The Effects of Military Competition between the United States and China on the Defense Spending of Asia-Pacific Countries

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Abstract: China's economic liberalization and reform has resulted in a rapid growth in defense spending. This has led to China becoming the main military competitor to the U.S. and China is now seen as a potential threat to other Asian countries. This study investigates the effects of the threat from China as well as the U.S. security effect on defense spending in the Asia-Pacific region. Panel data analysis was adopted to analyze multiple-period data from the Asia-Pacific region. The results of this study show that the threat from China positively, but not significantly, has influenced the defense spending of Asia-Pacific countries. Additionally, US military spending significantly reduces the defense expenditures of the other Asian Pacific countries. The findings also support the idea that Asian countries which have experienced military conflicts with U.S still treat the U.S. as a potential threat. For the coming decades, the security of the Asia-Pacific region is still determined by the U.S. and China.

Keywords: Defense Spending; China; Security; Asia-Pacific region

JEL Classification: F52, H61

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1. Introduction and Literature Survey

Study of defense spending is an important factor for evaluating country risk and area security; these are key components for area and global studies. Previous studies on defense spending have focused only slightly on the Asia-Pacific region and have not discussed the spillover effect of competition among the two great military powers. Some studies, such as Lee (2003, 2008) and Wang (2010), have evaluated China's military development and its effect on the USA and Taiwan.

Most related studies discuss the interaction between economic ability and defense spending; examples include Ozsoy (2008) and Karagianni and Pempetzoglu (2009). These studies explored the relationship between defense spending and economic growth in Turkey. Ozsoy (2008) verified a negative relationship, while Karagianni and Pempetzoglu (2009) found economic development had a positive effect on defense spending. Abu-Qarn (2010) did not find any significant relationship between economic growth and defense spending in data concerning Israel and various Arabic countries. Recently Dunne and Smith (2010) reviewed the Granger causality of the interaction of military spending with the economy of six countries, Italy, Japan, the Netherlands, Sweden, the UK, and the US for the period 1960-2006 and the results were mixed.

According to recent articles, besides economic factors, external threats are additional key determinants of defense spending. Rosh (1988) defined a “security web,” the average military spending of nearby countries, as a potential threat, and provided empirical evidence which supported that country’s military spending being significantly and positively influenced by the spending of nearby countries. Dunne and Freeman (2003) divided external threats into four main sources: great power enemy, enemy, potential enemy, and security web. Evidence from panel data supported the idea that potential enemy and security web could significantly increase a country’s defense spending. Yang, Trumbullb, Yang, and Huang (2011) had similar findings when incorporated external threat was added to the relationship. They found that external threat will work to increase defense spending. Solomon (2005) and Dunne, Freeman and Smith (2008) respectively, evaluated the security web effect on the defense spending of developing countries and Canada; both studies found that security webs reduced the defense spending of the sampled countries, though not significantly.

The effect of Chinese economic growth on the peace of the Asia-Pacific region is unknown at the present time. The World Bank (2012) annual report pointed out that the annual GDP growth rate of China from 2006 to 2011 was 13%, 14%, 10%, 9%, 10% and 9%, respectively. Moving together with China's rapid economic growth, China has spent a large amount of money on national defense, which may imply a greater threat to the Asia-Pacific region. Shambaugh (1994) points out that fears of a Chinese threat not only exist in the West, but that fears also exist for China’s neighbors in Asia. Chang, Fang, Wen, and Liu (2001) examined the relationship between China’s economic growth and its defense spending. They found a unidirectional Granger causality running from economic growth to defense spending. Lee (2009) believes that China’s soft power level in the region remains at a low level compared to its hard power; accordingly, China’s hard power rise has been viewed by neighboring countries as uncomfortable and giving rise to the prevalence of the “China-threat theory.”

Some scholars do not treat Chinese growth as a potential threat to other Asian countries. Perkins (2007) points out that China’s economic growth has changed the balance of power in the East Asia despite the fact that China faces no obvious external threat at the present time. That study suggests that Taiwan is the only country which must be wary of China’s rising military spending. Park (2008) deals with the puzzle of why China intervenes militarily in neighboring countries. That research examines two case studies: the Korean War and the Sino-Vietnamese War. The study concludes that China will attack other countries only when it faces geostrategic vulnerability. Whether China's defense spending rise will contribute to an increase in defense spending in the Asia-Pacific region is an important issue in regards to the security of the Asia-Pacific region.

In order to maintain its leadership status in the Asia-Pacific region, the U.S. is becoming more involved in Asia. The growth of China's national defense force is a direct challenge to U.S. military power and the United States has treated China as a potential adversary since the rise of the Cold War. Shambaugh (2008) explores several dimensions of the impacts of China’s rise on American interests in Asia. Shambaugh (2008) concludes that China is not trying to push the United States out of Asia despite the fact that China’s growing military power is an increasing challenge and concern for the U.S. Thus, to maintain leadership and regional safety, the U.S. guides joint military exercises with Asia-Pacific countries including South Korea, Australia, and the Philippines, as well as some other Southeast Asian nations in an effort to confront China's military expansion. Peace and stability in the Asia-Pacific region is influenced by two great military powers, China and the U.S.

Although the Asia-Pacific region has become one of the main economic areas in the world, few studies have explored the effect of China’s growing military force and U.S. military power on the safety of the Asia-Pacific region. The aim of this study is to evaluate the effect of military competition between China and the U.S. on military spending in the Asia-Pacific region through panel data analysis of the last eleven-years of available data from 25 Asia-Pacific countries.

2. Data and Research Method

This study selected Asia Pacific countries as the initial sample; however, Bhutan, North Korea, Myanmar, Vietnam and Tajikistan were removed from the sample owing to insufficient data. The final sample comprised 25 countries (Afghanistan, Australia, Bangladesh, Brunei, Cambodia, Fiji, India, Indonesia, Japan, Kazakhstan, Kyrgyzstan, Laos, Malaysia, Mongolia, Nepal, New Zealand, Pakistan, Papua New Guinea, Philippines, Russia, Singapore, South Korea, Sri Lanka, Taiwan and Thailand) and the sample period was from 2001 to 2011. Owing to the fact that we wanted to evaluate the current status and the available data period is not long in geo-political terms, we do not discuss the interaction of military spending and economic growth; therefore, the static panel data analysis is suitable for this study.

The static panel data analysis model is as follows:

$$y_{i,t} = \alpha + X_{i,t}\beta + \mu_{i,t} \qquad i=1, 2, \ldots N,\ t=1, 2,..T. \qquad (1)$$

where $y_{i,t}$ is the dependent variable, α is the intercept, $X_{i,t}$ is the matrix of explanatory variables with coefficient β, $\mu_{i,t}$ is the disturbance term.

The one-way fixed and random effect model, $\mu_{i,t}$ can be separated into two parts: μ_i and $v_{i,t}$. μ_i which represent unobserved cross-sectional (individual) effects for N cross sections and $v_{i,t}$ represents random disturbances.

Pooled OLS does not consider the effects of μ_i. On the other hand, fixed-effect OLS does consider the effects of μ_i and assumes μ_i as an individual-specific time-constant variable. Under random-effect OLS, μ_i are random variables and are uncorrelated with explanatory variables. There are two ways to estimate the fixed-effect panel model; they are the least square dummy variable model (LSDV) and the within effect model. The LSDV model uses dummy variables to measure the individual effect, μ_i. The within effect model does not use dummy variables, it uses deviation from group means as the dependent variable and independent variables and estimates the model by OLS. Since no dummy variables are used, within model has a larger degree of freedom for error than LSDV, resulting in a smaller mean square error than LSDV. Even though LSDV has the advantage of accurate smaller mean square error than within effect model, LSDV is not suitable for samples with a large cross section. The random-effect model is estimated by generalized least squares (GLS) when the variance structure is known and feasible generalized least squares (FGLS) when the variance structure is unknown. Since the variance structure is often unknown, FGLS is more frequently used than GLS.

The Lagrange Multiplier test is used to determine whether pooled OLS should be used instead of a fixed-effect specification; the Hausman test is used to determine whether fixed-effect should be used instead of a random-effect specification.

The specific panel data model for this study can be expressed as:

$$\ln ME_{i,t} = \alpha + \beta_1 \ln GDP_{i,t} + \beta_2 \ln CME_t + \beta_3 \ln USME_t + \beta_4 \log POP_{i,t} + \beta_5 \log TR_{i,t} + \mu_{i,t} \qquad (2)$$

where $ln\,ME_{i,t}$ is the ln value of the military expenditure (in constant 2010 USD million), ME, of country *i* in time *t*, α is the intercept term, $ln\,GDP_{i,t}$ is the ln value of the gross domestic product (in constant 2010 USD million), GDP, of country *i* in time *t*. $ln\,CME_t$ is the ln value of the military expenditure (in constant 2010 USD million) of China, CME, in time *t* and $lnUSME_t$ is the ln value of the military expenditure (in constant 2010 USD million) of the U.S., USME, in time *t*. $log\,POP_{i,t}$ is the log value of the population (in millions), POP, of country *i* in time *t* and $logTR_{i,t}$ is the log value of trade value (in constant 2010 USD million), TR, of country *i* in time *t*. $\mu_{i,t}$ is the error term and uncorrelated with explanatory variables.

The defense expenditure (*ME* , *CME* and *USME*) data were obtained from the Stockholm International Peace Research Institute (SIPRI), while data on the gross domestic product of each country (*GDP*), the trade value of each country (*TR*), and the population of the sampled countries (*POP*) came from the World Bank. There were three explanatory variables in this model: *lnGDP*, *lnCME*, and *lnUSME*. It was hypothesized that China's military expenditure has a positive effect on Asia-Pacific defense expenditure, since a number of Asia-Pacific countries have experienced military conflict with China. For some Asia-Pacific countries, the U.S. offers beneficial security through military alliances and exercises; therefore, the coefficient of ln*USME* was expected to be negative. Referring to Dunne, Freeman and, Smith (2008) and Nikolaidou (2008), this study added the population and trade value of sample countries, *logPOP* and *logTR*, as control variables.

Static panel data analysis was used to analyze the relationships between the dependent variable and the explanatory variables. There were three possible models: the pooled ordinary least square model (pooled OLS), the fixed effect ordinary least square model (fixed effect OLS), and the random effect ordinary least square model (random effect OLS). Owing to the sample size, 25 countries, this study adopted the within effect model to estimate the fixed effect OLS. The likelihood ratio test (LR test), the Lagrange multiplier test (LM test), and the Hausman test were conducted to verify which model was the most appropriate for this panel data.

3. Empirical Results

3.1 Descriptive Statistics

Table 1 exhibits the descriptive statistics of the variables. The maximum defense expenditure (*ME*) value was found in Russia and the minimum value came from Laos. A high standard deviation value showed the high dispersion of defense expenditure among the different countries. The high standard deviation values of the *GDP*, *POP* and *TR* also exhibited their great dispersion in the different countries. Japan owns the maximum gross domestic product value and trade value among these countries. Kyrgyzstan has the minimum trade value and Mongolia has the least gross domestic product value. India has the greatest population and the population of Brunei is the smallest.

The mean value of China's military expenditure (*CME*) was 80.97 billion dollars which is about 9.1 times that of the mean military expenditure of 25 Asia Pacific countries; the mean value of U.S. military expenditure (*UME*) was 569.2 billion dollars which is 7 times that of China. For the 25 sample countries, China and the U.S. are the two great military powers. Figure 1 shows the military expenditure trend of the sample countries mean, including China and the U.S. The scatter plot of A-PMME, Asia-Pacific mean military expenditure, ranges from 7,640 million dollars to 10,285 million dollars from 2001 to 2011. China's military expenditure grew steadily from 41 billion dollars in 2001 to 129 billion dollars in 2011; its annual growth rate is 12.9%. As for U.S., it has the world biggest military expenditure and continues to grow 6% annually.

The correlation test and the variance inflation factor (VIF) test both verified there were no significant linear relationships among the explanatory variables at a 1% significance level (details can be presented upon request).

3.2 Panel Data Analysis

Table 2 shows that the most appropriate model for this study was fixed effect OLS, while the LM value of 754 indicated that fixed effect OLS was better than pooled OLS at a 1% significance level. The result of the Hausman test verified that fixed effect OLS was more appropriate than random effect OLS.

The result of fixed effect OLS of model 2 showed that both the ln*GDP* variable and the ln*USME* variable have significantly positive influences, coefficient value 0.478, on military expenditure in the Asia-Pacific countries at the 10% significance level. A 1% increase in a country's gross domestic product will correlate with its military expenditure increasing by 0.478% in order to protect its sovereignty; while an increase in U.S. military expenditure can significantly reduce every Asia-Pacific country's military expenditure (the coefficient value of ln*USME* is -0.307). The U.S. government offers beneficial security to Asia-Pacific countries; therefore, increased U.S. military expenditure reduces the military expenditure of Asia-Pacific countries. China's military expenditure, while growing, has a positive, but not significant influence on the military expenditure of Asia-Pacific countries. Asia-Pacific countries treat China as a potential threat, but they do not feel the immediate need to increase military expenditure as a response. No control variable was found to have a significant effect on military expenditure.

The findings show that an increase in gross domestic product has a significant positive effect on a country's military expenditure, was consistent with the findings of previous studies; however, this study offered a new viewpoint that military expenditure is also determined by the competition of great military powers. As competition becomes more intense, the effect of China-U.S. military competition on Asia-Pacific military expenditure is expected to strengthen.

3.3 Further Verification

We set up model 3 to further verify the negative relationship between U.S. military expenditure and Asia Pacific countries military expenditure. Owing to the suggestion that the threat posed by China is not supported by the empirical results in Table 2, we did not set up new model to further evaluate the effect from the China threat.

$$\ln ME_{i,t} = \gamma + \theta_1 \ln GDP_{i,t} + \theta_2 \ln CME_t + \theta_3 \ln USME_t + \theta_4 \log POP_{i,t} + \theta_5 \log TR_{i,t} + \theta_6 USCON_{i,t} + \pi_{i,t}, \text{ and}$$

$$\pi_{i,t} = \lambda_i + \varepsilon_{i,t} \tag{3}$$

Comparing to model 2, we have a new variable, $USCON_t$. The definition of $USCON_t$ is as following:

$USCON_{i,t}$ = ln $USME_t$ when country i have experienced military conflict with U.S.

= zero when country i have not experienced military conflict with U.S.

We hypothesize that the coefficient of *USCON* variable, θ_6, should be significantly positive while the θ_3 value is still significantly negative.

From the empirical result of model 3 in Table 2, the fixed effect model is the most appropriate model for model 3. The coefficient value of ln*USME* variable, θ_3, is -0.325% and is significantly negative at the 10% significance level. The coefficient value of *USCON* variable, θ_6, is 0.363% and is significantly positive at the 10% significance level. Those countries that experienced military conflict with U.S. will not treat the U.S. military as beneficial security and they will show an increase 0.038% (0.363-0.325) in military spending when U.S. increases its military spending by 1%.

4. Summary and Conclusion

Compared to previous studies, this study focused on the effect of China-U.S. military competition on military spending in Asia-Pacific countries. This study empirically evaluates the issues mentioned by Shambaugh (1994, 2008), Lee (2003, 2008), Perkins (2007), Park (2008), Lee (2009), and Wang (2010) and has interesting findings.

Panel data analysis was adopted to analyze the ten-year data of 25 Asia-Pacific countries. The research results show a significant negative relationship between U.S. military spending and military spending in the Asia-Pacific region, as the U.S. offers Asia-Pacific area countries beneficial security. On the other hand, the continuous growth of China military spending does not cause military panic in Asia-Pacific countries; this may result from the current situation in that the mean value of U.S. military spending is 7 times of the mean value of China military spending (and is 5.4 times for 2011). The findings also support the idea that countries which experienced military conflict with U.S. still treat the U.S. as potential threat. Facing China's high military spending growth rate, 13% annual rate comparing to 6% for the U.S., the gap between China's military spending and U.S. military spending will become less which weaken the beneficial effect from the U.S. military spending. Based on this finding, the security of the Asia-Pacific region will still be determined by the beneficial spillover effect of U.S. military spending and the potential threat from China for the coming decades.

Endnotes

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Table 1. Descriptive Statistics

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
ME(in million dollar)	8884	1587	15338	15.3	64123
GDP(in million dollar)	397490	93363	907788	1268	5488416
CME(in million dollar)	80971	76065	31412	41176	129272
USME(in million dollar)	569214	570769	103360	385142	698281
POP(in million)	97.3	22.8	229	0.33	124.1
TR(in million dollar)	201426	41087	316312	1124	1708294
lnME(in million dollar)	9.140	9.20	1.006	7.185	10.807
lnGDP(in million dollar)	10.80	10.97	0.939	9.103	12.740
lnCME(in million dollar)	11.23	11.24	0.399	10.62	11.77
lnUSME(in million dollar)	13.24	13.25	0.193	12.86	13.46
logPOP(in million)	1.99	1.36	0.789	-0.48	2.09
logTR(in million dollar)	5.30	4.61	0.882	4.05	6.32

Table 2. Panel Data Analysis

Model 2	Fixed effect OLS	Model 3	Fixed effect OLS
α	16.23 (0.023) **	γ	11.69 (0.12)
β_1	0.478 (0.000)***	θ_1	0.42 (0.000)***
β_2	0.170 (0.135)	θ_2	0.161 (0.156)
β_3	-0.307 (0.095)*	θ_3	-0.325 (0.08)*
β_4	-1.35 (0.163)	θ_4	-0.79(0.432)
β_5	-0.173 (0.323)	θ_5	-0.101(0.567)
		θ_6	0.363(0.054)*
$Adj\ R^2$	0.995	$Adj\ R^2$	0.996
LM test	754 (0.000)***	LM test	741(0.000)***
Hausman test	51.6 (0.000) ***	Hausman test	55.8 (0.000) ***

Notes:
Probability values are in parentheses;
*** indicates significance of the values at the 1% level.
** indicates significance of the values at the 5% level.
* indicates significance of the values at the 10% level.

Model 2:

$$\ln ME_{i,t} = \alpha + \beta_1 \ln GDP_{i,t} + \beta_2 \ln CME_t + \beta_3 \ln USME_t + \beta_4 \log POP_{i,t} + \beta_5 \log TR_{i,t} + \mu_{i,t} \quad \text{and}$$
$$\mu_{i,t} = \mu_i + \nu_{i,t}$$

Model 3:

$$\ln ME_{i,t} = \gamma + \theta_1 \ln GDP_{i,t} + \theta_2 \ln CME_t + \theta_3 \ln USME_t + \theta_4 \log POP_{i,t} + \theta_5 \log TR_{i,t} + \theta_6 USCON_t + \pi_{i,t} \quad \text{and}$$
$$\pi_{i,t} = \lambda_i + \varepsilon_{i,t}$$

Figure 1. The Scatter of Military Expenditures