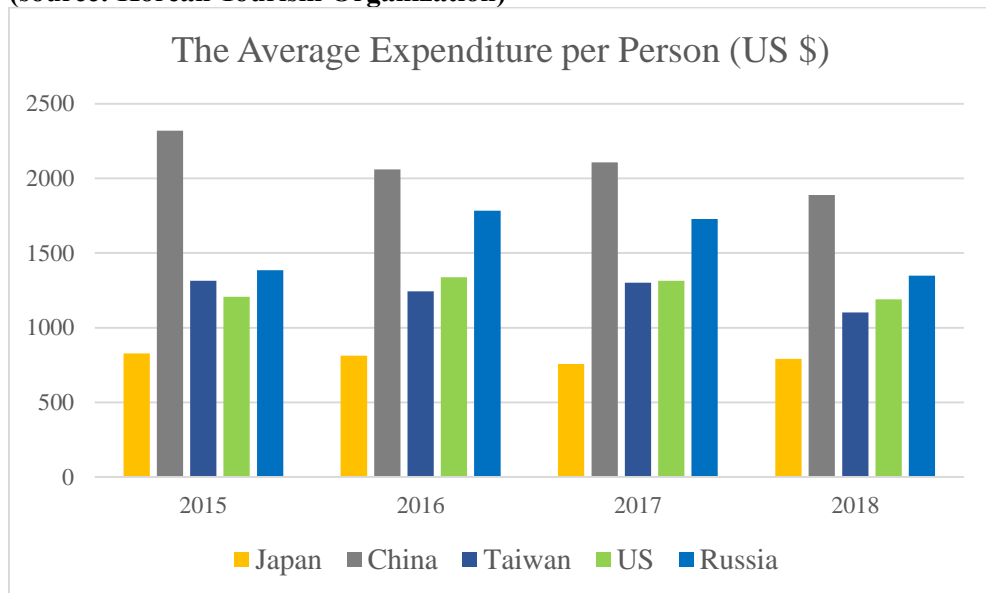
Note: The unit is percentage. The proportion is calculated by (export to a country)/(total volume of Korean export)

Figure 4. The Proportion of Chinese Tourists from Total Foreign Tourists in Korea (source: Korean Tourism Organization)



Note: The unit is percentage.

Figure 5. The Average Expenditure of Foreign Tourists visiting Korea
(source: Korean Tourism Organization)



Note: The unit is US dollar.

Figure 6. Total Revenue in Korean Tourism Industry from 2013 to 2019
(source: Korean Statistics Organization)

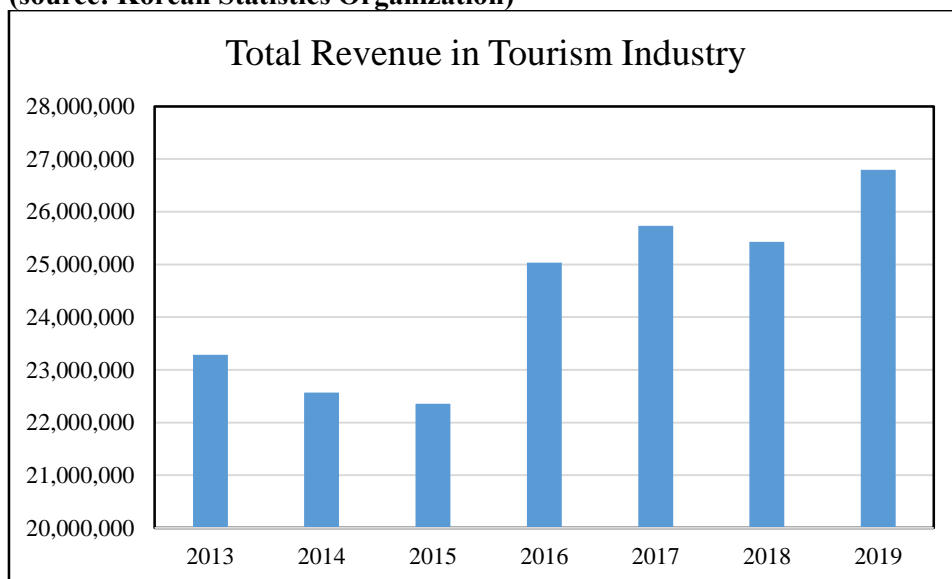


Figure 7. Total Revenue in Travel Business and Lodging Industry from 2013 to 2019 (source: Korean Statistics Organization)

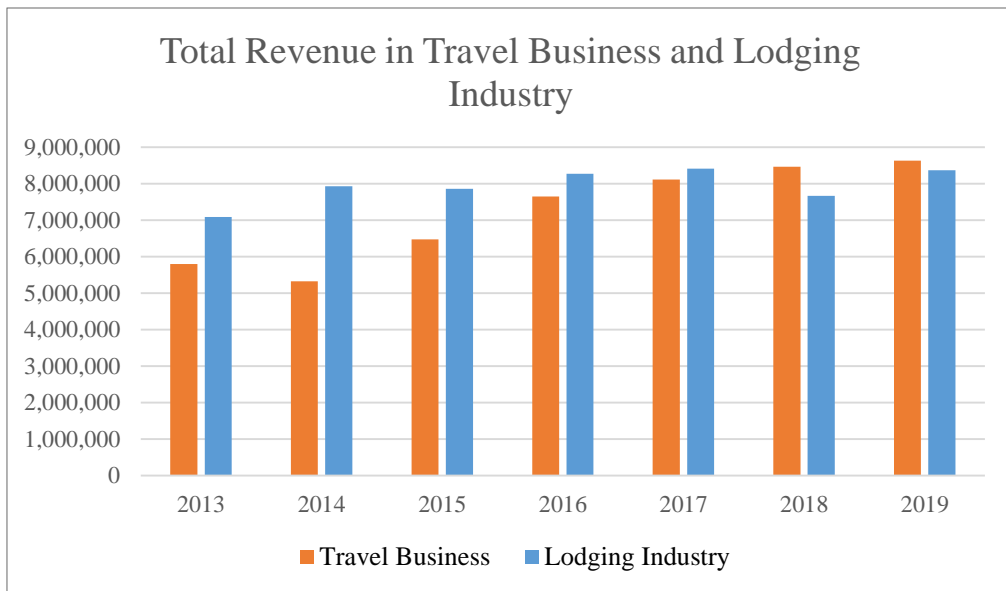


Figure 8. Total Employment in Korean Tourism Industry from 2013 to 2019 (source: Korean Statistics Organization)



국문 초록

본 연구에서는 사드 보복 사태가 방한 중국인들에게 미치는 영향을 분석한다. 분석을 위해, 이중차분모형(DID)이 사용되었다. 나이, 성별, 방한 목적, 입국장을 기준으로 2013년부터 2019년까지의 방한 중국인의 수를 분석함으로써, 각 집단별 이질적인 영향을 분석한다. 분석 결과, 사드 보복 사태 때, 중국인 방문객은 40%가량 줄었음을 확인하였다. 남성과 여성 방한 중국인 모두 사드 보복에 부정적인 영향을 받았음을 발견하였다. 연령대별로 분석했을 경우, 50대를 제외한 모든 연령층이 사드 규제로 인해 방한 방문이 감소하였다. 방한 목적별로 분석하였을 때, 관광 목적뿐 아니라 공적인 목적과 개인 사업을 위해 입국한 중국인들도 사드 규제의 부정적인 영향을 받았다. 입국장을 기준으로 했을 때, 모든 공항에서 중국인의 입국자 수가 줄었으며, 항구의 경우, 부산항과 제주항으로 입국한 중국인의 수가 많이 줄었음을 확인하였다.

주요어: 경제 제재, 관광업, 관광객, 중국, 사드보복 (THAAD crisis),
이중차분모형(DID)

학번: 2020-25241