

The Display of Resistance Spirit of the National Army in the Battle of Zhegan under the Leadership of Ding Zhipan and Its Impact on the Battle Situation

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ABSTRACT

The Battle of Zhegan was a longer and wider battle that took place in the late stage of the Chinese War of Resistance, and it was also the first time that American planes bombed the Japanese mainland and landed in Zhegan airport in an active attempt. In the Battle of Zhegan, Ding Zhipan led the national army to resist actively, which showed Ding's will to save the country and the world as well as the spirit of resistance, which had a certain influence on the direction of the battle of Zhegan. In order to analyze the performance of the resistance spirit of the national army under the leadership of Ding Zhipan and its specific impact on the battle situation of Zhejiang-Gan Battle, this paper utilizes the multiple linear regression model to quantitatively analyze the data. Through the Internet to collect Ding Zhipan in the Zhejiang-Gan campaign in the relevant text and graphic information, the use of data standardization methods for data dimensionless processing, and then carry out the benchmark regression and robustness test. The influence of the national army's resistance spirit performance under the leadership of Ding Zhipan on the battle situation of Zhejiang-Gan Battle shows a positive influence at the 1% level. It fully confirms the spirit of heroic resistance of the national army under the leadership of Ding Zhipan. Although the Battle of Zhejiang-Gan ended in the defeat of the national army, the spirit of resistance of Ding Zhipan is worth remembering.

Keywords: linear regression model, Zhejiang-Gan Battle, Ding Zhipan, anti-war spirit

1. Introduction

On April 18, 1942, after the bombing of Tokyo by the U.S. "Operation Doolittle", it caused shock and panic in Japan. The Japanese military began to doubt the air defense capability of the mainland, and the air bases in Zhejiang Province, represented by Quzhou in China, became the biggest obstacle to the air defense of the Japanese mainland [1-2]. Therefore, the Japanese military department decided to launch the "Battle of Zhejiang-Gan" to destroy the Quzhou military airfield, which was the main

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strategic target. The Battle of Zhegan was a war waged by the Japanese to destroy the Chinese advance airfields in Zhejiang and to strike at the main force of the National Army's Third War Area [3-4]. It mainly consisted of battles in Jinhua and Lanxi areas, battles in Quzhou area, battles in Shangrao and Guangfeng areas, battles in the western section of Zhejiang-Gan Road, battles in Linchuan area, battles in Lishui, Wenzhou, Songyang, and pursuit battles during the retreat of the Japanese army [5-6]. After the battle, the Japanese army basically achieved "confiscation and destruction of railroad facilities and equipment and other military, political, economic facilities and materials to develop the war effort", looting materials, and abducting young adults and other "war to raise war" purpose [7-8].

In the Battle of Zhejiang-Gan, under the air raids and bombing by the Japanese, the cities in the war zone were collapsed and damaged, the urban infrastructure suffered heavy damage, and the people were displaced. Even before the withdrawal of the Japanese army, the Japanese army heartlessly implemented bacteriological warfare on Quzhou [9-11], spreading plague, cholera, paratyphoid fever, dysentery, diphtheria, anthrax and other germs in the land of Zhejiang, which led to eight successive cities in Zhejiang suffered from bacterial infections, and 51,000 people died in Quzhou due to the bacteriological warfare, and many survivors suffered from illnesses, which brought long-term sufferings to the local people [12-14].

The failure of the Battle of Zhejiang-Gan was the result of Chiang Kai-shek's Nationalist government's passive anti-Japanese and active anti-communist behavior, and it was a greater sacrifice that the Allies made China pay for the strategy of "Europe first, then Asia". On the basis of analyzing the historical background of the Battle of Zhejiang-Gan, the article puts forward the practical expression of Ding Zhipan's will to save the country and the world and the spirit of resistance during his leadership of the national army in the war of resistance. In order to analyze the impact of the spirit of resistance of the national army under the leadership of Ding Zhipan on the battle situation in Zhejiang-Gan, this article quantifies the data through multiple linear regression model and quantitatively analyzes the data by combining the relevant text and graphical data of the battle of Zhejiang-Gan in which the national army under the leadership of Ding Zhipan took part in the battle.

2. Theoretical analysis and research methodology

The Battle of Zhegan was a major battle organized by the National Government after the outbreak of the Pacific War. After the battle, both Chinese and Japanese claimed victory. In fact, the Chinese army was inferior to the Japanese army in terms of material results of the battle, while the Japanese army, although it had achieved the purpose of destroying the airfields, had not annihilated the main force of the third war zone, and also wasted the use of troops and time, which ultimately led to its loss in the Pacific battlefield and in the North China battlefield. The Battle of Zhegan was a draw in which China had a strategic advantage at the cost of some material losses. The Battle of Zhegan under the leadership of Ding Zhipan fully demonstrated the spirit of resistance against Japan, and although the overall victory or defeat is subject to different opinions, the battle still demonstrated Ding's will to save the country and the world.

2.1. Theoretical analysis

2.1.1. Historical Background of the Battle of Zhegan. The Battle of Zhejiang-Gan in 1942 is often interpreted as a war of revenge. It is true that the Battle of Zhejiang-Gan was caused by retaliation; on April 18, in response to the Japanese attack on Pearl Harbor, the U.S. Air Force launched its first air attack on the Japanese mainland and landed at airfields along the southeast coast of China, which caused Japan to be "panicked" and aroused a retaliatory mentality. On the second day of the U.S. air attack, the Japanese base camp instructed the Chinese Dispatch Army to send air force to bomb the airfields in Zhejiang, and on April 21st, Japan ordered the transfer of the 62nd Battle Group of Flight (heavy bombers) from the Southern Army to Nanjing, and the 90th Battle Group of Flight (light

bombers) and 84th Squadron of Flight (two-seat fighters) to Guangzhou under the Chinese Dispatch Army to take part in bombing the airfields in Zhejiang. The Southern Army, the Chinese Dispatch Army and the Kwantung Army were ranked as the three main forces of the Japanese army overseas during World War II. The Southern Army was in the midst of a fierce battle in Southeast Asia and the Pacific region at that time. Japan's determination to destroy the Zhejiang airfield can be seen from the fact that the Southern Army deployed additional air force to support the Chinese Dispatch Army.

At the same time, the Japanese Main Battalion began to study the deployment of ground forces to enhance the effect of destroying the airfields in Zhejiang. On April 20, the Main Battalion telegraphed to the Chinese Dispatch Forces that in order to rapidly destroy the airfield complexes in Zhejiang Province, especially the airfields in Lishui, Qu County, and Yushan, the use of air force bombardment along with the use of ground forces would be possible. On April 30, the Main Battalion formally ordered the launching of the destruction of the airfields of Zhejiang for the main purpose of the On April 30, the Main Office officially ordered the launching of the "Zhejiang Campaign" with the main purpose of destroying the airfields in Zhejiang to curb the enemy's attempts to attack the mainland of the Empire by air using this area. The "Zhejiang Operation" was planned to attack from east to west of Zhejiang with the main force of the 13th Army and the 11th Army and a part of the North China Front Army, totaling more than 40 infantry brigades as the backbone.

From the use of air force bombing to the mobilization of ground forces, the "Zhejiang Campaign" was launched with the destruction of airfields along the south-east coast as the main purpose of the campaign, and it was within the "limits" of retaliation. The Japanese Chinese Dispatch Army on the front line of the war believed that the "Zhejiang Campaign" only aimed at destroying airfields with limited effect, while opening up the Zhejiang-Gan Line and annihilating the main force of the Chinese army in the Third War Zone could shake the will of the Chinese generals to resist the war and help to solve the Chinese Incident. For this reason, the Chinese Dispatch Army favored a larger scale "Zhejiang-Gan Operation", which was finally approved by the Main Office.

To this end, the national government made the corresponding deployment. January 17, Chiang Kai-shek instructed the Minister of the Ministry of Military Orders Xu Yongchang urged by the end of March to complete the Quzhou city defense core fortifications. On February 3, Chiang Kai-shek called Gu Zhutong, the commander of the third war zone, and ordered him to "prevent the enemy from attacking Quzhou with more than four divisions, and to deploy and supervise the training and construction of fortifications on schedule" by March 15th. At the beginning of April, the Nationalist Government deployed Ding Zhipan's Twenty-sixth Army and Wang Yaowu's Seventy-fourth Army from the Ninth War Area to Zhejiang-Gan Road. Among them, the 74th Army can be called the National Government's trump card troops, as the absolute main force to participate in the front battlefield many times, the "anti-Japanese fire brigade". The fact that the 74th Army reinforced the Third War Area and guarded the Zhejiang-Gan Road shows the importance the National Government attached to it.

To sum up, Japan from "Zhejiang War" to "Zhejiang-Gan War", the nature of the war has actually exceeded the "limits" of retaliation, and with the main force of the Chinese army in the third war zone, shaking the will of China to resist the war, the overall strategy to resolve the Chinese Incident is closely related. The overall strategy of resolving the Chinese Incident was closely related. As far as the National Government was concerned, the battle of Zhejiang-Gan was a prepared battle.

2.1.2. Ding Zhipan's Ambition to Save the Country and the World. Ding Zhi Pan (1894-1988), in 1937 the resistance army Xing Ren, the Army 41st Division Commander, in early 1942 was promoted to the Army Twenty-sixth Army Commander, in March 1945 as the Twenty-seventh Group Army Deputy Commander-in-Chief and Twenty-sixth Army Commander. During the Battle of Zhengan, Ding Zhipan argued that "the Chinese army is not good enough to fight, that is to say, because the establishment of the soldiers is too small." He Chengjun also asserted that "this is the major reason for the failure of the war of resistance". As a division commander Ding Zhipan had a more direct experience. He wrote in

his diary on October 17, 1939: "According to the enemy's establishment and equipment on the proportion of its a brigade, about when my division. However, the enemy command excellence, soldiers are well-trained, so I can only be a division when the enemy a coalition." April 5, 1940 Ding also quoted others as saying, "Nanning's loss, the enemy to one and a half divisions to attack me more than twenty divisions of the force, but actually defeated its soldiers of the strong can be a battalion defeat me a division." In the face of the loss of the battle of Zhegan, as a division commander, army commander Ding Zhipan, holds the view that "the soldiers are good officials are not good", that is, the army commander quite to the army without training, not enough to empower the commanders of the plan for the sigh. I said, "The soldiers are all available, but I only lament the incompetence of the commander". In his diary wrote: "resistance to the current stage of the war, each battle, my troops are superior to the enemy,..... equipment I am not a disadvantage, my morale is also not discouraged by the enemy but still can not win, only the commander is not as good as the enemy ear." As well as "the study of the loss of Yichang, all in the senior commander's initiative is inappropriate, neither planning and preparation in advance and less contingency approach, and after the fact is to blame the crime on the subordinates, this is not the welfare of the country yeah."

Although Ding Ji Pan also criticized the Supreme Command "lack of power", that the Supreme Command "only strangled the leader's brain power, others are only in the only no, brigade into the Zhen retreat column, the battlefield realities are still a lot of disconnect". However, Dinh's criticism of the "incompetence of commanders" was mainly directed at senior generals, who were considered tactically illiterate. "Our commanders do not study the tactics and do not know the situation to judge a sense of directness, east to east block, west to west to take care of the army without focus." He even thought that the reason why the commander of the National Army was "not good" was that he "did not use his efforts in his profession", but spent his time on preparing speeches and other things "so that he could show his face when he made speeches", and when "the enemy really came, the commander could not win the battle with speeches, but he knew nothing about the way to win the war". When "the enemy really came, the commander could not use speeches to defeat the enemy and knew nothing about the method of winning battles".

Ding Zhi Pan believed from the beginning that the national army could not defeat the Japanese army, mainly not due to the inferiority of weapons and equipment but due to the inferiority of generals. "Gai our army equipment inferiority is not yet impossible to win the Japanese soldiers, and our general material inferior, then really not to be Japanese generals carry on". On the whole, Ding Zhipan fully criticized the incompetence of the commander of the national army in the Battle of Zhejiang-Gan and other situations, and was unable to effectively realize the excellent command of the army. The loss of the Battle of Zhejiang-Gan did not lie in the weaponry, but was more attributed to the difference in the commander's commanding ability, which made it impossible for him to effectively carry out his will to save the country and the world, and indirectly led to the collapse of the Battle of Zhejiang-Gan.

2.1.3. Practical Expression of Ding Ji Pan's Spirit of Resistance. During the war, "national affairs are trifles and life is sad", which made Ding Zhipan cry in secret several times. However, with his position, what he can do, and what he expects, is to take martial arts as his soul, make self-revolution, "choose the good and be stubborn, and do what is right alone", "cultivate the atmosphere by itself", so that "those who are in the same way learn from it, and those who have different interests look forward to it", gradually change the people's psychology towards the army, invigorate the people's "martial spirit", and finally realize his ambition to save the country and the world.

Ding Zhi Pan has always valued history and admired the loyal and righteous men of ancient China. Bian Juyi, a general of the Southern Song Dynasty, was ordered to guard the new city of Hubei, and after being broken by the Yuan soldiers, he went to the fire and set himself on fire. When he visited the site, he said, "In this world of war, there are only a few dead soldiers." In reading the Tang book Li Guangbi biography, he thought Li Guangbi can be awe-inspiring, calmly on the death, "must have been

prepared for his usual", "have been long to build up the will", "not hastily made the blame for the constant people". Therefore, Ding Zhi Pan usually always strict military discipline, regarded the army as a school, paid attention to the development of morale, sent to save the country and the world's high hopes, so that the subordinates understand the significance of the war of resistance. During his term as commander of the 41st Division, he never forgot: "The state entrusted more than 10,000 people to me, with a monthly fee of more than 172,000 yuan, how can I make such people become rich and useful for the country, so that such money will not be thrown away", in order to realize "the way of loyalty to the country".

Ding Zhipan warned his subordinates that the land is vast and the resources are vast, and the harshness of modern warfare cannot be escaped. He hoped that they would realize that "the present is a military era in which discipline and knowledge are observed," so he tirelessly emphasized "emphasizing integrity and discipline" as "the internal combustion force for saving the country and the people." Whenever there was a gathering, Ding Zhipan told his subordinates that one of the main principles of army reorganization was to arouse people's interest by reorganizing the military discipline. He took the Spring and Autumn period ZiYan rule Zheng as a lesson, and advocated: "the army should also be more strict and occasionally lenient". Ding Zhipan asked the troops to "not be afraid of suffering, not be afraid of difficulties", and "every time we move to the defense, when we are about to arrive, have arrived, are going to go, have gone," it is necessary to "sweep the ground, dig the fur pit, picket, visit the boss, bundle the grass, and go to the door board." Even when the march was to rest and wanted to drink water, he asked for a camp to pay the people to boil water, but the team could only "sit outside on the side of the road and drink water, and were not allowed to enter the people's houses."

Ding Zhipan said more than once: "Great men don't have to be in high positions", and "Cao Ding of Nantong and Wu Xun of Guanxian County" are great figures. Ding Zhi Pan this intention, as Zhang Jian for the Nantong Cao Gong Ancestral Shrine, the couplet said: "Pittsburgh is still ashamed of the country is not the country, a hundred generations thought that the public can be public." In June 1942, during the Battle of Zhejiang-Ganzhou, Yu Muying of Guangfeng, Jiangxi Province, threw herself into the water to die without being humiliated by the Japanese invaders. A weak woman, but can sacrifice her life for righteousness, Ding Ji Pan highly praised, for which the inscription "Ching Min Zhu Guo". On August 21, at the meeting held in Shangrao Shitang, he proposed: "I hope that the government and local cultural circles will do more interviews on the deeds of the enemy's cruelty to our compatriots and the deeds of our compatriots who loyally and bravely killed the enemy", and "the book of the pen will be widely circulated and will never be forgotten by future generations." So far, it is not difficult to understand why Ding Zhipan in Zhejiang Gan after the war in Shangrao to build "Japanese grave", especially for which to write the inscription but "the text is not the right title", do not want to sign his name, and why he wants to invoke Cao Ding to declare his intention, for the country to cry out.

2.2. Research methodology

2.2.1. Multiple linear regression models. In multiple regression analysis, when the dependent variable Y is interfered by external influences, these influences are defined as the independent variable x_i , and if there is a certain correlation between Y and x_i , a multiple regression model can be established based on the dependent variable Y and each influence factor x_i [15]. The mathematical expression of the model is as follows:

$$y_1 = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip} + \varepsilon_i \quad (1)$$

The multivariate linear regression model is given in the following equation and represented by a matrix:

$$y = x\beta + \varepsilon \quad (2)$$

The valuation $\hat{\beta}$ of β can be found from the least squares principle as:

$$\hat{\beta} = (x'x)^{-1} x'y \quad (3)$$

In the multiple linear regression model, the following assumptions are made:

Assumption 1: The unbiased assumption of the random error term, the mathematical expectation of the random error term ε_i is 0, i.e.:

$$E(\varepsilon_i | x_1, x_2, \dots, x_k) = 0 (i = 1, 2, \dots, n) \quad (4)$$

Expressed in matrix form:

$$E(\varepsilon | X) = 0 \quad (5)$$

Assumption 2: Normality Assuming that the random error term ε_i is a random variable obeying a normal distribution, then:

$$\varepsilon_i | x_1, x_2, \dots, x_p \sim N(0, \sigma^2) (i = 1, 2, \dots, n) \quad (6)$$

Assumption 3: No serial correlation assumption, different random error terms ε_i and ε_j are not correlated with each other, i.e:

$$\begin{aligned} Cov(\varepsilon_i, \varepsilon_j | x_1, x_2, \dots, x_p) &= E[(\varepsilon_i | x_1, x_2, \dots, x_p)(\varepsilon_j | x_1, x_2, \dots, x_p)] \\ &= 0 (i \neq j) (i, j = 1, 2, \dots, n) \end{aligned} \quad (7)$$

Under the assumption of normality, each random error term is independent, which in econometrics is called the absence of autocorrelation or serial independence of random error term ε .

Assumption 4: Homoskedasticity assumes that the variance of random error term ε_i is independent of i and should be a constant, i.e.:

$$Var(\varepsilon_i | x_1, x_2, \dots, x_p) = \sigma^2 (i = 1, 2, \dots, n) \quad (8)$$

Expressed in matrix form:

$$\begin{aligned} Var(\varepsilon | X) &= E(\varepsilon \varepsilon' | X) = E \left(\begin{array}{ccc|c} \varepsilon_1^2 & \cdots & \varepsilon_1 \varepsilon_n & \\ \vdots & & \vdots & \\ \varepsilon_n \varepsilon_1 & \cdots & \varepsilon_n^2 & \\ \hline & & & X \end{array} \right) \\ &= \begin{pmatrix} \sigma^2 & \cdots & 0 \\ \vdots & & \vdots \\ 0 & \cdots & \sigma^2 \end{pmatrix} = \sigma^2 I_n \end{aligned} \quad (9)$$

Expressed in matrix form:

$$\varepsilon | X \sim N(0, \sigma^2 I_n) \quad (10)$$

In Eq. I_n is represented as a unit matrix of order n and the vector of random error terms ε follows a multidimensional normal distribution.

Assumption 5: Any of the explanatory variables x_{ij} is uncorrelated with any of the random error terms ε_i , and x and ε do not tend to co-vary, which is called contemporaneous covariation of each X or contemporaneous uncorrelation with ε . I.e.:

$$Cov(x_{ji}, \varepsilon_i) = 0 (i = 0, 1, \dots, n; j = 1, 2, \dots, k) \quad (11)$$

From this we know that the random error term is uncorrelated with each of the explanatory variables, such that the unbiased assumption of the random error term and this contemporaneous uncorrelation with each of the explanatory variables is written in a matrix form:

$$E(X_i^T \varepsilon_i) = 0 (i = 1, 2, \dots, n) \quad (12)$$

$$\text{Eq. } X_i = (1, x_{i1}, x_{i2}, \dots, x_{ip}).$$

Hypothesis 6: Explanatory variable X has a non-zero finite constant in the limit of its sample variance due to sufficient variability, i. e:

$$\sum_{i=1}^n \frac{(X_i - \bar{X})^2}{n-1} \rightarrow Q, n \rightarrow \infty \quad (13)$$

These assumptions above are known as the classical assumptions of linear regression models, and a linear regression model that satisfies the classical assumptions above is called a classical linear regression model [16].

2.2.2. Regression model testing methods. After building the model, it is necessary to test the significance of the regression equation, so as to verify the correctness of the regression model. A common method to test the significance of the regression equation is the F-test [17]. The F-test is a test of the overall significance of the regression equation, which tests the significance of the linear relationship between all the independent variables and the dependent variable using analysis of variance (ANOVA).

Construct the following hypothesis testing problem:

$$\begin{aligned} H_0 : \beta_1 = \beta_2 = \dots = \beta_p = 0 \\ H_1 : \exists i \in \{1, 2, \dots, p\}, \beta_i \neq 0 \end{aligned} \quad (14)$$

If the original hypothesis H_0 holds, i.e., $\beta_i = 0$, the construct F statistic is:

$$F = \frac{ESS / p}{RSS / N - p - 1} \sim F(p, N - p - 1) \quad (15)$$

The F statistic should be satisfied given the confidence level $1 - \alpha$:

$$P\{F > F_\alpha(p, N - p - 1)\} < \alpha \quad (16)$$

According to the principle of “small probability events do not occur in a single test”, under the premise that H_0 is correct, if $F > F_\alpha(p, N - p - 1)$, there are enough reasons to believe that the original hypothesis is incorrect, thus rejecting the original hypothesis. Since the F value is equivalent to the F statistic, the P value of the F statistic is used to test the significance of the regression model.

The P-value is a value used to determine the outcome of a hypothesis test and is the probability of the occurrence of a situation in which the population deviates more from the original hypothesis than the resulting sample when the original hypothesis proposition is valid. If the P-value is very small, then according to the theory that small probability events are unlikely to occur in a single trial or observation, the original hypothesis proposition is to be suspected, and in problems that require decision-making, the original hypothesis proposition can be ruled not to be valid. Generally we give the test level α in advance (in this paper we take $\alpha = 0.05$), when $P < \alpha$, the original hypothesis is rejected, otherwise the original hypothesis is not rejected.

3. Data sources and model construction

In the summer of 1942, hundreds of thousands of Chinese and Japanese troops fought a major battle along the Zhegan Railway, which was then called the Battle of Zhegan. As a large-scale battle on the front battlefield in the middle of the War of Resistance, the Battle of Zhejiang-Gan is quite representative. If its successes and failures are analyzed in terms of combat guidance and campaign implementation by both sides, it will help to comprehensively and accurately evaluate the position and role of the Kuomintang in the War of Resistance, as well as help to summarize the lessons of the Chinese National Anti-Aggression War. This chapter is mainly based on the multiple linear regression model given in the previous section, and analyzes the specific degree of influence on the battle situation of the Zhejiang-Gan Campaign by quantifying the Ding Zhi Pan resistance.

3.1. Data sources and processing

3.1.1. Data sources. The most basic and important step in analyzing the impact of the war spirit of the Chinese army under the leadership of Ding Zhipan in the Battle of Zhejiang-Gan on the war situation is the acquisition of textual data on the relevant battles. Due to the lack of datasets for this field of research, the data in this paper are obtained from Baidu Encyclopedia on the historical events in Zhejiang-Gan and from Ding Zhipan's personal diary.

For the acquisition of the text of the battle of Zhejiang-Gan, this paper first constructs a collection of the names of the battle of Zhejiang-Gan, and the time span of the battle is the period between the launching and the ending of the battle of Zhejiang-Gan (a total of more than four months), and then the elements in the collection of the names of the battle are used as the search terms, and the Baidu search engine is utilized to obtain the text. The obtained text of the Zhegan Battle contains two types of data, namely, table data and text data, in which the table data contains information such as the name of the battle, the time of the battle, the location of the battle, and the participants of the battle, which can be used to assist in the labeling of the text entities of the Zhegan Battle. Text data contains information such as the background of the battle, the passage of the battle, the follow-up of the battle, the impact of the battle, etc., which is the main body of the description of the battle events and the main body of the text data of the battle.

3.1.2. Data processing. The purpose of standardization is to eliminate the bias caused by the inconsistency of numerical attributes due to the size of the value, and the commonly used standardization methods include the maximum and minimum standardization method and the zero-mean standardization method. Data standardization mainly includes data convergence processing and dimensionless processing of two aspects. Data convergence processing mainly solves the problem of data of different natures, and the direct sum of indicators of different natures cannot correctly reflect the comprehensive results of different forces, and it is necessary to consider changing the nature of data of inverse indicators first, so that the force of all the indicators on the assessment program can be converged, and then summed up in order to get the correct results. Data dimensionless processing is mainly to solve the comparability of data [18].

In this paper, we mainly use the maximum and minimum value standardization as well as Z-score standardization to carry out the standardized processing of data related to the Zhegan Campaign. The details are as follows:

1) Maximum and minimum value standardization. The maximum and minimum value standardization method is a linear transformation of the original data, after linear transformation, so that the results fall into the [0,1] interval. The transformation function is as follows:

$$x^* = \frac{x - x_{\min}}{x_{\max} - x_{\min}} \quad (17)$$

where $x_{\max}$ is the maximum value of the sample data and $x_{\min}$ is the minimum value of the sample data.

To map the sample data into the interval $[-1,1]$, the formula transforms to:

$$X^* = \frac{X - X_{\max}}{X_{\max} - X_{\min}} \quad (18)$$

One disadvantage of this method is that when new data is added, it may cause the maximum and minimum values of the sample to change and need to be redefined.

2) Z-score standardization. The processed data satisfy the standard normal distribution, i.e., the mean is taken as 0 and the standard deviation is taken as 1. This allows the data with different scales to be placed in the same matrix with the transformation function:

$$X^* = \frac{X - \mu}{\sigma} \quad (19)$$

where μ is the mean of all sample data and σ is the standard deviation of all sample data.

The Z-score standardization method is suitable for cases where the maximum and minimum values of the samples are unknown, or where there are outlier data beyond the range of values.

3.2. Variable Selection and Model Construction

3.2.1. Selection of variables. In order to better analyze the influence of Ding Zhipan's anti-war spirit on the battle situation of Zhejiang-Gan, this paper standardizes the data collected from Ding Zhipan's texts and charts about the battle of Zhejiang-Gan and chooses Ding Zhipan's anti-war spirit (DZP) as the independent variable and the battle situation of Zhejiang-Gan (ZGZY) as the dependent variable. Ding Zhipan's spirit of resistance to war was quantified by the number of records in Ding Zhipan's personal diary about the Battle of Zhejiang-Gan, and the form of ZGZY was quantified according to the casualties in the relevant historical data of the Battle of Zhejiang-Gan.

In addition, in order to further control the possible influence of the remaining variables on the battle situation of the Zhegan Campaign, this paper chooses the number of participating corps (WN), the type of participating equipment (TWE), the commander's ability of literacy (CA), the number of troops (TN), the number of national army deserters (TFN), and the number of conscripted strong soldiers (PRN) as control variables. The data of each control variable were obtained from the historical text or tabular information during the Zhegan Campaign, and some missing data were interpolated as a way to ensure the normalization of the data.

3.2.2. Modeling. Based on the independent variables, dependent variables and control variables selected in the previous section, combined with the multiple linear regression model given in the previous section, the fixed effects model for the benchmark test is constructed as follows:

$$ZGZY_{it} = \beta_0 + \beta_1 DZP_{it} + \beta_2 \sum Control_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (20)$$

In the formula, each area involved in the battle of Zhegan is represented by i , the time is represented by t , and $\beta_0 \sim \beta_2$ represents the coefficients of each variable. $ZGZY_{it}$ refers to the form of the battle situation in the Zhejiang-Gan Campaign, and DZP_{it} represents the performance of the spirit of resistance of the national army under the leadership of Ding Zhipan. $\sum Control_{it}$ represents the individual control variables, which are the number of participating corps, the type of participating equipment, the commander's literacy ability, the number of army personnel, the number of national army fugitives, and the number of conscripted stalwarts. μ_i represents the control area fixed effect, δ_t represents the time fixed effect, and ε_{it} serves as the error disturbance term.

4. Results and analysis

The Battle of Zhegan was a large-scale battle. Before the battle, both China and Japan attached great importance to the battle and actively prepared for it. After the outbreak of the Battle, the Japanese attacked vigorously, and the Chinese army was once in a state of retreat and defense, but also effectively consumed the Japanese army. Due to changes in the battlefield situation, the plan of “Quzhou Duel” was canceled, and the main force of the Chinese army withdrew to the mountains on both sides of the Zhejiang-Gan line, and the Japanese army took the opportunity to open the Zhejiang-Gan line. The performance of the national army led by Ding Zhipan in the Battle of Zhejiang-Gan was controversial, and the spirit of resistance he showed had a certain impact on the change of the battle situation. This chapter mainly adopts the regression model to carry out quantitative analysis of the data, so as to further question Ding Zhipan's spirit of resistance in the Battle of Zhejiang-Gan, to provide reference for the comprehensive and correct evaluation of the status and role of the National Army in the War of Resistance, and to help summarize the lessons of the Chinese National Anti-Aggression War.

4.1. Descriptive and correlation analysis

4.1.1. Descriptive statistics of variables. Based on the collected data related to the battle of Zhejiang-Gan and the combat of the national army under the leadership of Ding Zhipan, statistical analysis was conducted for each variable in the regression model after dimensionless standardization, and the descriptive statistical results of each variable were obtained as shown in Table 1. As can be seen from the table, the maximum value of the battle form of Zhejiang-Gan Campaign is 0.857, the average value is 0.589, and the standard deviation is 0.103, which indicates that there are big differences in the battle form of different regions in Zhejiang-Gan Campaign. The maximum value of the resistance spirit performance of the national army under the leadership of Ding Zhipan is 0.286, the mean value is 0.165, and the standard deviation is 0.115, which indicates that there are also some differences in the spirit of resistance between different regions in the Battle of Zhejiang-Gan. Comparatively speaking, the fluctuation of the national army's anti-war spirit performance under the leadership of Ding Zhipan is more variable, and the anti-war spirit performance of the national army under the leadership of Ding Zhipan in different regions in the Battle of Zhegan is more unbalanced compared with the form of the battle situation in the Battle of Zhegan.

Table 1. Descriptive statistics of variables

Variable	Means	STD	Min	Max	Skewness	Kurtosis
ZGZY	0.589	0.103	0.212	0.857	-0.691	-0.367
DZP	0.125	0.165	0.023	0.286	-0.865	-0.821
WN	0.184	0.127	0.034	0.198	-0.613	-0.212
TWE	0.322	0.341	0.089	0.365	-0.522	-0.806
CA	0.873	0.318	0.256	0.992	-0.646	0.793
TN	0.637	0.035	0.107	0.784	-0.439	-0.245
TFN	0.815	0.279	0.238	0.903	-0.167	-0.391
PRN	0.268	0.146	0.025	0.411	-0.305	0.838

4.1.2. Correlation analysis. Before launching the empirical study, the correlation between the variables was first analyzed in depth with the help of the Pearson test, so as to understand the correlation between the variables in the model. In addition, it is also necessary to test the multicollinearity of each variable in the model, in order to ensure that the analysis is rigorous and accurate, we will test the existence of covariance of the main variables. Having multicollinearity among

variables may affect parameter estimation and cause pseudo-regression artifacts. In this paper, we choose the variance inflation factor (VIF) method to assess the covariance, and the criterion for no significant covariance is that the VIF is less than 3. The results of the correlation analysis and the test for multiple covariance are shown in Table 2, where *, **, *** denote that they are significant at the 10%, 5%, and 1% levels, respectively, and the values in the parentheses are the robust standard errors, which are the same as those in the subsequent sections.

Pearson's test shows that the correlation coefficient between the performance of the National Army's spirit of resistance under the leadership of Ding Zhipan and the form of the battle situation in the Zhejiang-Gan Campaign is 0.274, a value that shows a positive correlation between the two associations and significance at the 1% level. In addition, each of the control variables is correlated at both the 1% and 5% levels, except for the number of national army escapees (TFN), which shows a negative correlation at the 1% level with the form of the battle situation in the Zhengan Campaign at the 1% level. And the VIF of each variable is much lower than 3, indicating that there is no problem of covariance between variables. Therefore, we can safely carry out regression analysis to further explore the variable relationships and their effects on the battlefield form of the Zhengan Campaign.

Table 2. Correlation and multiple conlinear tests

Variable	ZGZY	DZP	WN	TWE	CA	TN	TFN	PRN	VIF
ZGZY	1.000	-	-	-	-	-	-	-	-
DZP	0.274 ***	1.000	-	-	-	-	-	-	1.138
WN	0.107 **	0.212 **	1.000	-	-	-	-	-	1.127
TWE	0.116 **	0.127 ***	0.109 **	1.000	-	-	-	-	1.063
CA	0.238 ***	0.135 ***	0.121 ***	0.107 ***	1.000	-	-	-	1.852
TN	0.131 **	0.104 **	0.118 ***	0.115 **	0.118 ***	1.000	-	-	1.426
TFN	-0.129 **	-0.156 ***	-0.137 ***	-0.131 ***	-0.127 ***	-0.152 ***	1.000	-	1.435
PRN	0.165 **	0.223 **	0.181 **	0.126 **	0.135 **	0.137 **	0.121 **	1.000	1.381

4.2. Empirical results and analysis

4.2.1. Benchmark regression results. In this paper, the performance of the resistance spirit of the national army under the leadership of Ding Zhipan is taken as the independent variable, and the form of the battle situation in the Zhejiang-Gan campaign is taken as the dependent variable, and the fixed-effects model is determined to be used after the Hausman test is conducted on the data. The specific empirical results of the basic regression model analysis are shown in Table 3, where model (1) is the regression results without adding control variables, model (2) is the regression results after adding control variables, and model (3) is the regression results after adding control variables and controlling for area and time effects.

In the model (1), the regression coefficient of the influence of the national army's resistance spirit performance under the leadership of Ding Zhipan on the battle situation of Zhejiang-Gan is 0.432, which is extremely significant at the 1% level. For every 1 percentage point increase in the performance of the national army's spirit of resistance under the leadership of Ding Zhipan, the form of the battle situation in Zhejiang-Gan will change by 0.432 percentage points. This indicates that there is a close connection between the performance of the national army's spirit of resistance under the leadership of Ding Zhipan and the change of the battle situation in Zhejiang-Gan in the form of the battle situation in Zhejiang-Gan. The main reason for this is that Ding Zhipan was strict in governing the army, and although there were still cases of "desertion" in the army, the whole army inherited Ding Zhipan's will to save the country and the world, and the atmosphere of anti-Japanese spirit was stronger, which helped to increase the morale of the fighters. After adding control variables in model (2), the regression coefficient of the national army's resistance spirit performance under the leadership of Ding Zhipan on the battle situation form of the Zhengan Campaign decreases from 0.432 to 0.416. This fully explains the influence of each control variable on the battle situation form of the Zhengan Campaign. Especially, the commander literacy ability (CA) shows positive correlation with the battle situation form of Zhengan Campaign at 1% level, while the number of national army escapees (TFN) shows negative correlation with the battle situation form of Zhengan Campaign at 1% level. The more advanced the commander's literacy ability is, the better the army's discipline is, the more the overall strategy development meets the army's needs, and the greater the positive influence on the battle situation of the Zhengan Campaign. And the more the number of the national army escaped the more the overall morale of the army declined, which may lead to a certain extent to the battle situation

in the battle of Zhejiang-Gan to present a one-sided situation. After controlling the time and area variables in the model (3), the regression coefficient of the influence of the national army's anti-war spirit under the leadership of Ding Zhipan on the battle situation in Zhejiang-Gan is increased to 0.425, which indicates that the overall anti-war spirit in the area under the leadership of Ding Zhipan is stronger, and Ding Zhipan can command the army more effectively to fight, which can help to reverse the battle situation in the area. In addition, the F-statistic test results of the three models are all significant at the 1% level ($P < 0.01$), and the R^2 is higher than 0.7, which indicates that the regression model passes the basic test and hypothesis.

Table 3. Empirical results of the basic regression model

Variable	Model (1)	Model (2)	Model (3)
DZP	0.432*** (0.138)	0.416*** (0.127)	0.425*** (0.131)
WN	-	0.145** (0.054)	0.142** (0.052)
TWE	-	0.079** (0.019)	0.063** (0.018)
CA	-	0.223*** (0.238)	0.219*** (0.207)
TN	-	0.108** (0.116)	0.108** (0.116)
TFN	-	-0.167*** (0.105)	-0.173*** (0.112)
PRN	-	0.075** (0.213)	0.072** (0.208)
(Con.)	-3.276*** (0.958)	-3.067*** (0.832)	-2.984*** (0.742)
Region	-	-	YES
Time	-	-	YES
F statistic	8.714*** (P=0.000)	9.795*** (P=0.005)	9.514*** (P=0.000)
R-squared	0.7291	0.7928	0.7846

4.2.2. Endogeneity analysis. The previous empirical studies have shown that the performance of the national army's spirit of resistance under the leadership of Ding Zhipan can significantly affect the form of the battle situation in the Zhejiang-Gan Campaign, but some studies have suggested that there is a reverse causality problem between the performance of the national army's spirit of resistance under the leadership of Ding Zhipan and the form of the battle situation in the Zhejiang-Gan Campaign, i.e., there is a possibility of the endogeneity problem that results from the fact that the more chaotic the form of the battle situation in the Zhejiang-Gan Campaign is, the higher the national army's performance of the spirit of resistance under the leadership of Ding Zhipan is.

Therefore, in order to further ensure the reliability of the empirical findings, this study adopts the number of participants in the battle of Zhejiang-Gan as an instrumental variable for the performance of the National Army's spirit of resistance under the leadership of Ding Zhipan to alleviate the possible endogeneity problem. Since the adopted instrumental variable is in cross-sectional form, it cannot be used directly for panel data analysis, adding a time-varying data to multiply with it to obtain panel data, this paper adopts the number of corps under Ding Zhipan's leadership in the study and the number of participants in the Zhengan Campaign to add up to obtain the instrumental variable for the performance of the National Army's spirit of resistance under Ding Zhipan's leadership (DZP-SR). Two-stage least squares estimation was performed on this instrumental variable, and the estimation results are shown in Table 4.

The effects of the National Army's resistance spirit performance under the leadership of Ding Zhipan on the form of the battle situation in the Zhengan Campaign continue to hold, and they are all significant at the 1% level of significance. In addition, as shown by the results of Kleibergen-Paap rk's LM statistic, there is no problem of under-identification of instrumental variables, and Kleibergen-Paap rk's Wald F statistic is much larger than the critical value of 10% (15.27), which excludes the problem of weak instrumental variables. In conclusion, the facilitating effect of the National Army's performance of the

spirit of resistance under the leadership of Ding Zhipan on the form of the battle situation in the Zhegan Campaign still holds.

Table 4. The endogenous test results of the model

Variable	First Stage regression	Second order regression
DZP	-	0.469*** (0.174)
DZP-SR	0.0053*** (0.007)	-
Fixed effect	YES	YES
Kleibergen-Paap rk LM statistic	-	1812.153***
Kleibergen-Paap rk Wald statistic	-	3564.672
R-squared	-	0.7328

4.2.3. Robustness Tests. Although the previous paper has used two measures to measure the performance of the National Army's spirit of resistance under the leadership of Ding Zhipan and verified the robustness of the impact of the National Army's spirit of resistance performance under the leadership of Ding Zhipan on the form of the war situation in the Zhejiang-Gan Campaign, in order to improve the reliability of the empirical results of this paper, this paper further tested the robustness of the findings by means of replacing the empirical methodology and lagging the explanatory variables by one period.

1) Replacement of dependent variables. This paper chooses to quantify the battle form through the number of casualties in the Battle of Zhejiang-Gan when conducting the baseline regression, and in order to test the robustness of the regression results, the dependent variable is replaced with the ammunition consumption of the Battle of Zhejiang-Gan (ZGZY-AC), so as to quantify the battle form of the Battle of Zhejiang-Gan. Table 5 shows the robustness regression results after replacing the dependent variable. Table 5 shows the robustness regression results after replacing the dependent variable from the number of casualties in the Battle of Zhejiang-Gan to the ammunition consumption in the Battle of Zhejiang-Gan, the impact of the national army's resistance spirit performance under the leadership of Ding Zhipan on the battle situation form of the Battle of Zhejiang-Gan on the battle situation form of the Battle of Zhejiang-Gan is still significant at the 1% level and the regression coefficient is improved from 0.425 to 0.453. The regression results of the individual variables in the model are basically the same as those in the baseline regression, which proves that the previous baseline regression result is quite consistent with that in the previous section. It proves that the previous benchmark regression results are very robust.

Table 5. Change the robustness of the dependent variable

Variable	Model (1)-ZGZY	Model (2)- ZGZY-AC
DZP	0.425*** (0.131)	0.453*** (0.127)
WN	0.142** (0.052)	0.156** (0.078)
TWE	0.063** (0.018)	0.052** (0.013)
CA	0.219*** (0.207)	0.225*** (0.236)
TN	0.108** (0.116)	0.113** (0.121)
TFN	-0.173*** (0.112)	-0.188*** (0.135)
PRN	0.072** (0.208)	0.081** (0.223)
(Con_)	-2.984*** (0.742)	-3.051*** (0.937)
Region	YES	YES
Time	YES	YES
F statistic	9.514*** (P=0.000)	9.892*** (P=0.002)
R-squared	0.7846	0.7894

2) Replacement of parameter estimation methods. In this paper, the least squares method is used for parameter estimation of the multiple linear regression model, and in order to verify the robustness of the regression results, mixed PLS, 2SLS, and random effects model (RE) are used for regression, and the robustness regression results are shown in Table 6. The regression results show that the coefficients of the influence of the National Army's performance of the spirit of resistance under the leadership of Ding Zhipan on the form of the battle situation in the Zhejiang-Gan Campaign are all significantly positive at the 1% significance level, which is consistent with the regression results in Tables 5 and 4, and once again indicates that the empirical test results of the influence of the National Army's performance of the spirit of resistance under the leadership of Ding Zhipan on the form of the battle situation in the Zhejiang-Gan Campaign are robust.

Table 6. The regression results of the proposed method

Variable	Model (1)-OLS	Model (2)-PLS	Model (1)-2SLS	Model (2)-RE
DZP	0.425*** (0.131)	0.418*** (0.106)	0.422*** (0.127)	0.434*** (0.138)
WN	0.142** (0.052)	0.135** (0.049)	0.138** (0.051)	0.132** (0.049)
TWE	0.063** (0.018)	0.073** (0.022)	0.069** (0.020)	0.063** (0.017)
CA	0.219*** (0.207)	0.235*** (0.227)	0.241*** (0.232)	0.232*** (0.216)
TN	0.108** (0.116)	0.115** (0.128)	0.118** (0.131)	0.121** (0.135)
TFN	-0.173*** (0.112)	-0.165*** (0.103)	-0.169*** (0.101)	-0.171*** (0.118)
PRN	0.072** (0.208)	0.069** (0.211)	0.068** (0.204)	0.067** (0.198)
(Con_)	-2.984*** (0.742)	-3.028*** (0.915)	-2.995*** (0.867)	-2.981*** (0.895)
Region	YES	YES	YES	YES
Time	YES	YES	YES	YES
F statistic	9.514*** (0.000)	9.834*** (0.006)	9.851*** (0.000)	9.972*** (0.001)
R-squared	0.7846	0.7865	0.7724	0.8069

5. Conclusion

The article quantifies the performance of the National Army's anti-war spirit under the leadership of Ding Zhipan with a multiple linear regression model, and evaluates the effect of the National Army's anti-war spirit performance under the leadership of Ding Zhipan on the battle situation form of the Zhejiang-Gan Campaign through regression analysis. There is a positive effect of the National Army's anti-war spirit performance under the leadership of Ding Zhipan on the form of the battle situation in the Zhejiang-Gan Campaign at the 1% level, and for every 1% increase in the National Army's anti-war spirit performance under the leadership of Ding Zhipan, the form of the battle situation in the Zhejiang-Gan Campaign will improve by 0.432%. Based on the consideration of the endogeneity problem and the robustness test, it can be clarified that the performance of the national army's anti-war spirit under the leadership of Ding Zhipan has a positive impact on the form of the battle situation in the Zhejiang-Gan Campaign. Although the Battle of Zhejiang-Gan ended with the defeat of the national army, Ding Zhipan's ambition to save the country and the world was fully demonstrated during the leadership of the Legion, and his spirit of resistance deserves to be remembered and celebrated by future generations.

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