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The Economic Costs of Diplomatic Conflict: Evidence from the South Korea–China THAAD Dispute*

Hyejin Kim** · Jungmin Lee***

We examine the economic effect of the diplomatic conflict between South Korea and China that resulted from the joint decision by South Korea and the U.S. to deploy the Terminal High-Altitude Area Defense system in the Korean peninsula. Using the synthetic control method, we estimate the conflict's effects on Chinese tourists to Korea and stock prices of China-related Korean firms. We find that a negative effect on the inflow of tourists appeared with a lag of 3 months after the announcement of the decision and persisted for approximately 18 months. By contrast, the effects on the stock market appeared immediately but were insignificant and short-lived.

JEL Classification: F51, P16, Z30
Keywords: Economic Sanction, Geopolitical Events, Tourism, Stock Market, South Korea, China, Synthetic Control Method

I. Introduction

On July 8, 2016, the South Korean and U.S. governments announced that they had agreed to deploy the Terminal High-Altitude Area Defense (THAAD)—a defense system designed to shoot down ballistic missiles—in the Korean peninsula as a defensive measure against North Korea's nuclear and missile threats. China

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** First Author, Economist, Economic Research Institute, Bank of Korea, Email: hyjnkm@bok.or.kr

*** Corresponding Author, Professor, Department of Economics, Seoul National University and Institute of Labor Economics (IZA), Email: jmlee90@snu.ac.kr

strongly opposed the plan, worrying that the system would be used to spy on its military forces. However, amid heightened nuclear tension with North Korea, South Korea pushed to deploy the THAAD, leading to a diplomatic conflict between the two countries. The inter-country conflict was exacerbated as China started an array of retaliatory actions, such as banning South Korean television programs and celebrities, restricting travel agencies from selling travel packages to Korea, and tax auditing Korean companies in China. None of these actions were implemented either officially or explicitly by the Chinese government, but newspapers and other media reported on actual pressure from the top authority. After a year-long standoff, on October 31, 2017, China and South Korea finally agreed to restore their economic and political relationships.

In this study, we estimate the economic costs of diplomatic conflict and economic sanctions by China on the Korean economy. The costs are presumably large given that China is not only the largest trading partner for Korea but also the top source country of foreign tourists visiting Korea.[1] We focus on two particular outcomes—the number of Chinese tourists to Korea and the tourism industry's stock market performance. We also examine the stock market outcome of the Korean cosmetic industry, where Chinese consumers have become increasingly important. Lastly, we look at the effect on the stock market performance of a Korean retailer, Lotte Shopping. The company became the main target of retaliation because it handed over the site for THAAD (a golf club that the company owned) to the Korean government. Setting the announcement date of the THAAD deployment plan as the event date, we attempt to estimate the consequences of the event by using the synthetic control method (Abadie et al., 2010).[2] We use countries other than China as the donor pool for constructing the counterfactual trend of incoming tourists from China. In the analyses of stock market effects, the donor pool consists of industries or companies that were not directly affected by the event. We check the robustness of our main results to various alternative definitions of the donor pool.

To summarize our main results, we found that for the inflow of Chinese tourists, a negative effect appeared approximately 3 months after the announcement of the THAAD deployment, but the effect was substantial and persisted for approximately 18 months. The effect on the stock market appeared differently. In the stock market, the negative effect appeared immediately in the month of the announcement. However, we found that the effect on the stock market is not statistically significant except for the effect on the stock price of the tourism industry in the first month. Our results are robust to alternative specifications.

Our study adds another piece of empirical evidence to the long-standing literature on the use and efficacy of economic sanctions (Van Bergeijk, 1995; Pape,

[1] Hereafter, Korea means South Korea, unless distinguishing it from North Korea is necessary.

[2] For a brief introduction of the synthetic control method, please refer to Section 3.

1997; Pape, 1998; Eaton and Engers, 1999; Elliott and Hufbauer, 1999; Levy, 1999; Davis and Engerman, 2003; Hufbauer et al., 2009; Oechslin, 2014). Until the 1990s, most of the sanctions were imposed by the United Nations, the U.S., and the European Union for humanitarian purposes, and most of the targets were non-democratic and dictatorial regimes. A consensus in the literature is that the sanctions are not so effective in the sense that they could not achieve the desired goals and targeted countries did not comply with the interest of sanctioning countries.

Still, economic sanctions harm targeted countries. Economic sanctions decrease economic growth (Neuenkirch and Neumeier, 2015; Gharehgozli, 2017), worsen inequality (Afesorgbor and Mahadevan, 2016; Lee, 2018), depress trade (Evenett, 2002; Afesorgbor, 2019), and decrease foreign investment (Mirkina, 2018). This message is a cautionary one, especially considering that diplomatic conflicts between economic powers have recently been elevated and trade barriers are used as an instrument of foreign policy.[3] Recently, China has often used unilateral sanctions to achieve its diplomatic objectives and economic interest (Reilly, 2012), and examining the effectiveness of sanctions imposed by China is worthwhile given that it is the world's second-largest economy in terms of GDP and the dominant trading partner of many countries (Fuchs and Klann, 2013; Heilmann, 2016; Chen et al., 2017; Kolstad, 2019).

An additional contribution of our paper is to investigate the effect of sanctions on the financial market as well as on the service and goods market. Unlike the results for tourists, the adverse effect on the stock market was short-lived and died out quickly. This finding is in line with Heilmann (2016), which found only a temporary effect of the Chinese boycott on the Japanese stock market in response to the Senkaku/Diaoyu Island dispute. Stock prices are affected by various factors other than the dispute itself, and they reflect all information relevant to future prospects. Industries affected by the conflict likely diversified their products quickly.

The remainder of the paper is organized as follows. Section 2 describes the escalation of the THAAD crisis between Korea and China. Section 3 introduces the empirical strategy. Section 4 introduces the data used to construct the synthetic control unit. Section 5 presents our main results and robustness checks. Finally, Section 6 concludes.

[3] Another strand of the literature related to our study is the literature on the economic effects of political disturbances. Previous studies in this strand have found that violent incidents, such as civil wars, terrorist conflicts, or political coups, may have large and long-lasting negative effects on the economy and well-being of citizens (Alesina and Perotti, 1996; Collier, 1999; Abadie and Gardeazabal, 2003; Aidt et al., 2008; Cerra and Saxena, 2008; Guidolin and La Ferrara, 2010; Miguel and Roland, 2011; Aisen and Veiga, 2013).

II. The THAAD Crisis

North Korea conducted nuclear tests four times, from the first trial in 2006 until January 2016.[4] To cope with North Korea's nuclear threat, on July 8, 2016, South Korea and the U.S. announced that they had agreed to deploy the THAAD system in South Korea. China was not comfortable with that decision. Although the U.S. officially explained that the system would be solely aimed against North Korea, China perceived it as a major concern for their national security because the radar used by THAAD is so powerful that it can spy on its military forces.[5] For example, the Chinese Foreign Minister said that "China strongly urges the United States and South Korea to stop the deployment process of the THAAD anti-missile system, not take any steps to complicate the regional situation and do nothing to harm China's strategic security interests" and that "the recent behavior from South Korea has undermined the foundation for our bilateral relation."[6] Despite such strong opposition from China, South Korea decided to deploy the THAAD.

China consequently took various retaliatory actions against Korea. Korean travel agencies were first hit hard. Chinese authorities rejected all Korea-bound charter flights from China to Korea for January and February 2017, a peak travel season, and told airlines to reduce the number of round-trip flights to Korea.[7] China-based travel agencies, online and offline, were forced to end group tours to Korea and were forbidden from selling tickets even for individual travel, following instructions from the China National Tourism Administration on March 2, 2017.[8]

In particular, Lotte Shopping, South Korea's retail giant, became the main target of economic retaliation because the Lotte group had agreed to hand over a golf course it owned as the site for the THAAD system. In November 2016, the Chinese National Tax Service began a sudden investigation of all Lotte *Mart* stores in China. Moreover, the Chinese government ordered the closure and suspension of business of more than one-half of Lotte Mart stores in China because of safety issues (Bank of Korea, 2017). Finally, the Lotte group decided to withdraw from China and shut down all 112 Lotte Mart stores in September 2017.

These retaliatory actions represented a serious blow to the tourism and cosmetic sectors in Korea because China had been the largest source country of foreign

[4] CNN, https://edition.cnn.com/2013/10/29/world/asia/north-korea-nuclear-timeline---fast-facts/index.html (accessed in August 2019).

[5] USA. Department of Defense, https://www.defense.gov/News/Article/Article/831630/us-to-deploy-thaad-missile-battery-to-south-korea/ (accessed in June 2018).

[6] Korea Herald, http://www.koreaherald.com/view.php?ud=20160725000131&ACE_SEARCH=1 (accessed in June 2018).

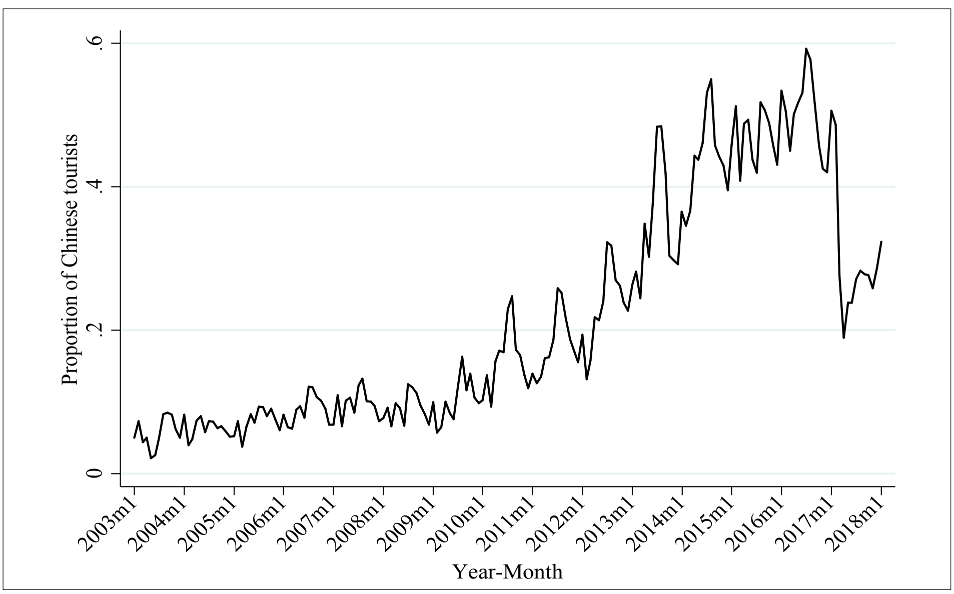
[7] Yeonhap News agency, http://english.yonhapnews.co.kr/news/2017/03/15/0200000000AEN20170315011700320.html (accessed in June 2018).

[8] Yeonhap News agency, http://english.yonhapnews.co.kr/news/2017/03/08/0200000000AEN20170308006700320.html (accessed in June 2018).

tourists and the Korean cosmetic industry had been heavily dependent on Chinese consumers for several years. In the 2000s, the share of Chinese tourists did not exceed 10 percent, but increased sharply from 2010, with Chinese tourists constituting nearly one-half of all foreign visitors to Korea in 2016, before the THAAD crisis (refer to Figure 1). Chinese tourist groups were easily found everywhere, from Seoul's main shopping streets and duty-free shops to Jeju Island, the most popular resort island in Korea.

In the continued backlash, the South Korean president attempted to smooth out a year-long diplomatic standoff, temporarily suspending THAAD deployment.[9] In the end, the breakthrough came only a few days after Chinese President Xi Jinping emerged triumphant from the Communist Party congress in October 2017, more confident than ever in his hold on power and in the pursuit of his foreign policy. This victory was achieved by the Korean government's public declaration of "three no's"; Korea would not consider additional THAAD deployment, not participate in the U.S. missile defense network, and not establish the trilateral military alliance with the U.S. and Japan. Finally, on October 31, 2017, South Korea and China agreed to end the dispute and restore their economic and political ties.[10]

[Figure 1] Trends of the Proportion of Chinese Tourists



Source: Korea Tourism Statistics.
Notes: The decision to deploy THAAD was made public by the Korean government in July 2016.

[9] CNN, https://edition.cnn.com/2017/10/31/asia/china-south-korea-thaad/index.html (accessed in June 2018).

[10] New York Times, https://www.nytimes.com/2017/10/30/world/asia/north-korea-nuclear-test-radiation.html (accessed in June 2018).

III. Empirical Strategy

In this section, we present the synthetic control method introduced by Abadie and Gardeazabal (2003) and Abadie et al. (2010). The synthetic control methodology formalizes the selection of control groups using a data-driven procedure, which reduces subjective discretion in the formation of comparison units, and provides a better comparison for the treated unit than any single unit alone (Abadie, 2020).

Suppose that we have $J+1$ units (source countries, companies, or industries in our paper), where unit 1 gets treatment at time T_0+1 and the remaining J units are potential control units called the donor pool. Let T_0 be the number of pre-treatment periods, with $1 \le T_0 < T$. Let Y_{it}^N denote the outcome that would be observed in the absence of the treatment for unit i at time t. Let Y_{it}^I be the outcome that would be observed if unit i is exposed to the treatment (the announcement of South Korea's deployment of THAAD in our case) in post-treatment periods. Then, the observed outcome is $Y_{it} = Y_{it}^N + \alpha_{it} D_{it}$, where $D_{it}=1$ if $t > T_0$ and $i=1$, and $D_{it}=0$ otherwise. The goal of this study was to estimate the treatment effect on the treated unit given by $\alpha_{1t} = Y_{1t}^I - Y_{1t}^N = Y_{1t} - Y_{1t}^N$ during the post-treatment period. Given that Y_{1t}^I is observed, we only need to estimate Y_{1t}^N using the synthetic control method.

We defined a synthetic control as a weighted average of comparison units that matches the pre-treatment characteristics of the treated unit as closely as possible. Consider a $(J \times 1)$ vector of weights $W = (w_2, \ldots, w_{J+1})'$ such that $0 \le w_i \le 1$ and $\sum_{i=2}^{j+1} w_i = 1$. Suppose that an optimal weight vector W^* can replicate the pre-treatment characteristics of the treated unit. Abadie et al. (2010) showed that under regular conditions, $Y_{it}^N - \sum_{i=2}^{j+1} w_i^* Y_{it}$ is close to zero. Thus, we can use $\hat{\alpha}_{1t} = Y_{1t} - \sum_{i=2}^{j+1} w_i^* Y_{it}$ for $t \ge T_0$ as an estimator of α_{1t}.

Let X_1 be a $(k \times 1)$ vector containing the values of the predictors of the outcome for the treated unit and X_0 be the $(k \times J)$ matrix collecting the values of the same variables for the units in the donor pool. The predictors can include not only pre-treatment characteristics and pre-treatment outcomes. As for numerical implementation, we chose an optimal weight W^* that minimizes

$$\|X_1 - X_0 W\|_v = \sqrt{(X_1 - X_0 W)' V (X_1 - X_0 W)}$$

where V is some $(k \times k)$ symmetric and positive semi-definite matrix, and k is the number of predictor variables. V reflects the relative importance of each predictor and, following a data-driven procedure proposed by Abadie et al. (2010), we chose an optimal V^* such that the root of mean squared prediction error (RMSPE) of the outcome variable, which measures lack of fit between the path of the outcome variable for the treated unit and its corresponding synthetic control unit, is minimized in the period prior to treatment.

Lastly, we performed a placebo test to assess the significance of our estimates. The basic principle of the placebo study was to apply the synthetic control method by randomly assigning the treatment across units in the donor pool and comparing the actual treatment effect to the distribution of each placebo effect.

IV. Data

Our data come from various sources. The main data source for analysis of tourist arrivals was Korean Tourism Statistics, which provides monthly statistics on the number of tourists to Korea by source country and purpose of visit. Our outcome variable is the number of tourists from each country. We collected some country characteristics for use as predictor variables. We obtained the data on population and GDP from the World Bank.[11] The geographic data on land size and distance from Korea were obtained from the CEPII GeoDist database developed by Mayer and Zignago (2005). Ultimately, we used the following variables as the predictors of the number of tourists: GDP per capita, population size, population density, and the distance from Korea. All pre-treatment outcomes were included as predictors.

Our main donor pool consists of the top 49 source countries of tourists for which information on the number of tourists from each country is available. We list the countries in the donor pool in Table A1. Finally, we constructed a monthly source country-level panel dataset from January 2011 to April 2019. Korean Tourism Statistics have been available since 2003, but the data from 2011 are used for our analysis because of a concern about the effect of the 2008 financial crisis as a potential confounder. Considering that the Korean government announced the deployment of THAAD on July 8, 2016, we set the start time of the treatment period to July 2016, resulting in a total of 66 months as the pre-treatment period—long enough to have a good pre-treatment fit. Our sample period ends in April 2019, so the post-treatment period is 34 months. The post-treatment period is also long enough to examine the dynamic effects of the treatment.

As mentioned, we also examine the effect on the stock market. For the analysis, we collected the financial data from the KIS-Value database by the NICE credit information service in Korea. We consider three treatment units that were presumably affected most severely by the Korea–China conflict: tourism industry, cosmetic industry, and Lotte Shopping. The tourism industry is an obvious choice because it was directly affected by the Chinese government's pressure on travel

[11] Taiwan is not listed as a separate country for population and GDP indicators by the World Bank. Therefore, we refer to the National Statistics Republic of China for data on Taiwan.

agencies. The cosmetic industry is chosen as another treatment unit because Chinese consumers are important for Korean cosmetic companies. Cosmetic goods are the most popular shopping items among Chinese tourists and major export goods to China.[12] Lastly, Lotte Shopping as a single company could have been hit hardest because the company provided the site for the THAAD system and became the public target of economic retaliation by China.

When implementing the synthetic control method to estimate the stock market effects for the tourism and cosmetics industries, the unit of observation is industry. After aggregating individual companies by industry, we have one treatment industry (either tourism or cosmetics) and 243 industries in the donor pool.[13] When we examine the effect on Lotte Shopping, of which Lotte Mart is a business division, the unit of observation is individual firm. Thus, we have one treatment firm (Lotte Shopping) and 613 firms in the donor pool.

The outcome variable is the monthly average end-of-day stock price. As predictor variables, we use firm characteristics from the KIS-Value database, such as total assets, the ratio of total liabilities to total assets, Tobin's Q, and all outcome lags. For the industry-level analysis, we use the weighted average of firm characteristics, where the weight is the market capitalization of each firm. The sample period is the same as that used in our analysis for the trend of tourists, from January 2011 to April 2019.

When implementing the synthetic control method, we use the log difference of the outcome variable, $\ln(y_t)-\ln(y_{it-12})$, the year-over-year (YOY) growth rate, for the stationarity of series as well as for the sake of the goodness of pre-trend fit.[14] For easy interpretation, we will also present the results after converting the estimates for the growth rates to the estimates for levels.

V. Empirical Results

5.1. Effects on Tourists

Using the synthetic control method, we construct the synthetic control unit that best reproduces the values of the predictor variables before the event, which is the

[12] According to the International Visitors Survey, in 2016, shopping accounted for approximately 65 percent of total travel costs per person for Chinese tourists. Approximately 85 percent of the expenditure on shopping was spent on perfumes and cosmetics.

[13] We excluded the tourism industry from the donor pool for estimating the effect on the cosmetics industry and *vice versa*.

[14] In particular, fitting the pre-trend of the level of inflow of tourists from China using other source countries in the donor pool is almost impossible because almost one-half of visitors to South Korea were coming from China before the THAAD announcement.

official announcement by Korea and the U.S. to deploy THAAD in the Korean peninsula. The synthetic control is constructed as the weighted average of source countries in the donor pool. Table 1 shows the list of donor countries chosen for constructing the synthetic control for China and their assigned weights. The synthetic control for China is the weighted average of eight countries: Hong Kong, Uzbekistan, Kazakhstan, Singapore, Vietnam, Taiwan, Indonesia, and Russia. As usual in the literature using the synthetic control method, we do not give any substantive meaning to the chosen units. The good pre-trend fit shown in Figure 2 demonstrates that the synthetic control can serve as a good approximation to the counterfactual outcome that would have evolved in the treatment unit (the inflow of Chinese tourists) for the post-treatment period in the absence of the treatment (the THAAD announcement).[15]

We found that the THAAD announcement did not have any significant effect on the inflow of Chinese tourists for the first six months. The effect was positive in the first three months. However, a negative effect started to appear significantly in March 2017, after the Chinese government banned chartered flights for Korean tourism and Chinese travel agencies stopped selling Korean tourism products. Afterward, Korea experienced a sharp decline in the number of tourists from China, whereas the trend for the synthetic control unit remained stable. After Korea and China agreed to restore their relations on October 31, 2017, the negative effect started to weaken. The negative effect continued until March 2018. A positive effect appeared, which is simply a base effect reflecting the large negative effect exactly 12 months ago. The base effect occurs because the outcome variable is the YOY growth rate.

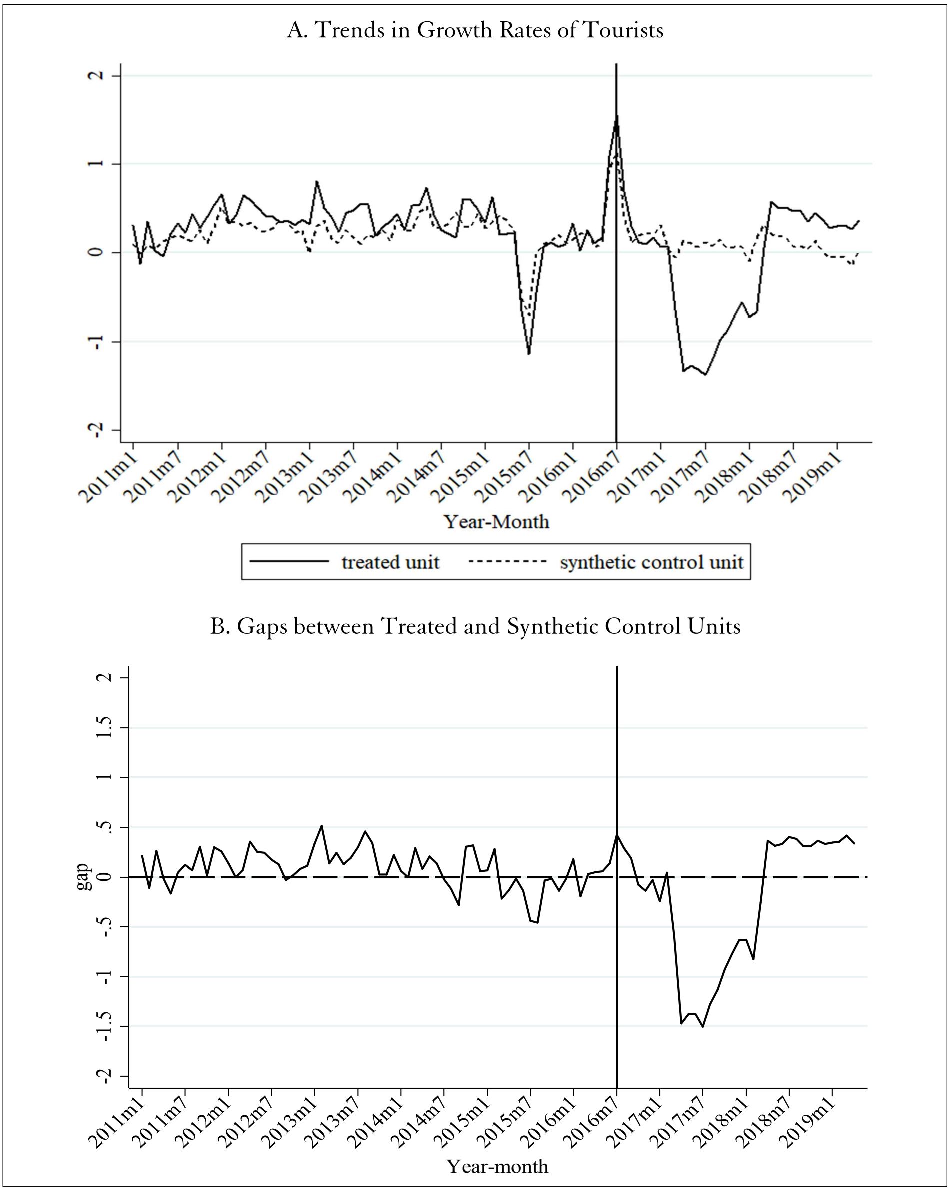
[Table 1] Country Weights

Country	Weight
Hong Kong	0.324
Uzbekistan	0.238
Kazakhstan	0.208
Singapore	0.070
Vietnam	0.065
Taiwan	0.060
Indonesia	0.017
Russia	0.017
Sum	1.000

Note: Weights assigned to the other regions in the donor pool except the above regions are zero.

[15] In Figure 2.A, a substantial drop occurred around July 2015, which was caused by the outbreak of Middle East Respiratory Syndrome in Korea. The first case was reported in May 2015. This dramatically decreased the inflow of tourists from not only China but also from other countries overall. Our results do not change even after dropping the unusual trend period from the sample.

[Figure 2] Treatment Effects over Time: Growth Rates of Tourists

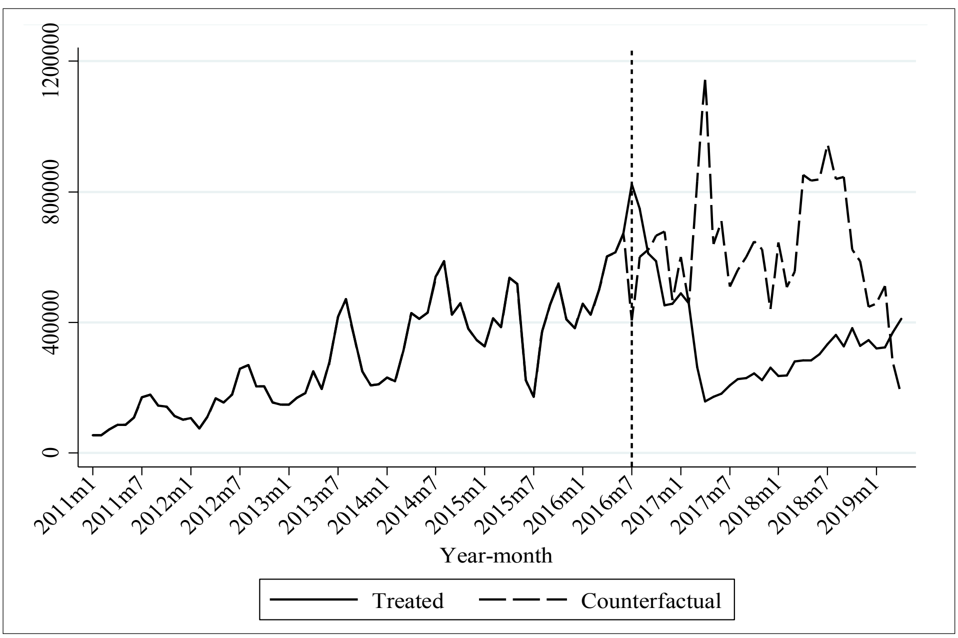


Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government.

To convert our results on the growth rate to those on the number of tourists per month (levels), we accumulated the effects in terms of the YOY growth rate and plotted the gaps between China and the synthetic control in Figure 3. In the initial period, the announcement had little effect. The announcement had a positive effect on the number of tourists, though only for a very short while (2–3 months). A significant negative effect appeared after six months. The effect started to become larger in the absolute term since January 2017. The negative effect then persisted for 18 months, and only recently did a recovery begin, albeit slowly. We found that after the announcement of THAAD deployment, from July 2016 to April 2019, the number of tourists fell by approximately 8,989,097. The total number of Chinese tourists in the 34 months before the announcement of THAAD deployment was 13,775,742. That is, the effect was substantial, amounting to an approximately 65% reduction from the level before the event.

We calculated the monetary costs using the synthetic control estimates of the treatment effect. According to the 2016 International Visitors Survey, Chinese tourists spend approximately USD 2,079 on average when they visit Korea. Multiplying the sum of treatment effects during the whole post-treatment period by the average spending, we found the total monetary loss to be USD 19.2 billion. This figure is approximately 44.7% of the total tourism revenue of Korea from July 2016 to April 2019.[16] This calculation is merely a simple back-of-envelope one, but it clearly shows that the costs were substantial.

[Figure 3] Treatment Effects in Levels: Number of Tourists



Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. The figure plots the number of tourists of the treated unit and the counterfactual unit, which were obtained by accumulating the log of seasonal difference, $\log(y_t) - \log(y_{it-12})$, of the number of tourists for the treated unit and the synthetic control unit.

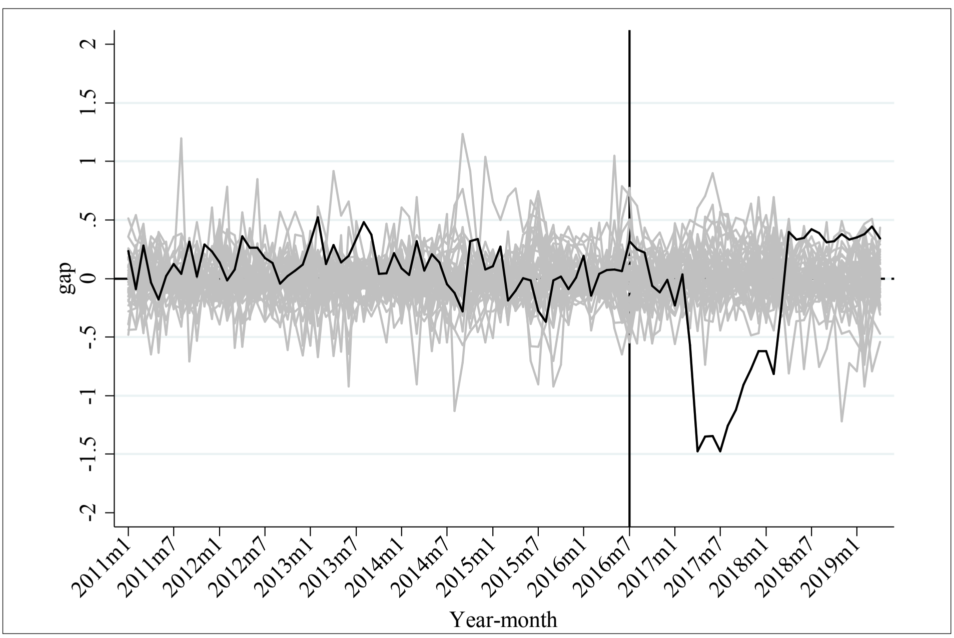
[16] If we use the counterfactual total revenue as the denominator, then the relative loss is 31%.

5.2. Statistical Significance

Given that the size of the effect is substantial, we check its statistical significance. For statistical inference, we performed the placebo test that is commonly used in the synthetic control literature. The test is conducted as follows. First, we iteratively apply the synthetic control method by assuming that each of the 49 countries in the donor pool is the treated unit and estimate the (placebo) effect in each case. We then compare the treatment effect for the true treated unit to the effects for placebo units. We can construct the empirical p-value given the distribution of the estimated placebo effects.

Figure 4 shows the results from the placebo permutation test. The gap for the true treated unit, China, is a major outlier compared with the distribution of the estimated gaps for placebo units. We interpret from these results that the effect for the treated unit is statistically significant because the estimated gap for the treated unit is unusually large compared to the distribution of the effects obtained for placebo units.

[Figure 4] Placebo Treatment Effects: Growth Rates of Tourists

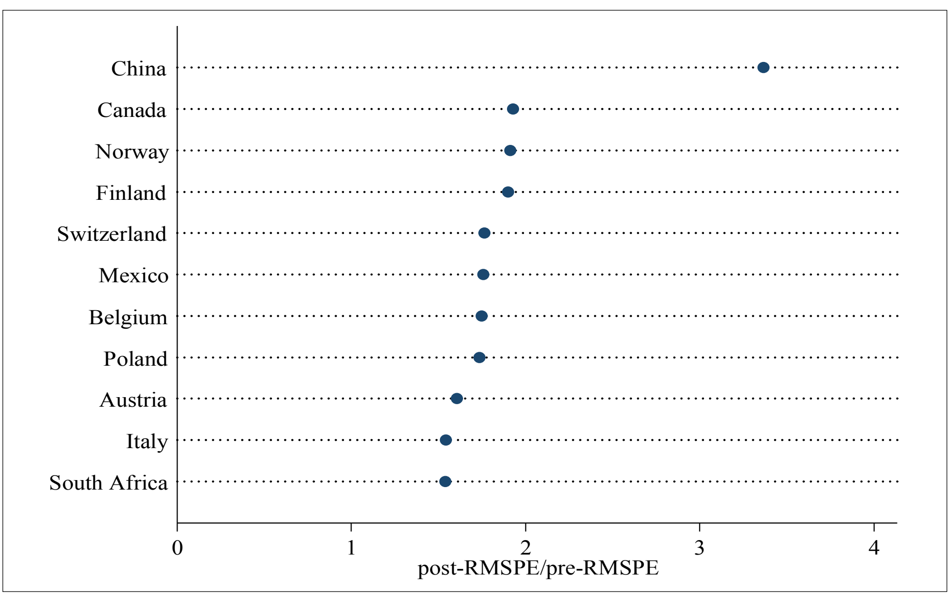


Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. Graphs depict the gap between the growth rate in the number of tourists in the treated unit and the synthetic control. The thick dark line represents the gap for the true treated unit. The gray lines indicate the gap for the placebo units.

An alternative way to evaluate the statistical significance of the effect for China compared with placebos in the donor pool is to look at the ratios between the post-treatment and pre-treatment RMSPE (Abadie et al., 2010). If the pre-treatment RMSPE is sufficiently large—that is, the synthetic control fails to fit the pre-trend in the outcome variable—the large post-treatment RMSPE is also highly likely to be artificially created by the lack of fit, not indicative of a large treatment effect. We divided the average post-treatment RMSPE by the average pre-treatment RMSPE for the treated unit and all placebo units. Figure 5 illustrates the ratios of the post-treatment and pre-treatment RMSPE of China and the top 10 countries with the 10 highest RMSPE ratios among all source countries next to China. China remarkably stands out with the highest ratio, exhibiting a considerable gap compared with the other countries. In the case of China, the post-treatment gap is approximately 3.4 times larger than the pre-treatment gap.

In this context, an empirical p-value can be constructed by calculating the fraction of placebo effects greater than or equal to the effect estimated for the true treated unit (Abadie et al., 2015). Table 2 reports the p-value for the dynamic treatment effect for each month in the post-treatment period. The positive treatment effects for the first three months are not statistically significant at the conventional 10% level (except for the second month). Not until March 2017 had the effects been insignificant. Then, a significant negative effect appeared and persisted for 18 months.

[Figure 5] Ratio of Post-Treatment and Pre-Treatment RMSPE



Notes: China and 10 countries with the highest ratios of post- and pre-treatment RMSPE.

[Table 2] Estimated Treatment Effects and Empirical p-values: Number of Tourists

	(1) Treated Unit	(2) Synthetic control unit	(3) Gap	(4) p-value
2016m7	1.565	1.086	0.479	0.300
2016m8	0.696	0.324	0.371	0.100
2016m9	0.299	0.118	0.181	0.160
2016m10	0.126	0.199	−0.073	0.660
2016m11	0.099	0.188	−0.089	0.420
2016m12	0.180	0.223	−0.044	0.920
2017m1	0.069	0.346	−0.277	0.200
2017m2	0.079	0.034	0.044	0.760
2017m3	−0.639	0.033	−0.673	0.000
2017m4	−1.332	0.279	−1.610	0.000
2017m5	−1.270	0.145	−1.415	0.000
2017m6	−1.308	0.119	−1.427	0.000
2017m7	−1.380	0.158	−1.538	0.000
2017m8	−1.196	0.120	−1.316	0.000
2017m9	−0.982	0.210	−1.192	0.000
2017m10	−0.878	0.125	−1.004	0.000
2017m11	−0.703	0.144	−0.847	0.000
2017m12	−0.560	0.125	−0.685	0.020
2018m1	−0.726	−0.033	−0.693	0.000
2018m2	−0.661	0.292	−0.953	0.000
2018m3	0.063	0.321	−0.258	0.140
2018m4	0.580	0.194	0.386	0.080
2018m5	0.500	0.269	0.230	0.020
2018m6	0.514	0.240	0.273	0.120
2018m7	0.474	0.118	0.355	0.000
2018m8	0.468	0.155	0.313	0.040
2018m9	0.354	0.103	0.250	0.100
2018m10	0.448	0.146	0.302	0.040
2018m11	0.381	−0.029	0.411	0.080
2018m12	0.279	−0.069	0.348	0.100
2019m1	0.301	−0.063	0.364	0.080
2019m2	0.313	−0.161	0.475	0.200
2019m3	0.273	−0.129	0.402	0.060
2019m4	0.370	0.031	0.339	0.020

5.3. Effects on Stock Prices

We examine the effect of the THAAD announcement on the stock prices of China-related units in the Korean stock market: tourism industry, cosmetics industry, and Lotte Shopping. As in the previous analysis of tourists, we construct the synthetic control for each treated unit by using industries or individual firms in the donor pool such that the synthetic control unit exhibits a trend in the growth rate of stock prices similar to that of the treated unit before the event.

Our results are qualitatively similar for all three treated units. Figure 6.A shows that for all three treated units, the synthetic control that we created provides a good match for the pre-treatment trend before the event date.[17] Regarding the post-treatment period, as seen in Figure 6.B, the gaps between the treated and synthetic control units decline sharply after the event, suggesting an immediate and negative effect. The negative gaps remain quite consistent but recover quickly since mid-2017 when the growth rate of the stock price became higher than that of the synthetic control. Again, this effect should be the base effect, reflecting the negative effect one year ago.

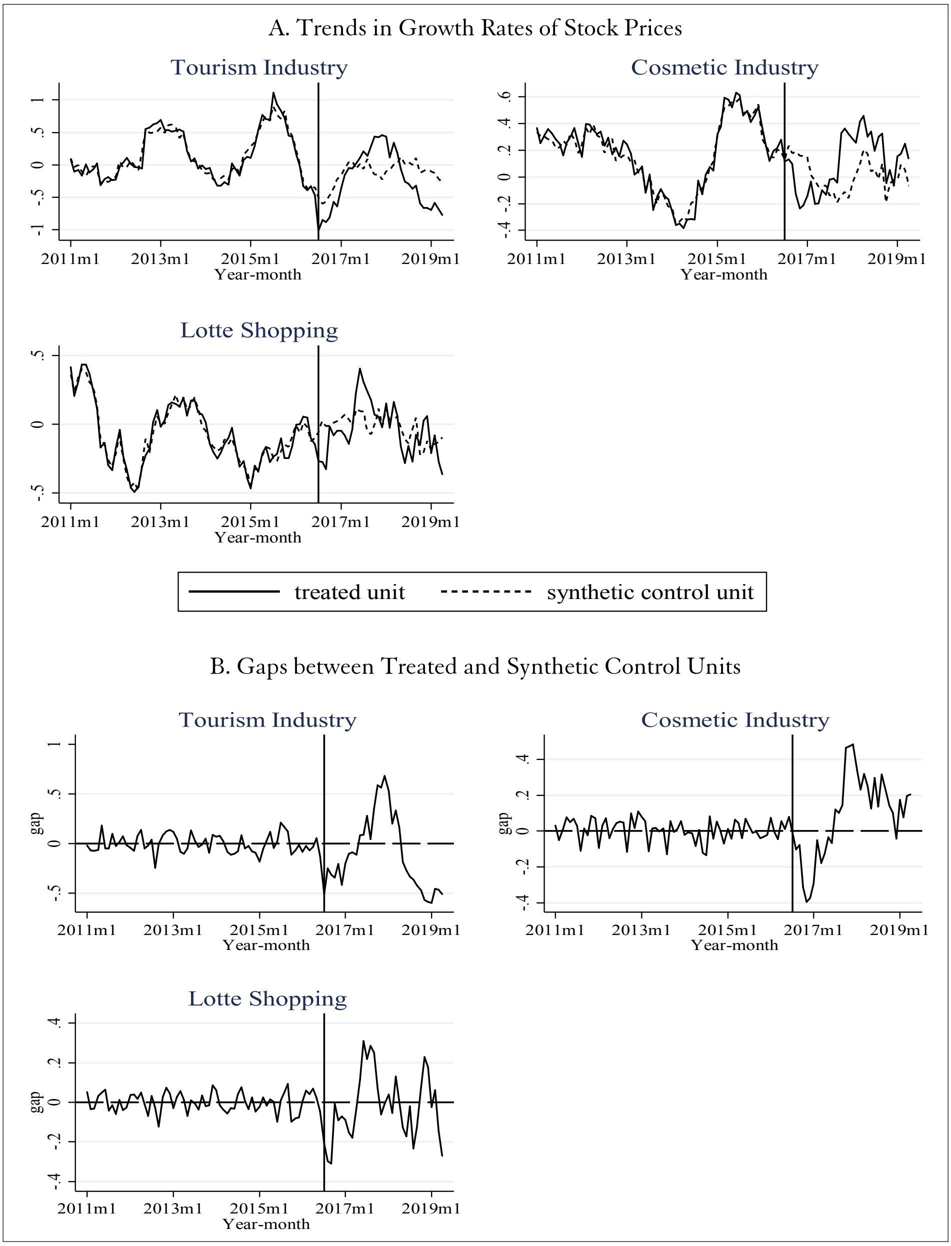
Taking into account the nature of the stock market, where unobservable confounding factors vary precariously over time, we do not attempt to interpret the long-term results too far from the event date. We also believe that any dynamic effects should be revealed within one year at most after the event. If the financial market is efficient, then stock prices should reflect all available information quickly and react only to new information (Abadie and Gardeazabal, 2003).

Figure 7 presents the results of the levels of stock prices. We found that the stock prices of the treated units dropped immediately following the announcement but recovered quickly after several months. However, we found that the effects on the stock market are not statistically significant. We assessed the significance of the effects by examining whether the estimated gap for the true treatment is large relative to the distribution of placebo effects. All panels in Figure 8 reveal that the gaps for the treated units are located within the range of idiosyncratic variations obtained from placebo tests during the post-treatment period. That is, the magnitude of the effect observed for the actual treatment is not rare or outstanding compared with the set of placebo effects. Therefore, our placebo tests suggest that the estimated effects for the treated units are not statistically significant over the entire post-treatment period. Table 3 demonstrates that the empirical p-value calculating the probability that a random placebo unit in the distribution has an effect larger than the treated unit. The p-value reported in Table 3 confirms the insignificant effect on the stock market. We found that only the effect in the first month for the tourism industry is significant at the conventional significance level.[18]

[17] The industry and company weights used to create the synthetic control are presented in Appendix A, Tables A2–A4.

[18] To evaluate the effects of the THAAD deployment more comprehensively, we attempt to estimate the effects on the whole economy including those sectors which were not directly hit by the shock. Specifically, we examine three outcomes; total monthly trade volume with China, monthly stock market index, and quarterly GDP growth. We present the results in Appendix Figure A7. First, we find no significant effect on trade with China and stock market index. We find that total trade volume with China dropped in September and November 2016, but the effects are not statistically significant. For the stock market index, we find a large negative effect in November 2018 but since it is too far away from the event time, we doubt that this is merely a statistical artifact. The GDP growth

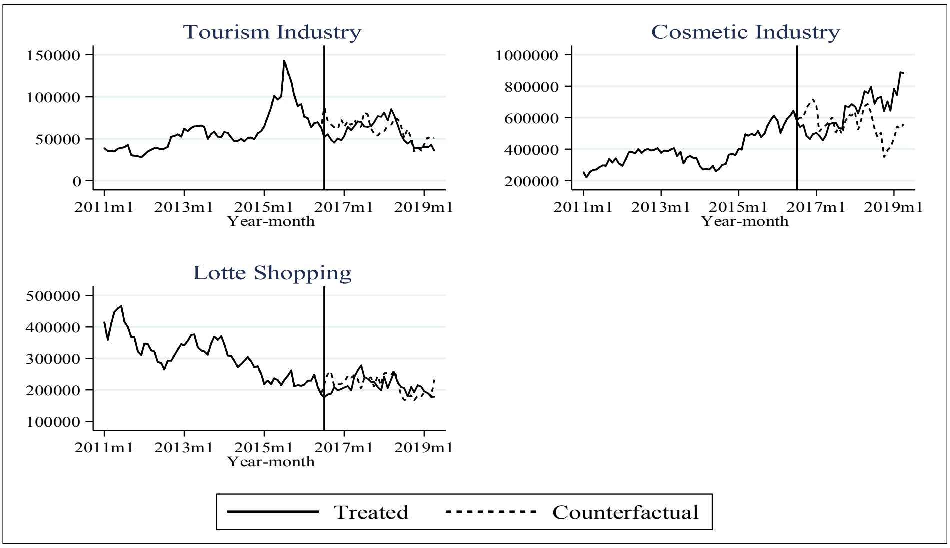
[Figure 6] Treatment Effects over Time: Growth Rates of Stock Prices



Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government.

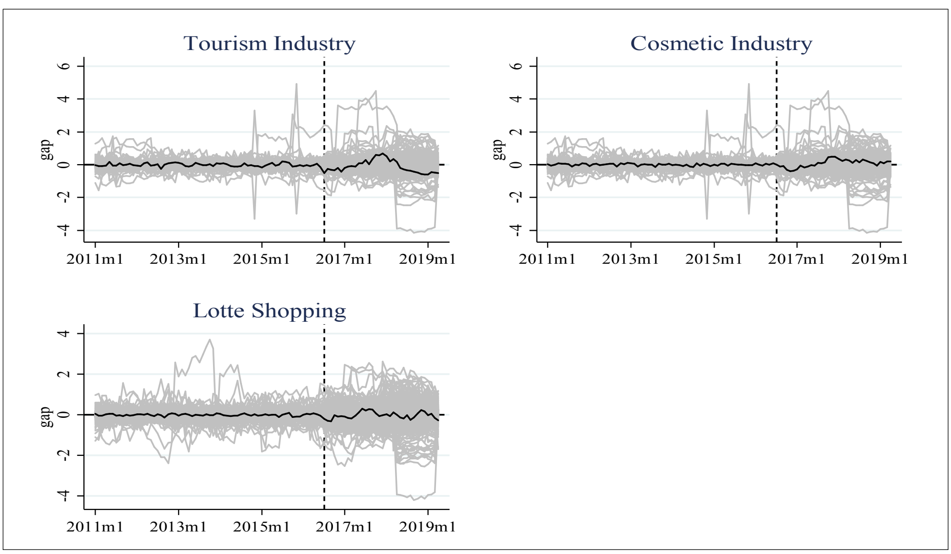
rate is lower after the THADD announcement. The size of the effect is quite large, and the effect in the last quarter of 2016 is also statistically significant. We conclude that the political conflict from the THAAD deployment resulted in economic costs not only on those industries directly hit by the event but also on the whole economy. However, because the THADD deployment is related to the national security, benefits might persist in the longer run. We leave this question as a topic for future research.

[Figure 7] Treatment Effects in Levels: Stock Prices



Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. The figure plots the stock prices of the treated unit and the counterfactual unit, which were obtained by accumulating the log of seasonal difference, $\log(y_t)-\log(y_{it-12})$, of stock prices for the treated and synthetic control units.

[Figure 8] Placebo Treatment Effects: Stock Prices



Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. Graphs depict the gap between the growth rate in the stock prices in the treated unit and the synthetic control. The thick dark line represents the gap for the treated unit. The gray lines indicate the gap for the placebo units.

[Table 3] Estimated Treatment Effects and Empirical p-values: Stock Prices

	(1)	(2)	(3)	(4)	(5)	(6)
	Tourism Industry		Cosmetic Industry		*Lotte Shopping*	
	Gap	p-value	Gap	p-value	Gap	p-value
2016m7	−0.510	0.033	−0.010	0.959	−0.210	0.246
2016m8	−0.252	0.288	−0.103	0.593	−0.298	0.179
2016m9	−0.316	0.230	−0.078	0.733	−0.310	0.191
2016m10	−0.344	0.173	−0.314	0.214	−0.008	0.959
2016m11	−0.208	0.461	−0.396	0.169	−0.090	0.680
2016m12	−0.416	0.144	−0.372	0.202	−0.071	0.723
2017m1	−0.203	0.506	−0.291	0.313	−0.089	0.736
2017m2	−0.102	0.724	−0.052	0.868	−0.151	0.519
2017m3	−0.091	0.737	−0.177	0.514	−0.179	0.480
2017m4	−0.115	0.626	−0.123	0.609	−0.028	0.887
2017m5	0.083	0.728	−0.035	0.868	0.114	0.662
2017m6	0.090	0.716	−0.066	0.770	0.309	0.287
2017m7	0.277	0.374	0.120	0.675	0.219	0.432
2017m8	0.046	0.864	0.103	0.695	0.285	0.320
2017m9	0.351	0.284	0.144	0.634	0.251	0.392
2017m10	0.588	0.119	0.466	0.177	0.071	0.750
2017m11	0.566	0.132	0.474	0.160	−0.061	0.803
2017m12	0.682	0.107	0.485	0.185	−0.007	0.972
2018m1	0.529	0.160	0.341	0.263	0.038	0.899
2018m2	0.200	0.457	0.233	0.399	−0.055	0.824
2018m3	0.332	0.317	0.319	0.317	0.129	0.633
2018m4	0.162	0.654	0.253	0.498	0.003	0.987
2018m5	−0.185	0.617	0.126	0.708	−0.128	0.654
2018m6	−0.272	0.457	0.297	0.444	−0.172	0.579
2018m7	−0.335	0.383	0.138	0.704	−0.019	0.935
2018m8	−0.365	0.374	0.318	0.444	−0.234	0.468
2018m9	−0.424	0.329	0.225	0.576	−0.124	0.677
2018m10	−0.473	0.280	0.143	0.695	0.074	0.819
2018m11	−0.567	0.173	0.102	0.761	0.229	0.463
2018m12	−0.590	0.165	−0.043	0.901	0.177	0.564
2019m1	−0.598	0.152	0.174	0.601	−0.025	0.940
2019m2	−0.458	0.202	0.079	0.790	0.061	0.829
2019m3	−0.468	0.202	0.196	0.531	−0.145	0.602
2019m4	−0.510	0.111	0.204	0.395	−0.270	0.310

5.4. Robustness Checks

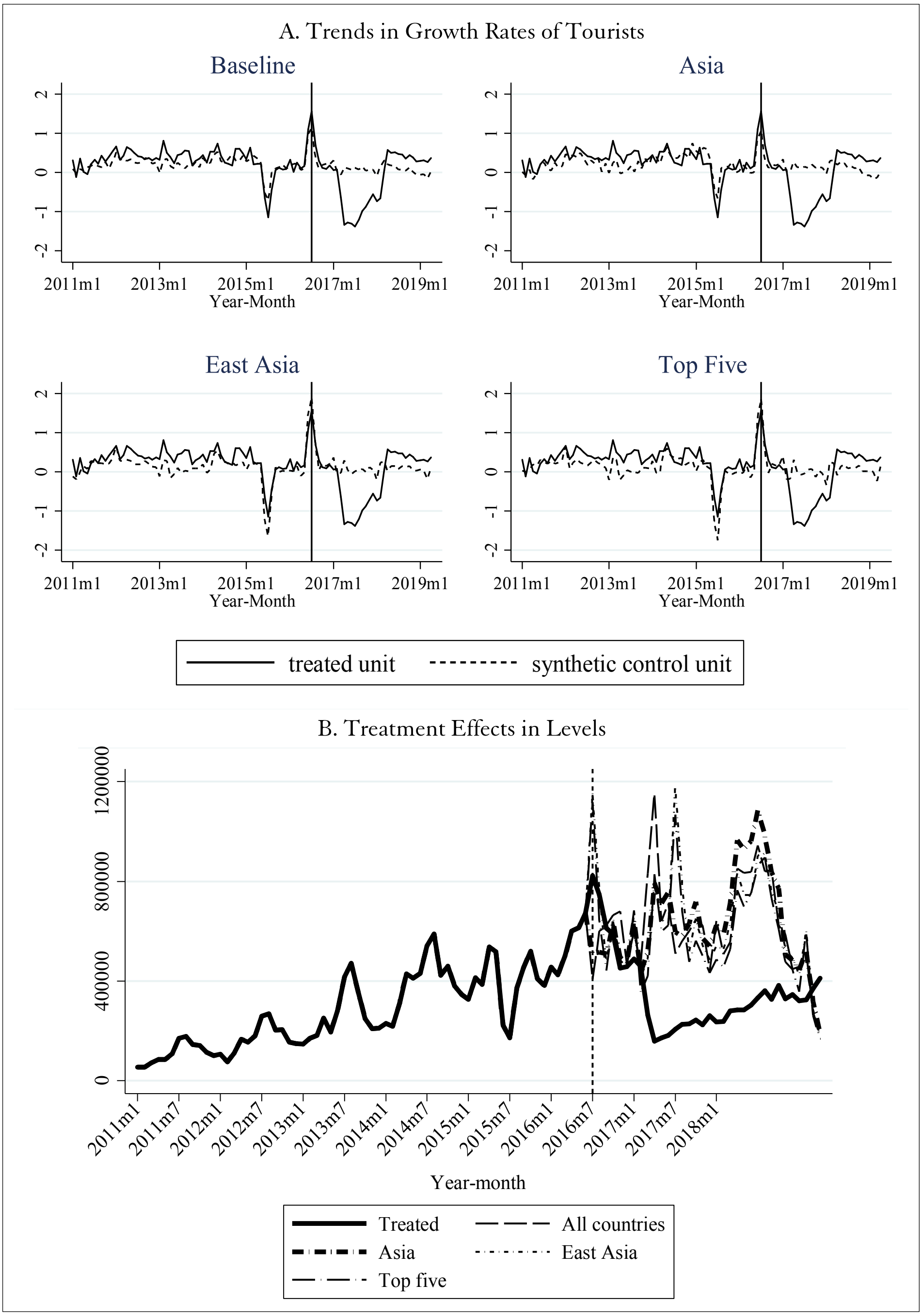
In this subsection, we examine whether our main results are robust to donor pool restrictions and pre-treatment outcome usage. We also discuss the possibility of spillover effects which would bias our estimates. Lastly, we present the results from the difference-in-differences estimation.

Alternative donor pool restrictions. We start by examining the robustness of the results for tourists to alternative donor pool restrictions. First, we restrict the donor pool to 20 Asian countries because tourists from countries outside of Asia should be fundamentally different from those from Asia. Along the same lines, we further restrict the donor pool to include only four countries in East Asia (Hong Kong, Japan, Mongolia, and Taiwan). With only four countries in the donor pool, however, constructing a synthetic control that can fit the treated unit's pre-trend well is difficult. Finally, we select and include the top five source countries for tourists to Korea (Japan, Taiwan, United States, Hong Kong, and Thailand) next to China. The results from the three robustness checks are reported together in Figure 9. In panel A, we show the trends in the growth rates of the treated and synthetic control units over the whole period. In panel B, as before, we convert the results in the growth rate to the number of tourists. Overall, the results are similar across the three alternative donor pool restrictions. The results indicate that the THAAD deployment had little or no effects in the first few months but yielded a large negative effect since January 2017.

Spillover effects. The results in Figure 9 also address a concern about a spillover effect that might have occurred between the treated and synthetic control units (Abadie et al., 2015). The THAAD announcement might have affected the trends of tourist inflows from countries other than China as well. For example, the announcement could have had a positive effect on the number of tourists from countries other than China in the synthetic control. This effect would bias our estimates downward, exaggerating the negative effect of the announcement. The expectation of a decrease in Chinese tourists after the announcement led more tourists from other countries to decide to visit Korea. By contrast, the THAAD announcement could have had a negative spillover effect on tourists from the other countries included in the synthetic control. In this case, our estimates should be biased upwardly. That is, our estimates present an upper bound of the true effect of the THAAD crisis. We think that, if any occur, spillover effects are more likely to occur among those countries with more visitors to Korea or those countries near Korea which can respond more quickly to changes in tourists from China. Therefore, the finding that the results in Figure 9 for the top five countries or close countries in Asia are the same as the baseline results indicates that any spillover effects should not be significant.[19]

[19] Under the same presumption that any spillover effects should occur in major visitor countries, we also estimated the effects of the THAAD announcement on the trends of tourists from each of the top five source countries—Japan, Taiwan, the U.S., Hong Kong, and Thailand—and found no significant effect.

[Figure 9] Donor Pool Restrictions: Number of Tourists



Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. East Asia includes Hong Kong, Japan, Mongolia, and Taiwan. The top five includes Japan, Taiwan, United States, Hong Kong, and Thailand. For panel B, see Figure 3.

Pre-treatment outcome usage. As a further robustness check, we use different specifications regarding the pre-treatment outcome usage. In our baseline specification, we use all pre-treatment outcome lags as predictors. Alternatively, we try five different specifications: (1) using the annual averages instead of all monthly outcomes; (2) using only the outcomes of the first month, January, for each year; (3) using only the outcomes of the last month, December, for each year; (4) using only the average of the entire pre-treatment period; and (5) using only the outcome at the month right before the treatment. Figure 10 presents the results. Panel A shows the trends in the growth rates, and panel B depicts the results for the number of tourists. We find that the results are similar across different specifications. Table 4 presents the predictor weights for each corresponding specification. When using all outcome lags, the sum of weights for lagged outcomes is approximately 0.9, meaning that the explanatory power of outcome lags is high. The sum of weights for lagged outcomes is also high for the specification of using the pre-treatment period average and the last pre-treatment value. When we use the pre-treatment outcome of yearly averages, January or December, the weights for outcome lags are close to zero, but population density and size are weighted more. Although the weights given to the predictors depend on the pre-treatment outcome usage, the estimation results for the treatment effect are quite similar.

Difference-in-differences method. An alternative approach to the synthetic control method is the standard difference-in-differences (DID) method. The synthetic control method generalizes the DID estimator, but we present the DID results for robustness. The DID model can be written as follows:

$$y_{it} = \lambda_i + T_t + \beta \cdot \text{China}_i \cdot \text{AfterTHAAD}_t + X_{it}'\gamma + \varepsilon_{it}$$

where the subscript i indicates a source country and t indicates a time in year and month (January 2011–December 2018).[20] The dependent variable represents

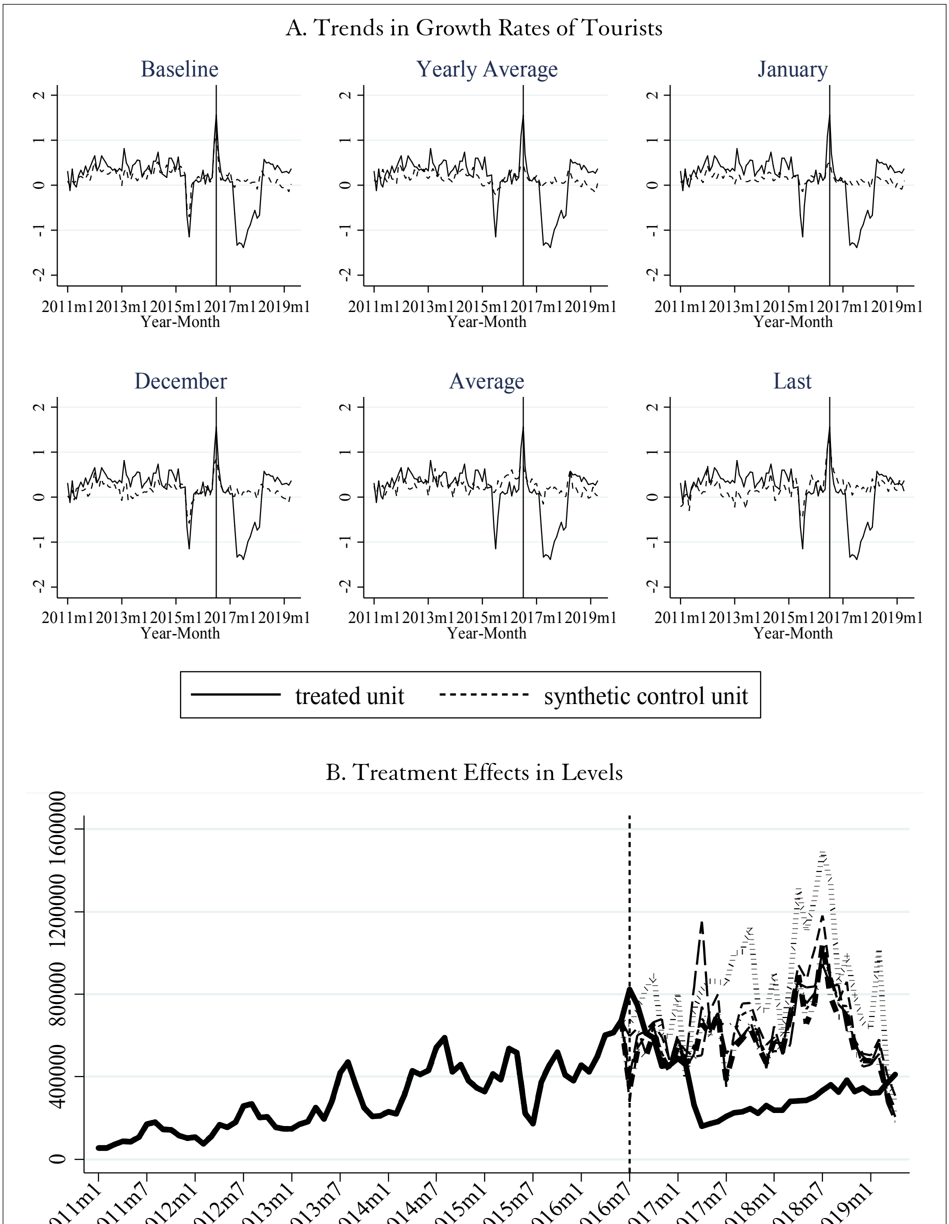
[Table 4] Predictor Weights: Number of Tourists

	All	Yearly average	Jan.	Dec.	Average	Last
Number of tourists	0.890	0.000	0.000	0.000	0.565	0.649
GDP per capita (current US$)	0.046	0.000	0.000	0.000	0.139	0.148
Population size	0.045	0.500	0.500	0.500	0.112	0.000
Population density	0.000	0.500	0.500	0.500	0.000	0.092
Distance from Korea (in km)	0.002	0.000	0.000	0.000	0.185	0.111

Notes: Population density is measured by the number of human inhabitants per square kilometer.

[20] The sample period ends in December 2018 for the DID approach because two explanatory variables, GDP and population, are only available up to 2018.

[Figure 10] Pre-Treatment Outcome Usage: Number of Tourists



Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. For panel B, see notes in Figure 3.

The growth rates in the number of tourists, and λ_i and T_t are the source country- and year-month-specific fixed effects, respectively. China_i is defined as 1 if the country is being treated (China), and zero otherwise. AfterTHAAD_t is a binary variable set to 1 if the year-month is after July 2016, and zero if it is before that. Thus, β captures the effect of THAAD deployment on the growth rate of tourists from China. Given arbitrariness regarding what the appropriate control group would be, we attempt to use four different groups as the control group: (1) the rest of the source countries (all 49 countries), (2) 20 countries in Asia, (3) four countries in East Asia, and (4) the top five source countries for tourists to Korea. These groups were chosen because we restricted the donor pool in these four ways before. The results in Panel A in Table 5 show that the DID estimates are slightly larger than what we found from the synthetic control approach. The THAAD deployment announcement decreased the growth rates of tourists by 45–63 percentage points, depending on which control group was used. However, the results were not different from our baseline results using the synthetic control method. Furthermore, we divide the post-treatment period into two periods, the first between July 2016 and December 2017 and the second after December 2017 (Panel B). Consistent with the results from the SCM, the results show that the effect gets smaller after the official resolution of the diplomatic conflict. However, unlike the results from the SCM, we find that the effect is persistent and still negative in the second period.

Robustness of stock price results. We also check the robustness of our baseline results for stock prices. As for donor pool restriction, we first select the 1-digit industry where each treated unit belongs: manufacturing (C) for tourism industry, business facilities management, and business support services; rental and leasing activities (N) for cosmetic industry; and wholesale and retail trade (G) for Lotte Shopping. Next, we include the industries or companies with levels of stock price similar to those in the treated unit during the pre-treatment period. Specifically, industries or companies whose stock price trends are within two standard deviations above or below the mean of the treated unit are chosen. We find that the results are robust to the choice of donor pool.[21] We also find that the results are not sensitive to different pre-outcome specifications, yet the pre-trend fit is poor when we use the average and last pre-treatment values, perhaps due to high volatility in stock prices.

[21] The results are reported in Appendix A, Figures A1–A6, and Table A4.

[Table 5] Difference-in-Differences Results

A. Baseline

Control group	(1) All	(2) Asia	(3) East Asia	(4) Top five
China×AfterTHAAD	−0.4710***	−0.4508***	−0.6289***	−0.5540***
	(0.0189)	(0.0283)	(0.0488)	(0.0547)
Observations	4,788	2,004	480	576
R-squared	0.4276	0.5119	0.9461	0.8178

Notes: All specifications control for GDP per capita, population size, year-month time, fixed effects, and country-specific fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

B. Effects before and after the Official Resolution of the Diplomatic Conflict

Control group	(1) All	(2) Asia	(3) East Asia	(4) Top five
2016.7–2017.12	−0.6920***	−0.6724***	−0.8664***	−0.7660***
	(0.0229)	(0.0350)	(0.0593)	(0.0597)
2018.1–	−0.2043***	−0.2019***	−0.3991***	−0.2495***
	(0.0247)	(0.0367)	(0.0586)	(0.0669)
Observations	4,788	2,004	480	576
R-squared	0.4581	0.5376	0.9515	0.8360

Notes: All specifications control for GDP per capita, population size, year-month time fixed effects, and country-specific fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

VI. Conclusion

We attempt to examine the economic costs of diplomatic conflict and subsequent economic sanctions. We investigate the THAAD crisis between South Korea and China as an exemplary case. We found that after the announcement of the THAAD deployment, the inflow of tourists from China dropped substantially. The negative effect persisting for 18 months is somewhat unexpected because the sanction was only implicit or informal. By contrast, such persistence is not surprising, taking into account the stronger government's control over the private sector in China than in Western countries. However, we found that the stock prices of China-dependent industries, such as tourism and cosmetics, dropped immediately but recovered in six months, while the effects were not statistically significant. Even for the company that was the main target of economic sanctions, we found no significant effects. A possible reason for this absence because of either the government financial aid to the affected industries or the Lotte group's diversification strategy. In 2017, the Ministry of Culture, Sports and Tourism injected KRW 200 billion, four times more than originally planned, to offer low-rate loans for the tourism, accommodation, and restaurant industries.[22] Furthermore, to mitigate heavy dependence on China, the Lotte group started to expand their businesses to South Asian countries.[23]

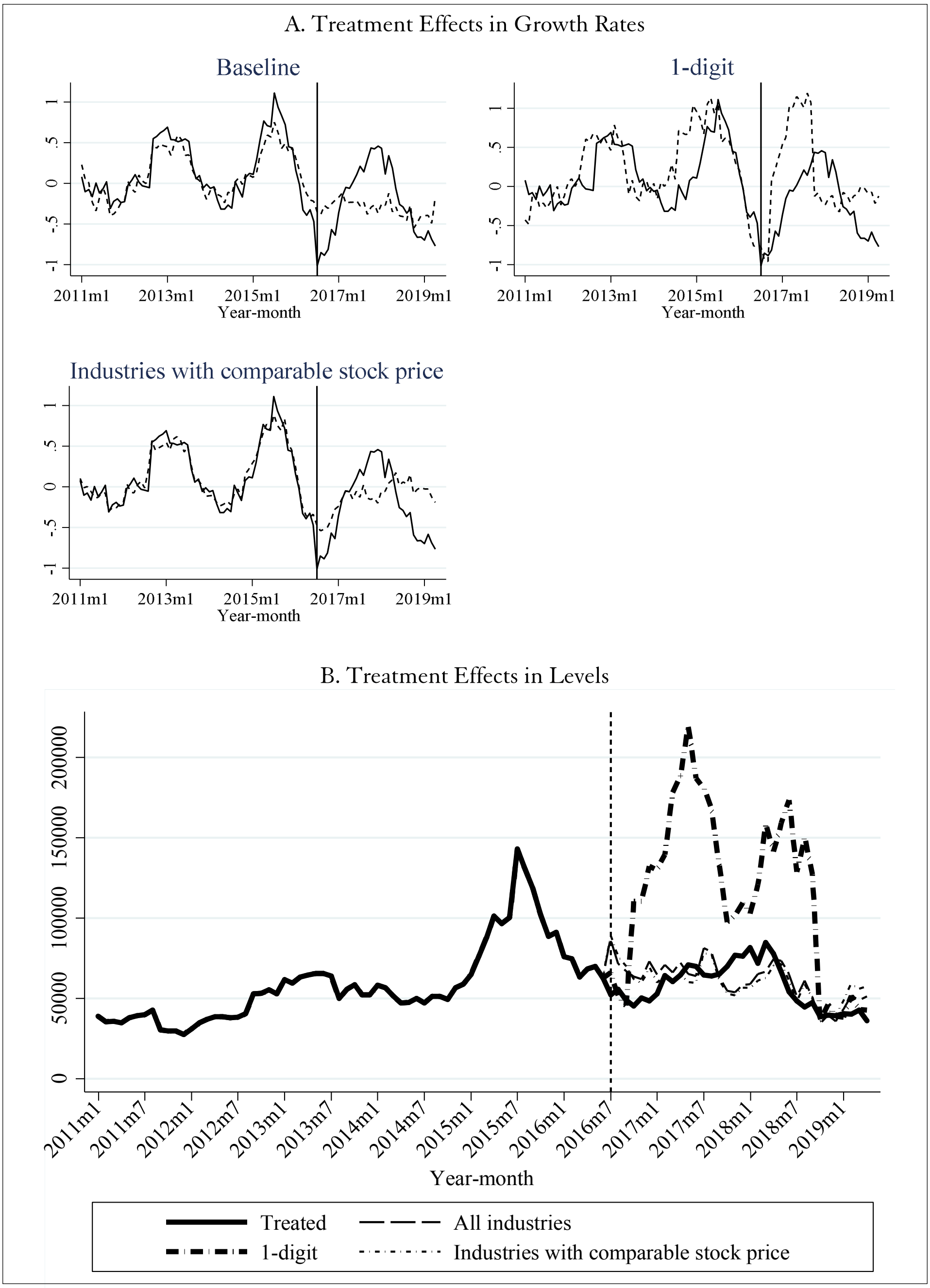
The findings in this paper show that diplomatic conflicts and subsequent economic sanctions can be significantly harmful to the target country's economy. Our estimates are likely to represent a lower bound of the true economic costs. A decrease in the number of tourists may as well depress other businesses related to the tourism industry. For example, restaurants and hotels in major tourist attractions should be adversely affected. Who actually pays the costs of economic sanctions is an interesting question.

[22] KTV, http://www.ktv.go.kr/issue/home/518178/view/535827 and Korea Herald http://www01.koreaherald.com/view.php?ud=20170308000861 (accessed in August 2020),

[23] Business Korea, http://www.businesskorea.co.kr/news/articleView.html?idxno=19355 (accessed in August 2020).

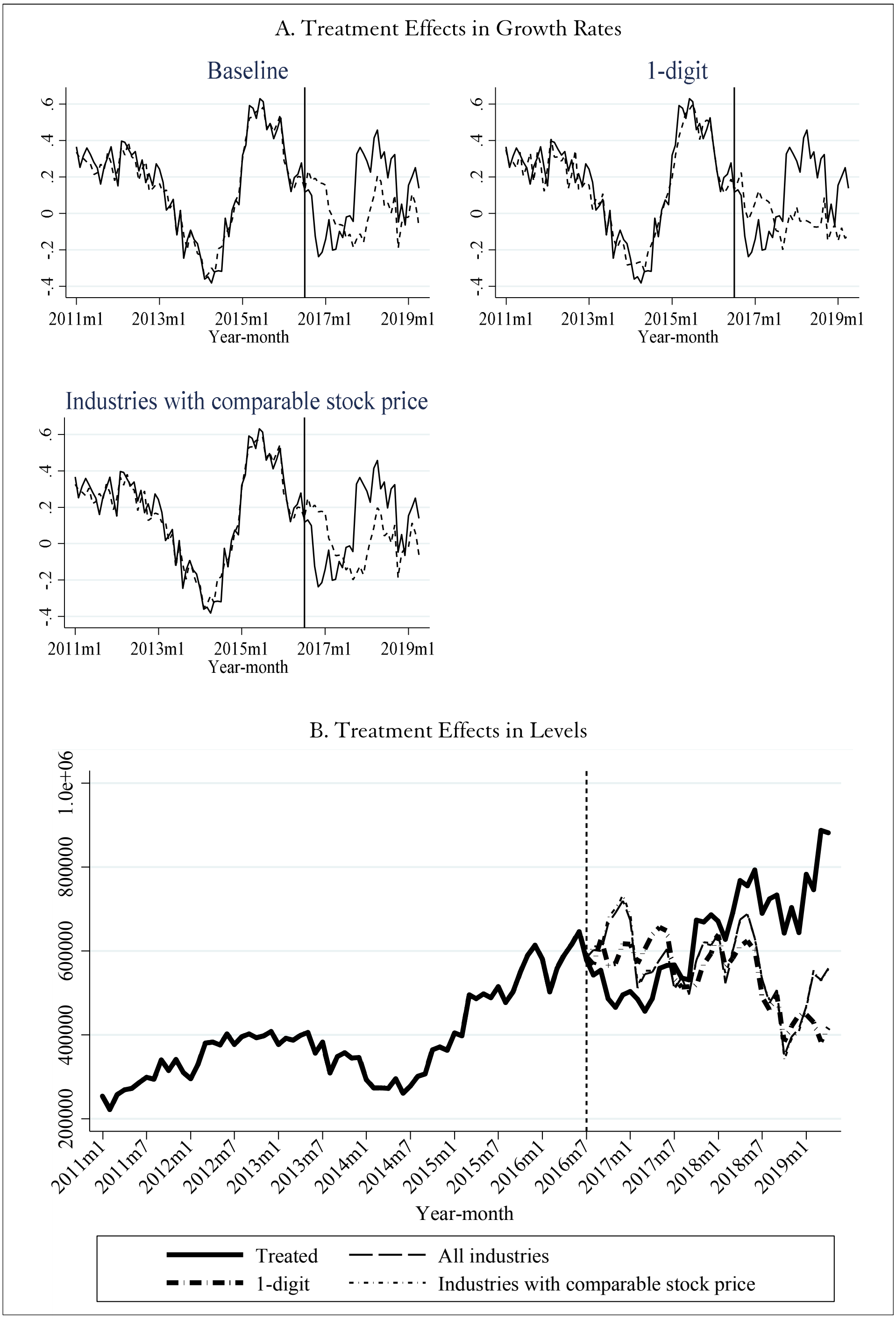
Appendix A: Figures and Tables

[Figure A1] Donor Pool Restrictions: Tourism Industry



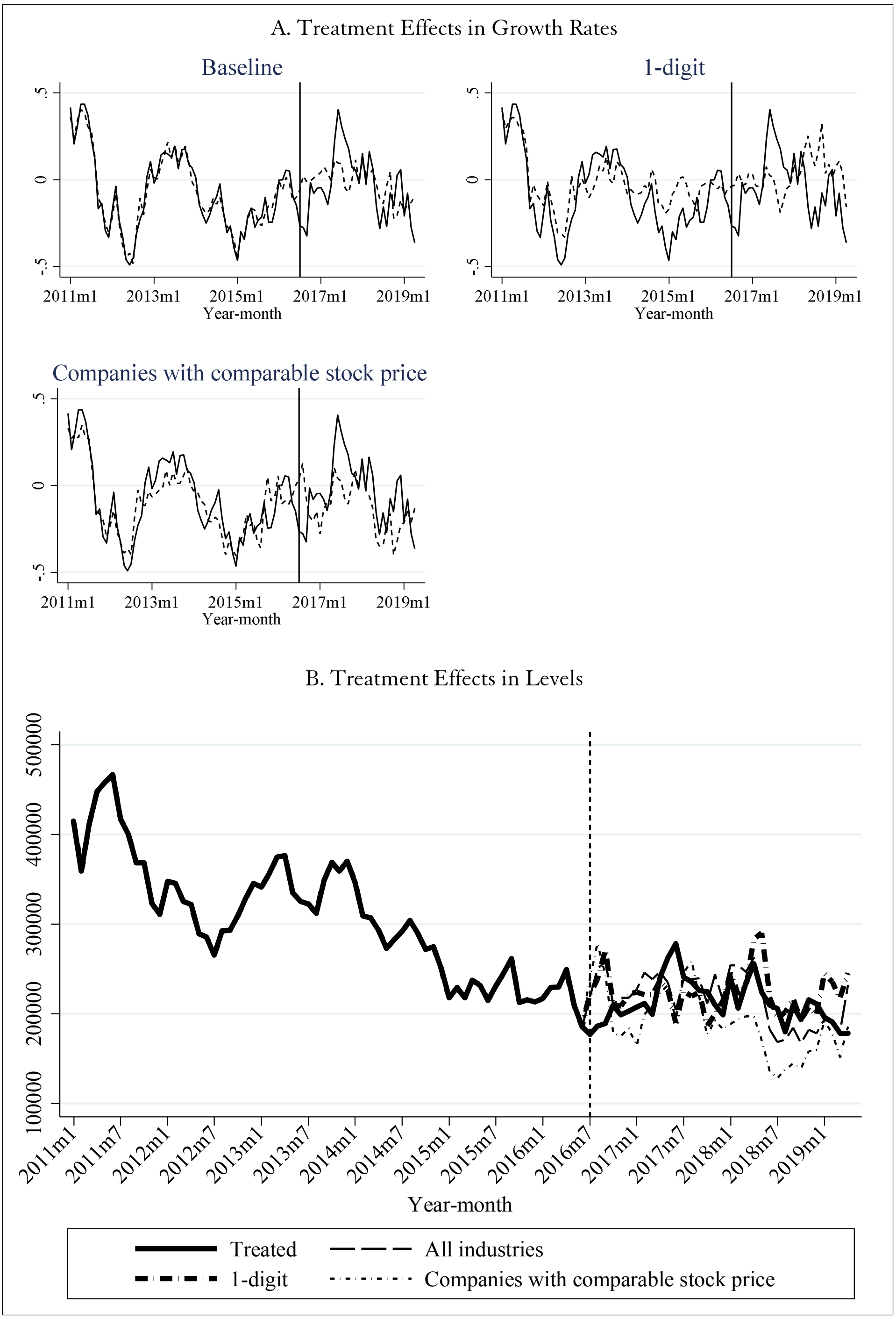
Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. For panel B, see Figure 7.

[Figure A2] Donor Pool Restrictions: Cosmetic Industry



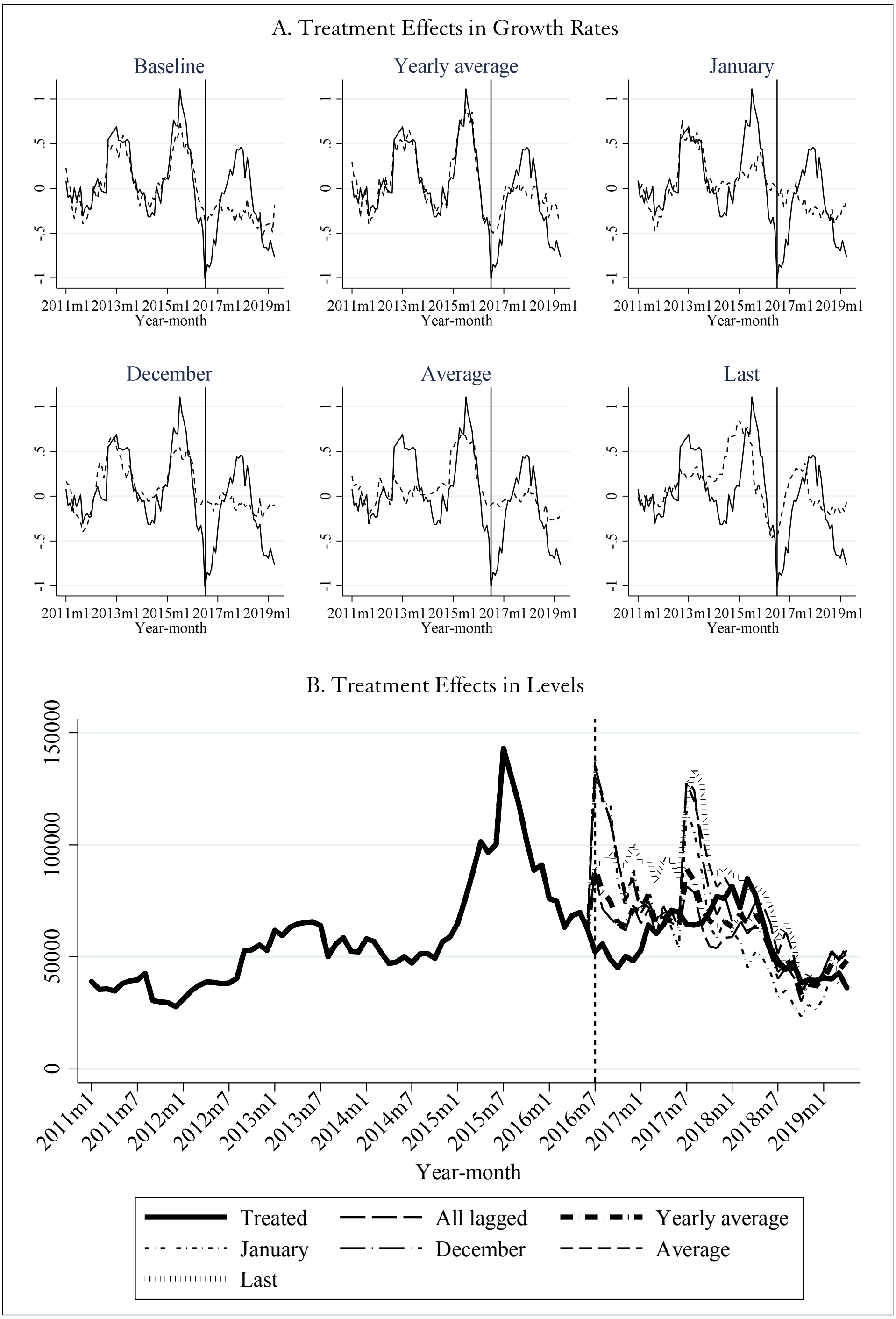
Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. For panel B, see Figure 7.

[Figure A3] Donor Pool Restrictions: *Lotte Shopping*



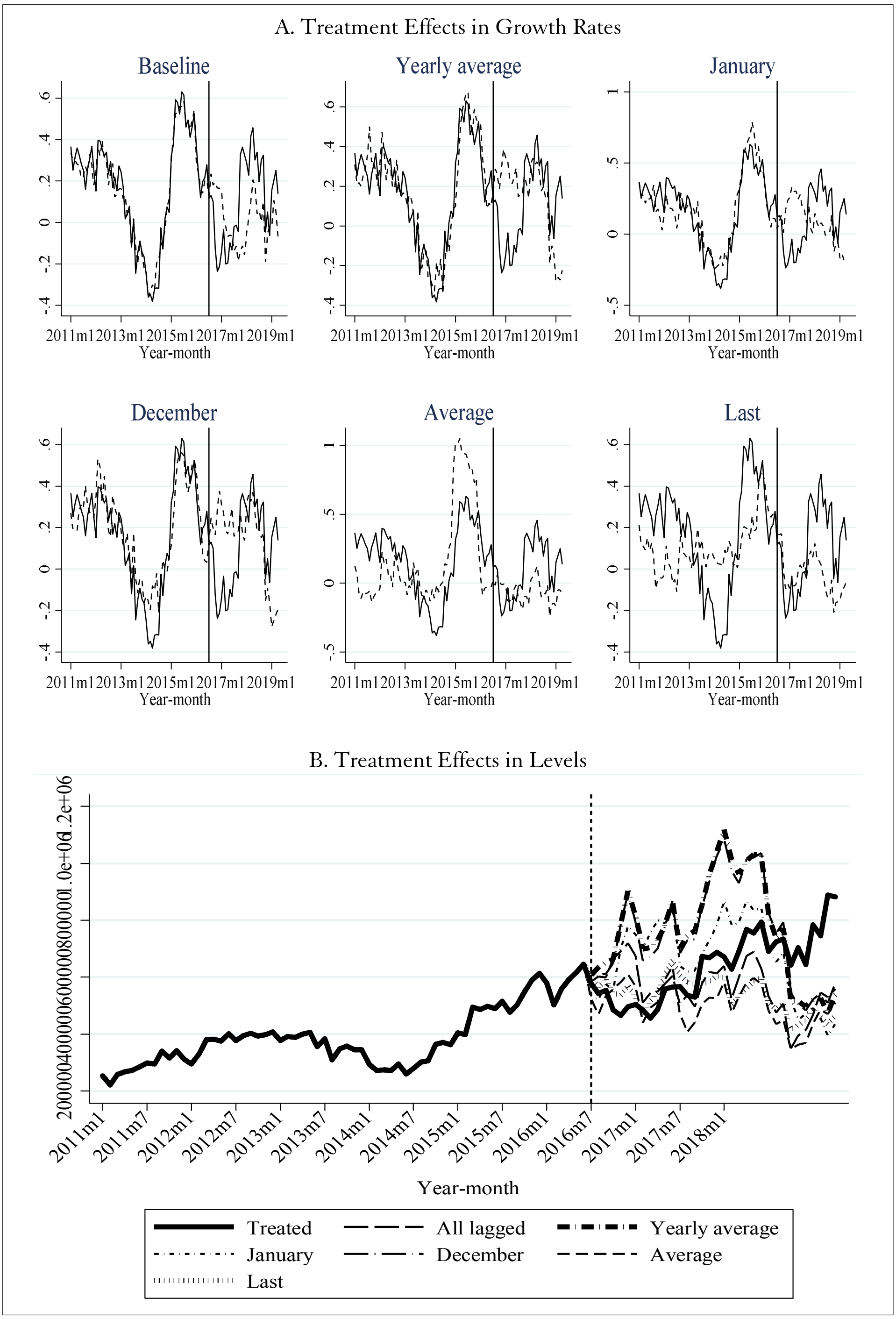
Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. For panel B, see Figure 7.

[Figure A4] Pre-Treatment Outcome Usage: Tourism Industry



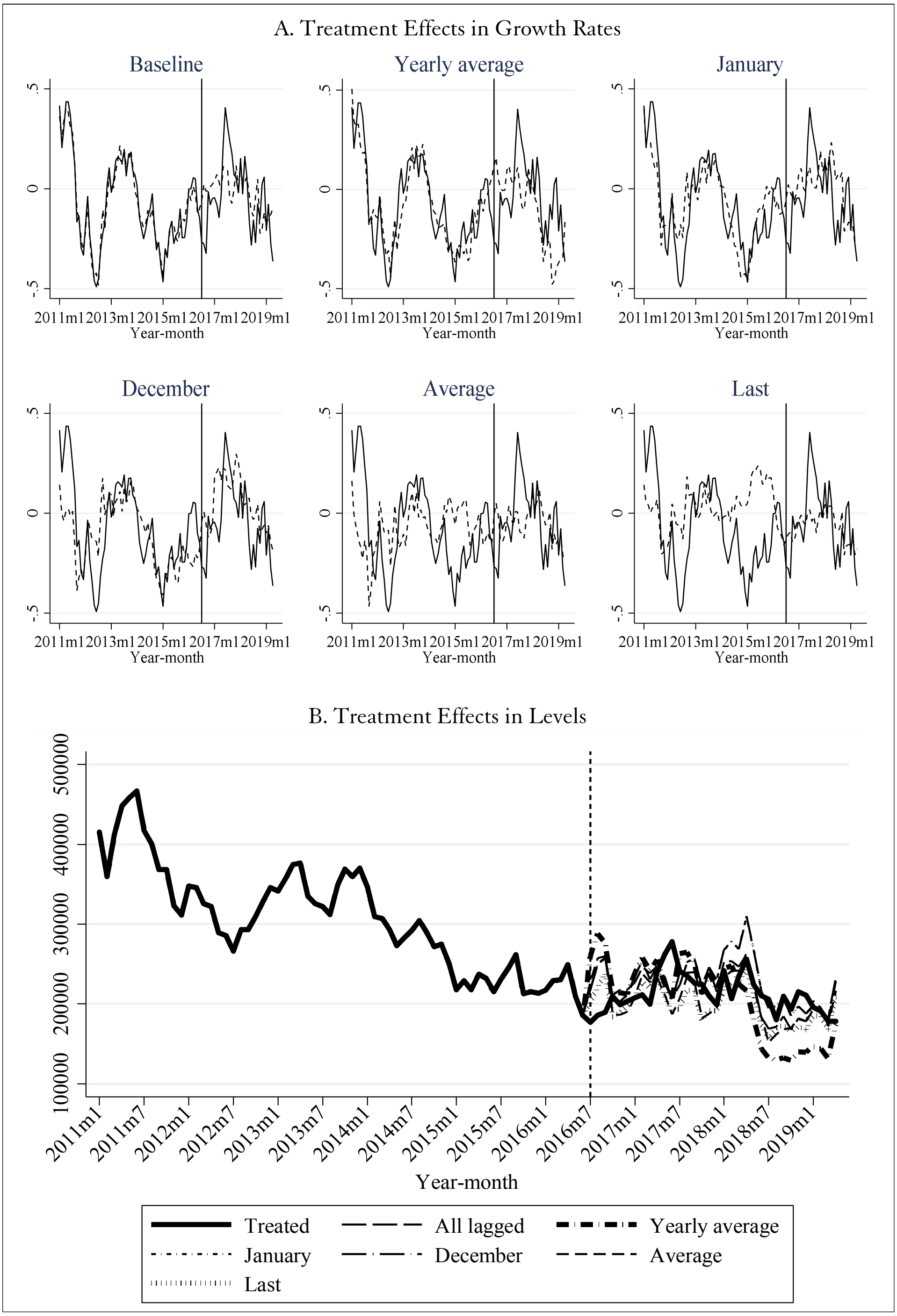
Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. For panel B, see notes in Figure 7.

[Figure A5] Pre-Treatment Outcome Usage: Cosmetics Industry



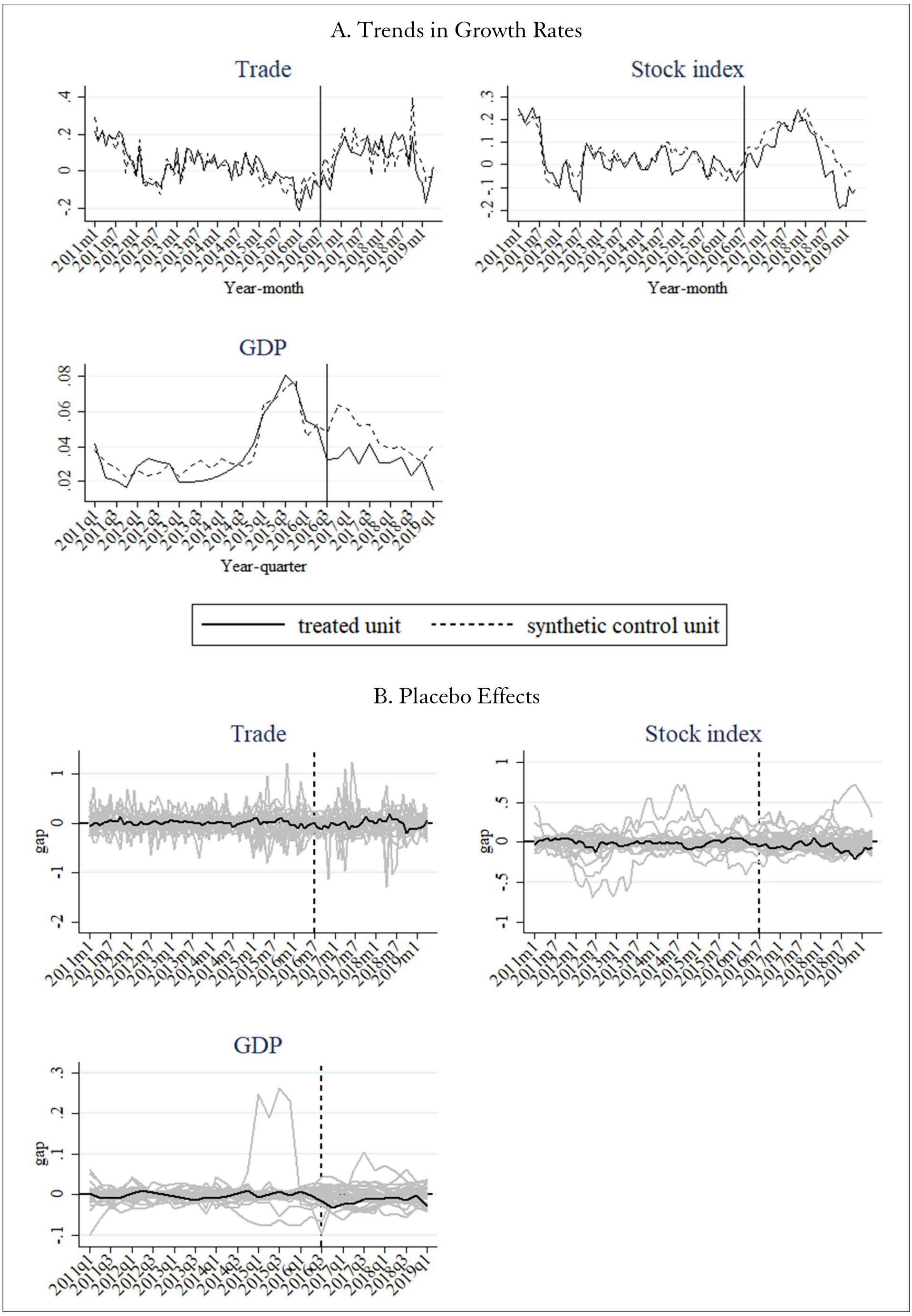
Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. For panel B, see notes in Figure 7.

[Figure A6] Pre-Treatment Outcome Usage: *Lotte Shopping*



Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government. For panel B, see notes in Figure 7.

[Figure A7] Treatment Effects over Time: Growth Rates of Trade Volume, Stock Market Index, and GDP



Notes: The vertical line corresponds to the time (2016m7) when the decision to deploy THAAD was made public by the Korean government.

[Table A1] List of Countries in the Donor Pool

Australia	Finland	Italy	Philippines	Switzerland
Austria	France	Japan	Poland	Taiwan
Bangladesh	Germany	Kazakhstan	Portugal	Thailand
Belgium	Greece	Malaysia	Romania	Turkey
Brazil	Hong Kong	Mexico	Russian Federation	Ukraine
Bulgaria	India	Mongolia	Singapore	United Kingdom
Burma	Indonesia	Netherlands	South Africa	United States of America
Canada	Iran	New Zealand	Spain	Uzbekistan
Croatia	Ireland	Norway	Sri Lanka	Viet Nam
Denmark	Israel	Pakistan	Sweden	

[Table A2] Industry Weights (Treated Unit: Tourism Industry)

Country	Weight
General Warehousing	0.218
Manufacture of Electrical Measuring, Testing, and Analysis Instruments	0.137
Manufacture of Kraft Paper and Paperboard	0.135
All Other Business Support Services	0.067
Retail Sale in Other Non-Specialized Large Stores	0.065
Manufacture of Electronic Coils, Transformers, and Other Inductors	0.061
Manufacture of Computers	0.061
Computer Programming Services	0.055
Manufacture of Pulp	0.052
Manufacture of Veneer Sheets, Plywood, and Similar Laminated Layer Boards	0.050
Publishing of Textbooks and Study Books	0.035
Other Credit Granting	0.029
Manufacture of Tubes and Pipes of Cast Iron or Cast Steel	0.014
Weaving of Cotton Fabrics	0.010
Manufacture of Fresh or Frozen Bakery Products	0.004
Wholesale of Footwear	0.004
Other Manufacturing	0.003
Sum	1.000

Note: Weights assigned to the other industries in the donor pool except the above industries are zero.

[Table A3] Industry Weights (Treated Unit: Cosmetic Industry)

Country	Weight
Wholesale of Telecommunications Equipment and Parts	0.175
Manufacture of Elevators	0.144
Manufacture of Other Plastic Products	0.131
Manufacture of Sanitary Paper Products	0.122
Media Advertising Agencies	0.116
Wholesale of Footwear	0.045
Other Manufacturing	0.037
Manufacture of Tires and Tubes	0.029
Life Insurance	0.028
Manufacture of Women's Suits and Coats	0.026
Manufacture of Plastics, Synthetic Leather	0.025
All Other Business Support Services	0.018
Manufacture of Synthetic Rubber	0.016
Weaving of Man-Made Fiber Fabrics	0.014
Manufacture of Biological Products	0.013
Manufacture of Weapons and Ammunition	0.012
Manufacture of Glass Containers, Blown or Pressed	0.011
Retail Sale in Other Non-Specialized Large Stores	0.008
Manufacture of Industrial Ceramic Ware	0.007
Manufacture of Medicinal Chemicals and Antibiotics	0.006
Manufacture of Printed Circuit Boards	0.006
Manufacture of Electronic Integrated Circuits	0.005
Manufacture of Surface-Active Agents	0.004
Sum	1.000

Note: Weights assigned to the other industries in the donor pool except the above are zero.

[Table A4] Company Weights (Treated Unit: *Lotte Shopping*)

Company	Weight
SHINSEGAE CO., LTD.	0.200
BAIKSAN CO., LTD.	0.111
SAMSUNG HEAVY INDUSTRIES CO., LTD.	0.102
KUMHO TIRE CO., INC.	0.064
PAIKKWANG INDUSTRIAL CO., LTD.	0.063
SAMSUNG ENGINEERING CO., LTD.	0.057
SAMSUNG CARD CO., LTD.	0.051
POSCO INTERNATIONAL CORPORATION	0.051
KOREA DISTRICT HEATING CORP.	0.051
HWASHIN CO., LTD.	0.044
UNI CHEM CO., LTD.	0.041
DONGBU CORPORATION	0.036
KOREA LINE CORPORATION	0.024
KOREA FLANGE CO., LTD.	0.023
BUMYANG CONSTRUCTION CO., LTD.	0.020
HANSAE YES24 HOLDINGS CO., LTD.	0.016
GENEONE LIFE SCIENCE INC.	0.014
LOCK & LOCK CO., LTD.	0.012
OCI CO., LTD.	0.007
HANDSOME CORPORATION	0.007
CITECH CO., LTD.	0.005
TBH GLOBAL CO., LTD.	0.001
Sum	1.000

Note: Weights assigned to the other companies in the donor pool except the above regions are zero.

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외교적 갈등이 경제에 미치는 영향: 한-중 사드 갈등 사례를 중심으로*

김 혜 진** · 이 정 민***

논문초록 본 연구에서는 외교적 갈등이 경제에 영향을 미친 구체적 사례 분석을 위해 사드 배치과정 중 발생한 갈등이 우리 경제에 초래한 효과를 파악하고자 한다. 구체적으로는, 합성통제방법을 이용하여 사드 배치가 중국인 관광객 수와 관련 부문의 주가에 미친 영향을 분석하였다. 중국인 관광객 수는 사드 공표 3개월 이후부터 감소하였으며 이러한 현상은 18개월간 지속되었다. 반면, 중국에 영향을 받는 부문의 주가에 대한 부정적 영향은 즉각적으로 나타났으나 통계적으로 유의미하지 않았다.

핵심 주제어: 경제적 제재, 지정학적 이벤트, 관광, 주식시장, 한국, 중국, 합성통제방법
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** 제1저자, 한국은행 경제연구원 미시제도연구실 부연구위원, e-mail: hyjnkm@bok.or.kr

*** 교신저자, 서울대학교 경제학부 교수, IZA, e-mail: jmlee90@snu.ac.kr