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NEGATIVE COGNITION OF TERRORIST ATTACKS AND FDI INFLOWS: ANALYSIS BASED ON THE "3.1" ATTACK IN KUNMING

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Abstract: Background: In today's world of increasing globalisation, foreign direct investment (FDI) plays a crucial role in driving a city's economic development. However, when a city suffers a serious security incident, such as a terrorist attack, the economic impact can be far-reaching. Take the violent terrorist incident in Kunming in 2014 as an example, this incident not only brought great panic and harm to the local people, but also had a non-negligible impact on Kunming's economy.The statistical data shows that the violent terrorist event in Kunming in 2014 led to a dramatic decline in foreign direct investment (FDI) in the city, the mental health and psychological characteristics of foreign investors, such as perceived norms of economic development, may be affected.
Subjects and Methods: In order to explore the causal relationship between FDI decline and the attack, this study collects and collates relevant economic data from more than one hundred prefecture-level cities in central and western China. By analysing the data, we expect to understand the specific impact of terrorist attacks on FDI and the mechanisms of their impacts.This study uses the Synthetic Control Method (SCM) to study whether the 2014 attack caused the decline in FDI in the following two to three years to assess its impact on investors' mental health and psychological profiles.
Results: The results show that the control group of other prefecture-level cities has a good fitting effect on Kunming City through the SCM; the changing trend in FDI in the synthetic control group before 2014 is basically the same as that in the real Kunming City. The three years following 2014 see a huge deviation between the real Kunming FDI curve and the synthetic control group, with the negative impact being most evident in 2016. FDI in Kunming was more prominently affected by the terrorist attacks, demonstrating a prolonged period of fear-related negative emotions and impaired economic cognitive norms, resulting in uncertainty about the psychological needs of investors, increased anxiety, reduced credibility towards the city, and weakened social trust.
Conclusions: This indicates that the attack in 2014 did cause the decline of FDI in Kunming City, and the negative impact had a time lag of about one year. This study further explores the mechanisms by which terrorist attacks lead to a decline in FDI, with the aim of providing ideas for quantifying the economic impact of terrorist attacks, and thus reducing the negative impacts in terms of investors' mental health and psychological profiles.
Keywords: Negative Cognition;Terrorist attack; FDI inflows; Synthetic Control Method (SCM); Mental health

1 INTRODUCTION

Since the terrorist event in 2011, terrorist attacks have increasingly become an area of interest and concern for academic researchers. To date research has extended from the fields of international politics and national security to international economics, including the perspective of international investment and international trade[1]. In academic research, the economics of terrorism, an interdisciplinary topic of economy and security, is relatively mature.
The danger of terrorism faced by China is closely related to the changes in the macro international environment and the security situation in surrounding countries. The withdrawal of some countries from war-prone regions has left a series of disasters in its wake, leading to an increased threat of 'spillover violence' from terrorist forces. Frequent periods of unrest in the Middle East and North Africa, have seen an accelerated growth in international terrorist activities, with some countries becoming the latest training ground for violent and terrorist organizations from various countries. Terrorist organizations were particularly active in 2014, with a number of incidents occurring around the world[2].
Although China has not experienced a flood of terrorist attacks, its vast territorial size and numerous ethnic groups, accompanied by the complex national conditions of neighboring countries, have meant that China is naturally concerned by terrorism. China experienced some terrorist attacks between 2013 and 2014 [2].
Amongst those attacks mentioned above, the most brutal incident, which had the worst impact and resulted in the most serious casualties, was the "3.01" attack in Kunming in 2014. According to the "China National Security Research Report in 2014", the attack took place in the ticket office at the railway station and at other places in Kunming city. Armed with machetes, the attackers inflicted violent attacks on innocent civilians, resulting in 29 deaths and 143 injuries in total.
This event has attracted wide attention from the media and scholars in various academic fields in China. However, most existing literature on this attack is from the perspective of national security, crime fighting, and media communication, etc. There is a lack of research on the economic impact of the attack. And there is a lack of research on the mental health and psychological profile of foreign investors.
Terrorist attacks are commonly thought to trigger panic in a region, distorting the allocation of resources and leading to

capital flight. Hu and Lai [3] referred to the harmful impact of terrorist attacks at varying levels: cultural, social, economic, political, and many others. They calculated that terrorism would heavily block economic development by causing a high level of property damage and a large number of casualties. Through an empirical study of 187 countries, Fernanda found that terrorist attacks negatively impact private consumption growth rate and private investment growth rates. For every additional attack, the private consumption growth rate will drop by 0.98% and the private investment growth rate by 0.27%. Dinesen and Jager [4] studied the effect of terrorist attacks on confidence in political institutions in some countries. They identified that terrorism would increase trust in government institutions. However, specifically regarding the "3.01" attack in Kunming, the question is whether the attack has led to a decline in FDI in the region. In other words, is there a causal relationship between the "3.01" attack and the change in FDI? And what is the effect mechanism? These questions are the research focus of this study.

The contributions and innovations of this paper lie in the following. Firstly, most existing literature focuses on terrorist attacks on the West, whilst the terrorist threats in Asia are rarely mentioned, particularly those in China. There has been little research on the impact of terrorist attacks in China. Given the huge political, cultural and economic differences between regions, the results in other countries may not be completely consistent with those in China. This study focuses on terrorist attacks in China, taking the attacks in Kunming in 2014 as a basis for examining the impact of the attack on FDI in Kunming. The first reason for choosing this as the research object is that the number and scale of domestic terrorist attacks in China is relatively small, and the economic impact is not obvious, and subsequently little attention has been given to this field by existing academic researchers. Additionally, solely focusing on a city or region where violent terrorist attacks once occurred, may lead to the conclusion that such attacks still have a relatively distinct impact on the indicators of a certain region.

Secondly, existing research has investigated the "3.1" attack in Kunming from the perspectives of national security, the fight against crime, media communication, etc. There is a lack of research on the economic impact of the attack. The data shows that FDI decreased after the terrorist attack in Kunming in 2014. However, there is a lack of empirical studies testing the causal relationship between the "3.01" attack and the change in FDI in this region. This study uses the Synthetic Control Method (SCM) to study the causal relationship between the Kunming attack and the decline of FDI in the city, thus enriching the research on the impact of terrorist attacks in China.

Thirdly, this study further discusses the specific mechanism of the decline of FDI in Kunming caused by terrorist attacks at both the macro and micro levels. And it explores the psychological characteristics such as anxiety, negative emotions, and economic cognitive norms resulting from the decline in FDI. This study is also of great theoretical and practical significance in the formulation of Chinese regional economic and security strategy, and in the effective and stable development of regional investment activities.

The remainder of the paper is organized as follows: Section 2 is the literature review; Section 3 conducts a counterfactual causal analysis and produces the synthetic control model; Section 4 analyzes the results of the synthetic control and further uses the placebo test to test the significance and robustness of the empirical results; Section 5 is the mechanism test at the macro and micro levels. The final section provides conclusions and policy implications.

2 LITERATURE REVIEW

2.1 The Economic Effect of Terrorist Attacks

Since the famous terrorist attack in 2001, there has been an increasing number of studies on the economic effect of terrorism in Western countries, including both theoretical and empirical research[5].

Some scholars have found that terrorism largely impacts economic development. Abadie [6] studied the economic impact of terrorist activities ina certain country, and found that following the terrorist attacks of the 1970s, the country lost about 10% of its per capita GDP when compared with the control group. This is the earliest application of the SCM and one of the earliest studies to quantify the economic impact of terrorist attacks. Khan and Yusof [7]found that terrorist attacks had generated economic recession in a certain country. They found that the degree of impact of terrorism on economic performance gradually increased from 2002 to 2014, rising from -0.02% in 2002 to -2.95% in 2014. This means that the negative economic impact of terrorism reduced economic growth by 2.95% compared with the absence of terrorism.

Additionally, a large volume of literature focuses on the trade effect of terrorist attacks. One such category mainly focuses on the West, including America, Europe, North Africa, and the Middle East. Blomberg and Hess [8] investigated the impact of terrorist attacks on trade in terms of tariff imposition. The study found that the marginal effect of terrorist attacks on trade "taxation" even exceeded the impact of language barriers and WTO membership on trade. Gaibulloev and Sandler [9] focused on the impact of anti-terrorism measures on trade cooperation. They found that counter-terrorism measures had strengthened border security and transport hubs, and further reduced the efficiency of trade cooperation by extending customs clearance times and increasing insurance and security costs. The study was an extension of research on the economic effects of terrorist events, focusing on the indirect economic effects of terrorist attacks.

However, little research exists on the effect of terrorist threats in Central Asia, South Asia, and Southeast Asia – the area surrounding China. In recent years, some Chinese scholars have focused mainly on the trade effect on neighboring countries, including the "One Belt One Road" routes and the "Pakistan Economic Corridor", looking at the impact of terrorist threats on China's trade in these countries. Chen et al. [10]studied the impact of terrorist attacks on the trade

efficiency of the "One Belt One Road" countries and China from the perspective of the heterogeneity of targets. According to their study, attacks against "personal and property" targets have an apparent impact on trade efficiency in the "One Belt One Road" countries, but attacks on "commercial" targets have an even greater impact on China's trade efficiency.

The study also found that anti-terrorism action had a distinct moderating effect on the "terrorism attacks – trade efficiency" causal chain. Li and Yan [11] used the gravity model to investigate the impact of terrorist attacks on the imports and exports of countries along the "One Belt One Road" routes. According to this study, terrorist attacks have a less negative impact on trade between China and the countries along these routes than they do on trade with other countries. This may be a beneficial effect of China's foreign policy of peaceful coexistence and non-interference in the internal affairs of other countries. Azhati and Jiang [12] studied the impact of terrorist threats in some countrieson China's exports: it was found that the number of terrorist attacks and the number of casualties had a significant impact on exports. Zhang and Zhang [13] studied the trade-isolation effect of the risk of terrorist activity: increased terrorist risks in a country will produce a significant "trade-isolation effect", reflected mainly by a significant decrease in a country's export dependence. Moreover, the "trade-isolation effect" also relates to the heterogeneity of the target, and the degree of "trade-isolation effect" positively correlates with the randomness of the target. Xu and Liu [14]studied the impact of terrorist activities on the export of tourism service trade in the local and surrounding areas. The direct effect, the spatial spillover effect, and the total effect of terrorist activities on the development of tourism are all negative, and the spillover effect is greater. In other words, terrorist activities not only inhibit the development of tourism in those countries attacked, but they also have a negative impact on tourism in geographically and culturally similar countries through the spillover effect. The studies focus on the impact of terrorist attacks on trade, including trade in goods and services. Generally, the research results all point to the negative impact of terrorist attacks on the trade of imported and exported goods or services.

2.2 The Investment Effect of Terrorist Attacks

The first strand of literature we are reviewing focused on the effect of terrorist attacks on both FDI and OFDI. Lanouar and Shahzad [15] studied the impact of such attacks on foreign investment in large cities. Through a sample study of seven South Asian countries, they found that terrorist attacks in large cities hurt FDI. For every 1% increase in terrorist attacks, there was a significant decrease in FDI of 25.4%. Additionally, the study found that terrorist attacks in large cities had a greater adverse impact on external debt stocks and government lending than full-scale terrorist attacks. This study mainly focuses on the relationship between terrorist attacks in big cities and the FDI of Southeast Asian countries, and finds that attacks in big cities are the main obstacle to capital flow in South Asian countries.

Enders and Sachsida used two different estimation methods to measure the impact of terrorist attacks on FDI in a certain country. The results show that attacks have a significantly negative impact on FDI in the short term. Specifically, if the frequency of terrorist attacks increases by 1%, FDI in a developed country will decrease by 1.6%. However, the effect is not significant in the long term. The results show that whilst terrorism continues to hurt the American economy, the impact is limited. Tomislav [1] studied the impact of terrorist attacks on capital flows (including FDI inflows and FDI outflows) in developed countries. The results showed that a 1% increase in terrorist attacks would significantly decrease the FDI inflows per capita by 0.0001%. They also indicate a negative correlation between capital flow and terrorist attacks in developed countries. However, the occurrence of terrorism in developed countries does not strongly impact the outflow of FDI. Meanwhile, terrorist attacks may have a positive impact on capital flows, such as in the manufacturing of guns and military equipment.

Zhang and Sun [16] studied how terrorist risks in neighboring countries affected China's OFDI. They found that a 1% increase in the frequency of terrorist activities in the host countries led to a 1.496% decrease in the stock of China's OFDI in the host country. It also found that increasing international trade between China and the host country can effectively mitigate the risk of terrorist activities, thus mitigating the negative impact on China's OFDI.

The second strand of literature focuses on the mechanism of terrorist attacks affecting foreign investment. According to studies by Liu and Chen , there are three mediating mechanisms for the impact of a terrorist attack in Country A on the OFDI of Country B. The first mechanism is the talent-loss effect. When there is a terrorist attack in Country A, the health of enterprise employees and the safety of property in Country B will be greatly threatened. In order to avoid increasing losses, enterprises in Country B will not enter the market of Country A, thus reducing the capital inflow of Country A. The second mechanism is the cost effect. When terrorism prevails in Country A, the enterprises of Country B need to spend a lot of money on insurance in order to protect their property security in Country A, thus increasing their operating costs. Therefore, enterprises from Country B are more likely to withdraw from the market of Country A, thus reducing the capital inflow of Country A. The third mechanism is the accumulation of panic. A terrorist attack in Country A will lead to social unrest in Country A, resulting in economic disorder and a decline in domestic demand. All these factors will reduce the attraction of Country A to foreign investors.

Existing studies generally include analyses of the impact of terrorist attacks on domestic economic development and international trade cooperation, as well as on foreign investment. However, such studies primarily focus on the West, including America, Europe, North Africa, and the Middle East, whilst terrorist threats in Central Asia, South Asia, and Southeast Asia are rarely mentioned. Considering the particularity of different regions, the above results may not be completely consistent with the study of terrorist threats in these regions.

Existing research on the trade impact of terrorist attacks mainly takes western countries or countries around China as a

sample. There are few studies focusing on terrorist attacks actually within China. In particular, there is no study assessing the impact of terrorist attacks in the cities in China where such attacks took place. This is partly because the number and scale of domestic terrorist attacks in China is relatively small and the economic impact is not obvious. However, if we only focus on a city or region where terrorist attacks once occurred, it will be found that violent terrorist attacks still have a relatively distinct impact on the indicators of a certain region.

3 DATA AND EMPIRICAL STRATEGY

3.1 Data Description

This study uses panel data from prefecture-level cities in the China City Statistical Yearbook, with cities in central and western provinces as potential control groups. Cities in Xinjiang, Tibet, Gansu, Qinghai, Ningxia, and other remote provinces/autonomous regions are excluded due to missing FDI data. Finally, a total of 127 valid sample cities was obtained.

The study uses FDI as the research objectand uses urban GDP, population, the proportion of tertiary industry in GDP, the total output value of Hong Kong, Macao, and Taiwan Investment Enterprises above the designated size and finally, the total output value of FIEs above the designated size as the prediction variables. We use the SCM and empirical analysis with the STATA software synth program.

3.2 Setting of Synthetic Control Method (SCM)

3.2.1 Counterfactual analysis introduction

The counterfactual analysis is represented by Rubin [17]. In short, to evaluate the effect of a policy/event on region "*i*" (assuming that we are concerned about the impact of the event on the "*Y*" of region "*i*"), it is intuitive to observe the time series data of "*Y*" and compare the changes of "*Y*" before and after the time point of the event. However, this change is easily interfered with by the environment. "*Y*" may be affected by other environmental factors, thus the difficulty in proving this change has a causal relationship with a policy/event.

The framework of counterfactual analysis attempts to explore the causal relationship between the event and the "*Y*" index of region "*i*" as follows: if we assume that the event did not occur in region "*i*" in the "*t*" period, then what would be the "*Y*" of region "*i*" in the (*t*+1) period? Secondly, if the event did occur in the "*t*" period, then what would be the actual level of "*Y*" in the (*t*+1) period and beyond? The difference between the two is not only the actual impact of the event, but also the causal effect.

The mathematical model can help to express this idea: if "*D*" indicates an event, then whenever D_i= 1, it occurred in area "*i*", and when D_i = 0, the event did not occur in area "*i*". Then, when D_i= 1, Y_i= $Y_{1,\ i}$. Furthermore, whenever D_i = 0 and Y_i = $Y_{0,\ i}$, under this framework, the causal effect of event "*D*" on region "*i*" can be recorded as follows: $\tau = Y_{1,i} - Y_{0,i}$.

However, $Y_{0,\ i}$ cannot realistically be observed in "*i*" area where "*D*" event happened due to inconformity. This is also the origin of the term "counterfactual framework". As an alternative, we can look for another area which is highly similar to area "*i*" in all aspects. It has no "*D*" event and can be used as a substitute for area "*i*" ("if it is not affected by the event"). The estimated causal effect can be obtained by observing the difference between the treatment group "*i*" and the control group where "*i* was not affected by the event" after event "*D*". The next section explores the SCM, and will consider the method to find a good "stand-in".

3.2.2 Overview of Synthesis Control Method (SCM)

Abadie [18] put forward the SCM throughout his time studying the influence of terrorist activities on the economic indicators prevailing in a certain country in the 1970s. Based on the "counterfactual analysis framework", this method designs a set of methods to discover the best substitute , which is the control group of region "*i*" to compare the situation difference between region "*i*" and the control group after event "*D*".

Basically, this study aims to construct the "Synthetic Kunming" that is most similar to the real Kunming. It is necessary to find an optimal linear combination amongst cities in China, many of which may be similar to Kunming.

We suppose that there are (*1*+ *J*) cities in the database, the first being Kunming, which has suffered terrorist attacks. The remaining "*J*" cities have not been subjected to terrorist attacks. To construct this linear combination, we need to consider how to allocate the weight of each city in the combination. It is worth noting that weight "*W*" is the J-dimensional column vector (w_2, w_3, $w_{j+\ 1}$), whereby w_j is the weight of the *j-th* city in the synthetic control area, all weights are non-negative, and the sum is 1.

In this study, the dependent variable is "*y*" (FDI). Other indicators related to "*y*" can be used as predictors to help investigate the similarity between other cities and Kunming and to construct a control group. A record is compiled of the average value of each forecast variable in Kunming before the event in 2014, as vector x_1 (*K*1* column vector, representing the value of "*K*" forecast variables in Kunming), and we note that the average value of each prediction variable of other "*J*" cities is the matrix X_0 (*K*J* matrix, which represents the value of "K" prediction variables of "*J*" cities).

The goal of selecting weight "*W*" is to make X_0W as close to x_1 as possible. Additionally, since each predictor variable has a different degree of influence on "*y*", the predictor variables in x_1 should also be given different weights. Each number on the diagonal in the *K*K*-dimensional diagonal matrix "*V*" corresponds to a non-negative weight of different predictive variables. The following constrained minimization problem aims to find a suitable "*W*":

$$\min_{W}(x_1 - X_0 W)'V(x_1 - X_0 W)$$
$$st.w_j \geq 0, j = 2,3,...,J+1; \sum_{j=2}^{J+1} w_j = 1 \quad (1)$$

In the above problem, we can find the optimal solution "W", where the solution of "*W*" depends on the diagonal matrix "*V*", which can be denoted as *W**(*V*). Thus, as long as we find the optimal "*V*", we can obtain the optimal weight "*W*".
To identify the optimal "*V*", we need to make the FDI of the control group of other cities before 2014 as close as possible to that of Kunming. We record FDI in Kunming in each year before 2014 as the vector z_1 (*T*1* column vector represents FDI in Kunming in the "*T*" years before 2014). We record the FDI of the other "J" cities in each year as the matrix Z_0 (*T*J* matrix, representing FDI of "*J*" cities in "*T*" years). Similarly, $Z_0W^*(V)$ should be close to z_1. The logic to minimize the mean square prediction error is as follows:

$$\min_{V} \frac{1}{10}\left(z_1 - Z_0 W^*(V)\right)'\left(z_1 - Z_0 W^*(V)\right), \text{ where "V" is not negative.} \quad (2)$$

The optimal weight *W** can be obtained by solving the minimization problem of (2). Observation of the differences after 2014 enables us to construct the "Synthetic Kunming" with the best weight *W**, which is indeed highly similar to the real Kunming.

4 EMPIRICAL ANALYSIS

4.1 Descriptive Analysis

According to existing literature on terrorism economics, a major terrorist attack in an area has a negative impact on economic activity in that area, including disrupting trade or investment confidence, and even affecting overall regional economic growth.
In order to explore whether this negative effect existed in Kunming after the terrorist attacks, we make a descriptive statistical analysis of the GDP growth rate and the actual amount of FDI in Kunming both before and after 2014.
Figure 1 shows that the GDP of Kunming (the whole city) maintained rapid growth from 2010 to 2013, with the highest growth rate of 14.1% in 2012. However, in 2014 when the terrorist attack on "3.01" occurred (the year marked by the vertical dotted line in Figure 1 below), the GDP growth rate of Kunming dropped significantly compared with that of the previous year, and reached its lowest point of 8% in 2015. The growth rate picked up slightly in 2016. The apparent decline in this indicator (GDP growth rate) happened in the same year as the terrorist attacks.

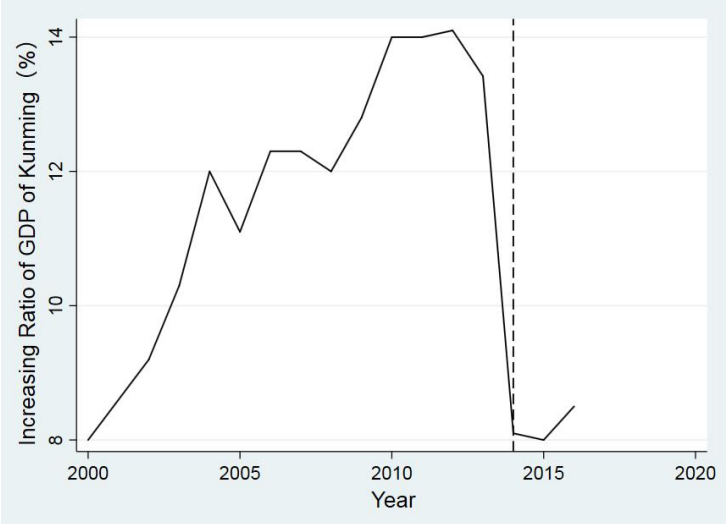

Figure 1 GDP Growth Rate of Kunming from 2000 to 2016

In addition to GDP growth, FDI is also vulnerable to terrorist attacks, since stability and security in a region affect the business environment due to the risk and return of investment. A major security incident in a region will cause panic amongst investors or potential investors in that region, cause increased anxiety among investors about terrorist attacks and uncertainty about the psychological need to continue investing in the city, leading to a decline in FDI.

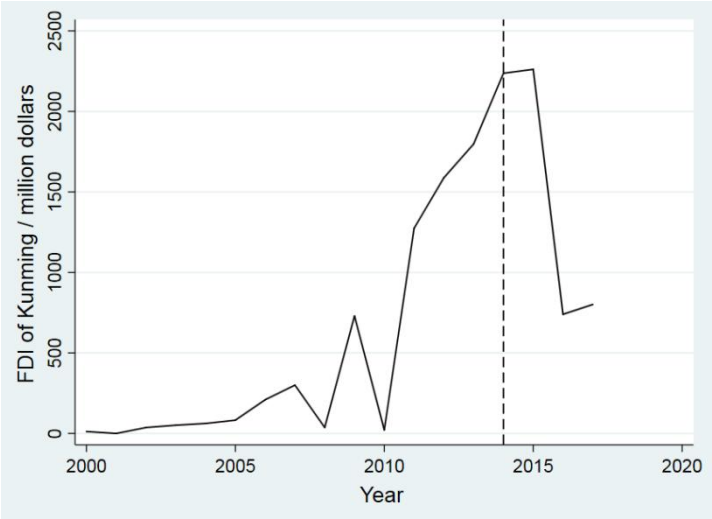

Figure 2 Foreign Direct Investment in Kunming from 2000 to 2017

Figure 2 shows that FDI in Kunming maintained a considerable growth rate from 2010 onwards, reaching $2.237 billion in 2014. Nevertheless, the terrorist attacks in 2014 caused the FDI in 2015 to have a very slight growth of $2.261 billion, almost the same as the previous year, whilst 2016 onwards saw a significant decline. Thus, we can predict that the terrorist attack in 2014 may have had a negative impact on foreign direct investment in Kunming. This negative effect has a certain delay. Due to historical inertia, FDI growth stagnated in 2015, but in 2016 FDI experienced a huge decline.

4.2 Empirical Results of Synthetic Control Method (SCM)

This study selects the period from 2002 to 2017, and takes 2014 as the starting year of event intervention. The following are specific forecast variables: total population at the end of the year; non-agricultural population; proportion of employees in tertiary industry; land area of administrative region; population density; GDP and per capita GDP; GDP growth rate; proportion of tertiary industry in GDP; output value of Hong Kong, Macao, and Taiwan/foreign-funded enterprises above Designated Size; net value of fixed assets; investment in fixed assets; completed investment in real estate development; retail sales of social consumer goods; local general public budget revenue. All the data are city-level data, except for the local general public budget revenue that is municipal district data. Additionally, we refer to Abadie (2010) to select the predictive variables for studying the effectiveness of the California Tobacco Control Act. We add FDI in 2002, 2008 and 2013 as three additional predictive variables, which are the starting year, the year of the global financial crisis, and the year before the "3.1" terrorist attack, respectively. This reduces the impact of special values in individual years.

4.2.1 The weight of each city in "Synthetic Kunming"

According to the results of the synth program, the cities that contribute to the economic situation of Kunming are not 0, and are as follows:

Table 1 Weight in the Cities in "Synthetic Kunming"

City	Guiyang	Zhengzhou	Luoyang	Harbin	Chengdu	total
Weight（%）	58	25.6	8.1	6	2.3	100

Data source: https://www.gtarsc.com/

As shown in Table 1, most of the cities contributing to "Synthetic Kunming" are provincial capitals in the central and western regions of China. In line with general expectations, Guiyang, which is similar to Kunming, has the highest weight.

4.2.2 Analysis of synthetic control results

We draw the change trend of FDI in "Synthetic Kunming" and the real Kunming City during the study period as a line chart, and then compare them in the same chart to get the synthetic control effect.

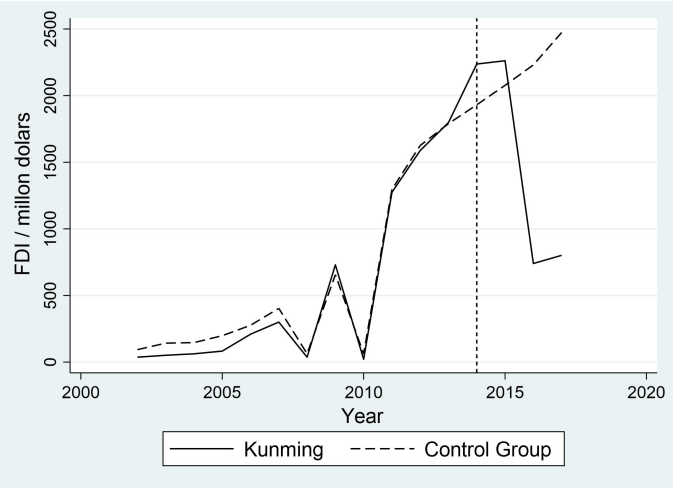

Figure 3 Diagram of Synthesis Control Effect

In Figure 3, the year of the "3.01" terrorist attack in Kunming in 2014 is marked with a vertical dotted line. The black solid line represents the real change in FDI in Kunming from 2002 to 2017, whilst the dotted line represents the changingtrend of FDI in "Synthetic Kunming", synthesized by the five cities in Table 1.

It can be seen that the two curves were very close before 2014, indicating that "Synthetic Kunming" had a good fitting effect on the real Kunming. From 2015 to 2017, the actual FDI of "Synthetic Kunming" maintained a considerable growth rate, which was close to US $2.5 billion in 2017. However, the actual FDI in real Kunming stagnated in 2015 and fell in 2016, producing a huge disparity with "Synthetic Kunming" in the last two years of the study period. This demonstrates an obvious causal relationship between the terrorist attacks in 2014 and the decline of FDI in Kunming, with a one-year delay in the occurrence of this negative effect.

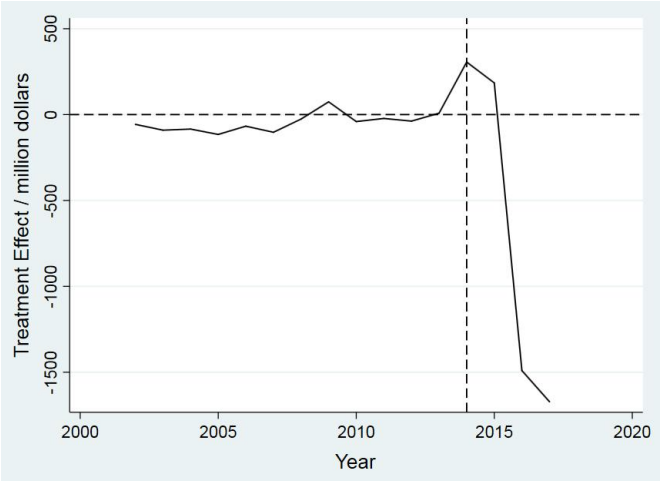

Figure 4 Effect of Synthetic Control Treatment in Kunming City

We get the treatment effect by subtracting the actual FDI in "Synthetic Kunming" from the actual FDI in real Kunming. Figure 4 shows the treatment effect. It can be seen that the processing effect fluctuated at around 0 before 2014. After 2014, especially in 2016 and 2017, the treatment effect then showed an obvious negative value, indicating the huge negative effect of the "3.01" terrorist attack in Kunming. The treatment effect in 2016 was US $-1.49 billion, which means that Kunming lost 66.62% of actual FDI in 2015 and 2016 compared with 2014.

4.2.3 Robustness test of synthetic control results

In order to test the validity and robustness of the above results, this section uses the "Placebo test" method proposed by Abadie (2010). The idea of the "Placebo test" is as follows: in order to test whether the negative treatment effect of Kunming may be caused by accidental or other factors, we must investigate whether a city is randomly selected from a potential control group, such as the "Hypothetical Treatment Group", and we suppose that it also had a terrorist attack in 2014, according to the SCM for Kunming. This will enable us to decide if we should give it the same treatment and investigate whether there will be similar negative effects. If a series of "Hypothetical Treatment Groups" are selected, the treatment effect is not as great as the huge negative value of Kunming, and it can then be considered that the negative treatment effect of Kunming after 2014 is significant and robust.

In order to avoid subjective arbitrariness in the extraction of the "Hypothetical Treatment Group", we take the actual FDI of Kunming in 2014 as the standard and select those cities where the actual FDI in 2014 is between a quarter and four times that in Kunming as the "Hypothetical Treatment Group" (If the difference between the actual FDI of the

"Hypothetical Treatment Group" and that of Kunming is too large during the investigation period, it has little reference value). The setting of this interval also includes all those cities whose weight in terms of "Synthetic Kunming" is not 0. These cities are then synthetically individually controlled to obtain their treatment effect.

It should be emphasized that if the MSPE (Mean Square Prediction Error) of the synthetic control of the "Hypothetical Treatment Group" is too large, the fitting effect is not ideal and its treatment effect cannot be used as a reference. The STATA synth program reports the RMSPE (Root Mean Square Percentage Error) of the synthesis control. According to this index, this study eliminates those cities whose MSPE was twice as large as that reported in the synthetic control treatment of Kunming, finally retaining 22 effective "Hypothetical Treatment Groups".

We plot the treatment effect curves of these "Hypothetical Treatment Groups" and the treatment effect curves of Kunming City in the same graph. Thus, we can directly compare their treatment effects.

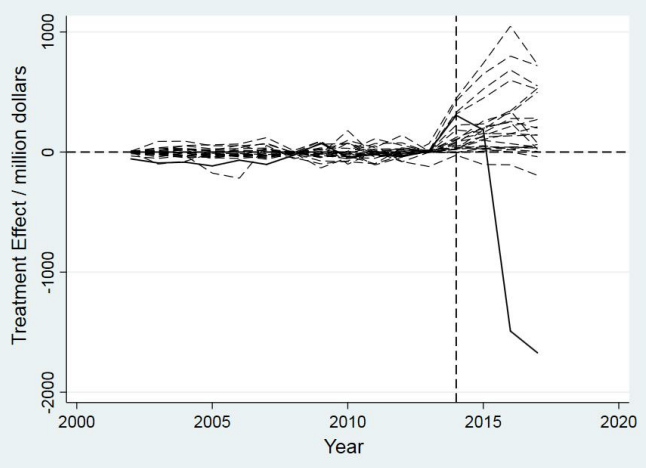

Figure 5 Placebo Test

In Figure 5, the black solid line is the treatment effect curve of Kunming City, whilst the other dotted lines are the treatment effect curves of 22 "Hypothetical Treatment Groups". Before 2014, the treatment effect curves of all cities fluctuated at around 0, indicating that the "Hypothetical Treatment Group" had a good fitting effect when we retained those cities whose MSPE was within less than twice the MSPE of Kunming. After 2014, the treatment effect curve of Kunming is far lower than that of all other cities.

Amongst the 23 cities, Kunming has the most significant negative treatment effect at only 4.35%, which is less than the general significance level. Therefore, it can be considered that the huge negative treatment effect of Kunming City is not caused by accidental factors and that this result is significant and robust.

5 THE MECHANISM OF THE DECLINE OF FOREIGN DIRECT INVESTMENT (FDI)

The synthetic control methods test enables us to determine that the terrorist attacks in Kunming in 2014 had a negative impact on its FDI. According to the treatment effect, the estimated decrease in FDI caused by the "3.01" attack is about 66.62%. However, the specific mechanism of this negative effect is not clear.

This section aims to explore the specific mechanism of the decline in FDI as a result of terrorist attacks.

5.1 Terrorist Attacks May Affect Local Economic Growth

In the field of terrorism economics, researchers generally believe that terrorist attacks will have a negative impact on regional economic growth.

Figure 1 shows that the growth rate of Kunming's GDP in 2014 dropped significantly compared with 2013, and there was no rebound in the short term (see the solid line in Figure 6). At the same time, Figure 2 reflects the decline in FDI in Kunming after 2014. This decline occurred in 2016 after the terrorist attacks, with a certain time lag (see the dotted line in Figure 6).

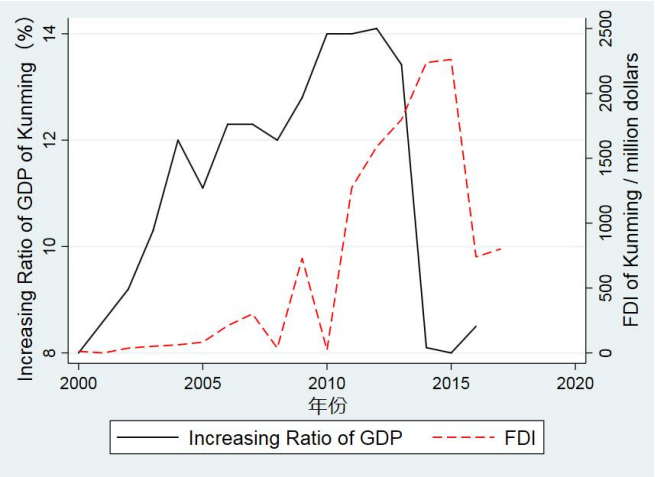

Figure 6 Comparison of GDP Growth Rate and FDI in Kunming

In Figure 6, the two curves are drawn on the same graph to compare the growth rates of GDP and FDI in Kunming. The solid line is the GDP growth rate curve, the dotted line is the FDI curve. We can see that the trend of the two curves is highly similar: the FDI curve (dotted line) has about two periods of delay compared with the GDP growth rate curve (solid line). For example, the growth rate of GDP reached a low point in 2008, followed by FDI reaching a low point in 2010. The GDP growth rate dropped sharply in 2014, followed by a sharp drop in real FDI in 2016.

This phenomenon shows that the terrorist attacks may have had an immediate impact on the local GDP growth rate with a delayed impact on FDI. Foreign investors show negative sentiments for a longer period of time, with impaired economic perception norms, leading to weakened trust in the city and in the community and hesitation to continue investing in the city. This also explains why the negative impact of terrorist attacks on FDI will be delayed for one to two years.

5.2 Terrorist Attacks May Affect the Behavior of Economic Entities

In addition to the macro impact, terrorist attacks also have a micro impact. After a local terrorist attack, residents (consumers) and enterprises (producers) may reduce their economic activity because of a fear of unsafe factors. Testing whether terrorist attacks reduce the participation of residents and enterprises in economic activities can prove whether or not terrorist attacks cause panic at the micro level. Furthermore, it can be predicted that foreign investors are facing the same panic as domestic residents/enterprises. Because the flight or transfer of foreign capital is more flexible than that of local residents/enterprises, a decrease in relevant economic indicators caused by panic will be more obvious.

5.2.1 Mechanism test based on consumer behavior

After the terrorist attacks, the local residents in Kunming may have had a fear of unsafe factors, which may have reduced their consumption activity in terms of entertainment, catering consumption, and so on. In addition, the recent terrorist attacks may have reduced the willingness of residents outside the city and province to travel to Kunming.

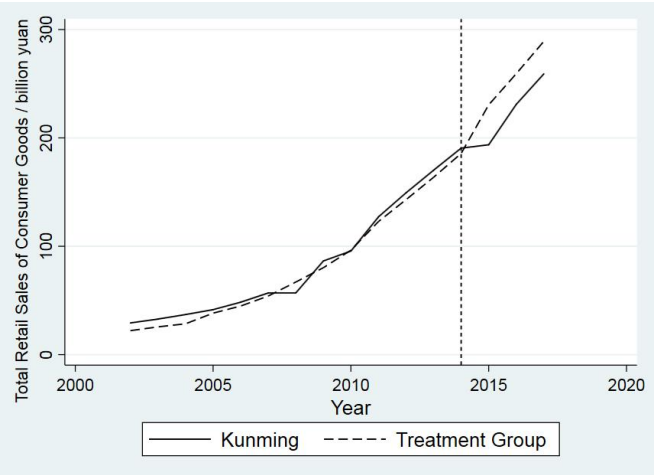

Figure 7 Synthetic Control Effect of Retail Sales of Social Consumer Goods in Kunming

In order to test whether consumer behavior is negatively affected by the terrorist attacks, we select the retail sales of social consumer goods in Kunming as the proxy index of consumer consumption activity and also use the idea of synthetic control methods to test the effect. Figure 7 shows that prior to the terrorist attacks, the curve of the retail sales of social consumer goods in Kunming was basically consistent with the synthetic curve, with good fitting effect.

However, following the terrorist attacks, the real retail sales of consumer goods in Kunming City (the solid line) stagnated for one year and returned to their normal growth rate two years later. However, there was some difference when comparing with the synthetic region (after 2015, the two curves in the figure extended almost in parallel and the solid line was below the dotted line). This shows that consumer behavior has been negatively affected by the terrorist attacks, increased consumer anxiety and negative feelings about spending money in that city, with a more immediate effect than that on FDI, but that the impact period is shorter and the impact effect is lower.

5.2.2 Mechanism test based on enterprise behavior

Similarly, the short-term panic caused by terrorist attacks existed not only in the consumer groups, but also amongst the producers/investors. Enterprises that had the intention of investing may have delayed their investment plans in Kunming, or switched to investing outside the city/province, as a result of the recent terrorist attacks.

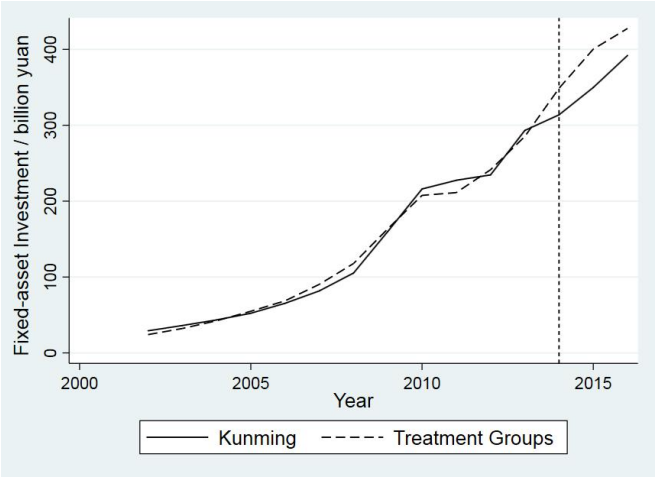

Figure 8 Effect of Synthetic Control of Fixed-Asset Investment in Kunming City

We take the total fixed-asset investment in Kunming as the proxy index of enterprise participation in local economic activities in the city and use the idea of synthetic control methods to test the effect. Figure 8 shows that after the terrorist attacks, Kunming's total fixed-asset investment deviated significantly from the synthetic area and the treatment effect was negative. This shows that the total investment in fixed assets in Kunming was also negatively affected by the terrorist attacks. This is similar to the change in the retail sales of social consumer goods and the short-term effect is weaker than that of FDI.

Overall, the terrorist attacks in Kunming in 2014 did have a negative impact on the participation of economic entities in economic activities and the panic and anxiety may have been widespread. Compared with the effect on FDI, this kind of influence has a more immediate response, a shorter influence period, and a weak influence effect.

6 CONCLUSION AND POLICY SUGGESTIONS

The impact of terrorist activities on international trade, tourism consumption, and foreign capital flow is highly debated within the international economic community. This study focuses on terrorist attacks in China, taking the attacks in Kunming in 2014 as an example to study the impact on FDI in Kunming, a subject that has so far attracted little attention in academic research. This study collects and collates relevant economic data from more than one hundred prefecture-level cities in central and western China, and uses the SCM (Synthetic Control Method) to study whether or not the terrorist attack in Kunming in 2014 caused the decline in FDI in the following two to three years.

The result shows that "Synthetic Kunming", which is the control group made up of other prefecture-level cities, has a good fitting effect on Kunming City through the SCM and that the change trend of FDI in the synthetic control group is basically the same as that in the real Kunming City before 2014. Following 2014, there was a huge deviation in FDI between the real Kunming and "Synthetic Kunming". In other words, FDI in "Synthetic Kunming" continued to grow at a considerable speed, whilst FDI in real Kunming stagnated in 2015 and dropped dramatically in 2016. This indicates that the violent terrorist attack in 2014 did lead to the decline of FDI in Kunming and that the negative impact had a time lag of about one year. This indicates a longer duration of negative emotions of fear expressed by foreign investors, a weakening of investment in the city, as well as an erosion of perceived economic norms, a decrease in the credibility of the city, and a hesitation to continue investing in the city. In the robustness test, we employed the "Placebo test" method to conduct the same synthetic control study and used 22 cities outside Kunming as the control group. We found that the treatment effect of Kunming was significantly lower than that of the other 22 cities after 2014, demonstrating that the negative impact of the terrorist attacks on the FDI of Kunming was robust.

The study further discusses the specific mechanism of the decline in FDI in Kunming caused by terrorist attacks at both the macro and the micro level. At the former level, it is found that terrorist attacks can reduce economic growth rate and deter foreign investment. At the latter level, it is found that terrorist attacks caused economic entities to reduce their participation in economic activities in the region. Specifically, the retail sales of social consumer goods and the total investment in fixed assets in Kunming, caused growth stagnation or delay by one or two years after 2014. This shows

that terrorist attacks have a negative impact on the participation of micro economic entities in economic activities. This is indicative of increased anxiety among consumers and investors about the continuation of terrorism and uncertainty about psychological needs.

Our study generates practical implications for reducing terrorist attacks and their economic effects. Firstly, it is important to prevent the risk of terrorism before the event. China should adhere to the path of peaceful development, which includes non-interference in the internal affairs of other countries, no riot spreading, and instead maintain a peaceful, friendly, and responsible image. At the same time, China should eliminate poverty and reduce income differentiation, in the pursuit of equality, unity, and prosperity amongst all ethnic groups. Moreover, China should respect the customs and religious beliefs of minority peoples and their languages and cultures.

Secondly, it is vitally important to reduce the harm caused by terrorist activities. In order to minimize resident panic at the micro level, the following are necessary: immediate report of the actual situation of the terrorist attack; immediate dispatch of police to control mobs and their accomplices; timely eradication of the event planners; conveyance of all this information to the public. The early resolution of panic is conducive to the timely recovery of normal economic activities. For local enterprises or foreign-funded enterprises that have suffered losses in terrorist attacks, the government can give appropriate compensation or produce preferential policies conducive to resuming production, so as to boost production enthusiasm and investment confidence. At the international level, it is important to carry out anti-terrorism cooperation with neighboring countries to prevent terrorists from hiding abroad. It is equally necessary to globally convey true and transparent information about the attack, and the measures taken to deal with it in a timely fashion, as this is conducive to the timely resolution of foreign capital outflow.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

REFERENCES

[1] Tomislav K. The concept of sustainable development: From its beginning to the contemporary issues. Zagreb International Review of Economics & Business, 2018, 21(1): 67-94.
[2] Zhang Y. Characteristics and prevention of terrorist attacks in China. Legal system and society, 2015, (33): 282+286.
[3] Hu X, Lai F, Chen G, et al. Quantitative research on global terrorist attacks and terrorist attack classification. Sustainability, 2019, 11(5), 1487.
[4] Dinesen P T, Jæger M M. The Effect of Terror on Institutional Trust: New Evidence from the 3/11 M adrid Terrorist Attack. Political Psychology, 2013, 34(6): 917-926.
[5] Todd Sandler. Introduction: Advances in the Study of the Economics of Terrorism. Southern Economic Journal, 2013, 79(4) : 768-773.
[6] Abadie A. Semiparametric instrumental variable estimation of treatment response models. Journal of Econometrics, 2003, 113(2): 231-263.
[7] Khan A, Yusof Z. Terrorist economic impact evaluation (TEIE) model: the case of Pakistan. Quality and Quantity, 2017, 51(3): 1381.
[8] S. Brock Blomberg, Gregory D Hess. How Much Does Violence Tax Trade?. The Review of Economics and Statistics, 2006, 88(4) : 599-612.
[9] Khusrav Gaibulloev, Todd Sandler. The adverse effect of transnational and domestic terrorism on growth in Africa. Journal of Peace Research, 2011, 48(3) : 355-371.
[10] Chen J Y, Li Z R, Liao X Y. Terrorist attacks, counter-terrorism operations and trade efficiency:From the perspective of heterogeneity of attack targets. Research on world economy, 2020, (04): 30-45+135-136.
[11] Li B, Yan X C. New comparative advantages of China and “One Belt One Road” along the two sides' trade--From the perspective of public security. Economic research, 2018, 53(01): 183-197.
[12] Azhati T, Jiang A. The impact of terrorism of the three countries in the southern line along the "One belt, one road" on China's exports——Analysis based on Panel Data.South Asian Studies Quarterly, 2018, (01): 101-108+6.
[13] Zhang X L, Zhang E Z. Trade segregation effect of terrorist risk along the “One Belt, One Road". World Economic Papers, 2017, (01): 69-86.
[14] Xu P Y, Liu Y F. The influence of “One Belt, One Road" terrorist activities on Tourism Development. Economic Geography, 2020, 40(03): 216-224
[15] Lanouar C, Shahzad U. Terrorism and capital flows: the missed impact of terrorism in big cities. Applied Economics Letters, 2021, 1-8.
[16] Zhang X L, Sun L J. The risk of terrorist activities and China's direct investment in developing countries. International Economic and trade exploration, 2015, 31(07): 64-74.
[17] Rubin Donald B. Estimating causal effects of treatments in randomized and nonrandomized studies. Journal of Educational Psychology, 1974, 66(5): 688-701.
[18] Abadie A, Diamond A, Haimueller J. Synthetic control methods for comparative case studies: estimating the effect of California’s tobacco control program. Journal of The American Statistical Association, 2010, 105(49): 493-505.