

**THE MILITARY EXPENDITURE –ECONOMIC GROWTH NEXUS:
EVIDENCE FROM CHINA, 1950-2011**

March 2011

OURANIA DIMITRAKI[†]
GUY LIU[‡]

Department of Economics and Finance
Brunel University
Uxbridge UB8 3PH

ABSTRACT

This paper focuses on the effects of military spending on economic growth in the case of China. The estimated regressions are based on Barro's (1991) neoclassical growth model that controls for economic institutional variation across countries. The data analysis covers the case of China during the period 1950 to 2011. The empirical findings indicate that military spending has had an overall net positive influence on economic growth for the covered period. Furthermore, the magnitude of this positive impact tends to increase over time as evidenced by the regression results. Given the move towards China's military modernization and rapidly growing military spending and the country's equally rapid economic growth in recent years, this paper's empirical results challenge the previous arguments that enhanced defense spending hinders economic growth.

Keywords: Defense Spending, Economic growth, Barro's neoclassical growth model, China

JEL 011

[†] Corresponding author. Contact information: Department of Economics and Finance, Brunel University Uxbridge, UB83PH, United Kingdom. Email: Ourania.Dimitraki@brunel.ac.uk.

[‡] Department of Economics and Finance Brunel University. Contact information: Department of Economics and Finance, Brunel University, Uxbridge, UB83PH, United Kingdom. Email: Guy.Liu@brunel.ac.uk. Phone: +44-1895-266-650.

1. INTRODUCTION

The analysis of how the defense sector impacts on economic growth has a long history. After the Cold War, the reduction in defense expenditure was considered a *peace dividend*¹. However, Benoit (1973, 1978) argues that defense spending has a positive effect on economic growth for a sample of 44 less developed countries (LDCs) over the period 1950 to 1965. Sipri (2011) reports that the world military expenditure in 2010 reached \$1630 billion, representing 2.6% of global gross domestic product (GDP) or \$236 for each person. Since Benoit's (1973, 1978) arguments, and especially currently (Sipri's reports different years), military spending causes a big debate in the field which is partly responsible for the controversial research that has followed. Unlike most other forms of government spending, the defense expenditure has both causes and consequences (e.g. political, economic and religious interactions and conflicts in both the domestic and international level) (Wilkins, 2004).

Theories on the economic impact and the increasing military spending greatly differ and include arguments that they either improve domestic economic performance or forcing down any growing processes. The empirical findings on this matter are inconclusive, partly due to a failure to extricate the various dimensions of military expenditures. The previous literature was divided in studies that investigate the military burden in developing countries and those that research the developed world. This paper adds to the literature by investigating the defense burden on the Chinese economy over the period 1950 to 2011 by using annual military data collected by Shambaugh (2002).

¹ At the end of World War II, and especially after the end of Cold War there was an increased need for substantial cuts in military spending with the simultaneous international cooperation to reduce political tensions will secure world peace and will enhance the output productivity.

China is among the Asian countries that cannot be categorized easily. In terms of per capita income it remains a Third World country and as an international actor and especially in terms of its security policies it is a major power (World development report, 1989).

Table 1: Net Government Revenues: CHINA 1952-2005				
(per cent of GDP in current prices)				
Year	Total	Taxes	Net revenues from enterprises	Other
1952	25.6	14.4	8.4	2.8
1965	27.6	11.9	15.4	0.3
1978	31.2	14.3	15.8	1.1
1987	18.4	17.9	-2.8	3.3
1995	10.7	10.3	-0.6	0.9
2005	17.3	15.7	-0.1	1.7

Table 2: Net Government expenditures: CHINA 1952-2005						
(per cent of GDP in current prices)						
Year	Total	Economic construction	Culture and education	Defense	Administration	Other
1952	25.9	10.8	3.1	8.5	2.3	1.2
1965	27.1	14.8	3.6	5.1	1.5	2.1
1978	31.0	19.8	4.1	4.6	1.5	1.0
1987	18.9	9.6	1.8	1.8	1.9	1.4
1995	11.7	4.9	1.1	1.1	1.7	1.0
2005	18.5	5.1	4.9	1.4	3.6	3.6

Sources: Adapted by Madisson OECD (1998:92; 2007: 90): Tables 3.29, 3.28

China's greatest challenge is to control its own ascend in contrast to countries such as Japan and Korea —to take advantage of its stronger capabilities to expand its regional influence without provoking the regional instability that could undermine its long-term economic prosperity and integration. Furthermore, the Chinese economy transformed from a closed and planned economy to a market economy. Through the above

transformation two different periods can be identified since 1949: ‘[a] closed-door economy before 1978 and opened-door economy after 1978’ with significant differences to the Chinese GDP before (5.9%) the 1978 and after (10.5%) even though the growth rate was increasing in both periods (Yiwen, 2011:3).

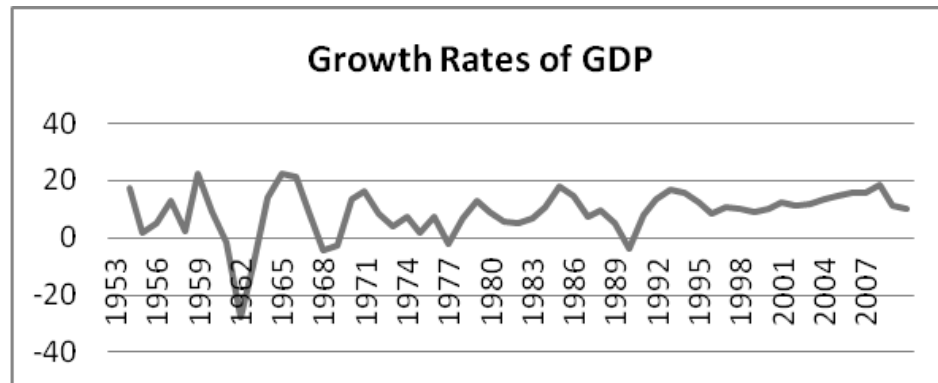


Figure 1: Growth Rates of GDP (source: data)

The Chinese per capita income rose fast (6.6 % a year from 1978 to 2003), comparing to 1.8% a year in Western Europe and the United States and four times faster than the world average (22% to 74% of the world level) (Maddison, 2007). With that speed growth China became the world’s second biggest economy, after the United States. Nonetheless, the extent of China’s economic growth seems to be increasingly accompanied by growing caution from its Asian neighbors and Western powers. Ideological biases against and diplomatic challenges toward China’s authoritarian system have, ironically, fueled Chinese nationalism and patriotism.

Thus, to investigate the Chinese military expenditure is of great interest since the Chinese leadership seems to rely increasingly on appeals to domestic harmony for political legitimacy and international image. To determine though, China’s military

spending is not an easy task. Firstly, because the military budget in China has had extra-budgetary sources of revenue (Shambaugh, 2002). Secondly, the Chinese government publishes its official annual defense budget figures and provides justifications for the announced increases in military spending as part of its efforts to alleviate potential outsiders. Furthermore, according to the Chinese government the Chinese military budget reflects in general the economic growing process but the Pentagon identifies China as the only potential power to challenge USA in the future (Shen and Feffer, 2009). But these published by the Chinese government figures, many times do not match the estimates of outside observers. The official Chinese defense budget for 2010 was 532 billion Yuan (\$78 billion), but according to SIPRI's estimates China's total military expenditure was 809 billion Yuan (\$119 billion) which shows an increase in military spending by 189% between 2001 and 2010 (an average annual increase of 12.5%) (Sipri, 2011). The 3.8% increase in 2010 signifies a significant slowing of growth, which in turn reflects the lower economic growth in 2009 (Sipri, 2011).

The results of the above arguments and research were to raise more questions than they answer related with the Chinese military burden such as what is its role in the Chinese growth spectrum. In the last six decades there were major institutional changes in China and the route of the Chinese growth increased sharply. China now plays a big role in the world economy, and its importance is likely to increase further. The above statement brings security issues and political tensions into the centre of the Chinese national agenda which creates a necessity for defense spending. Figure 2 shows the direction of the Chinese GDP, the governmental military spending and non-military governmental spending.

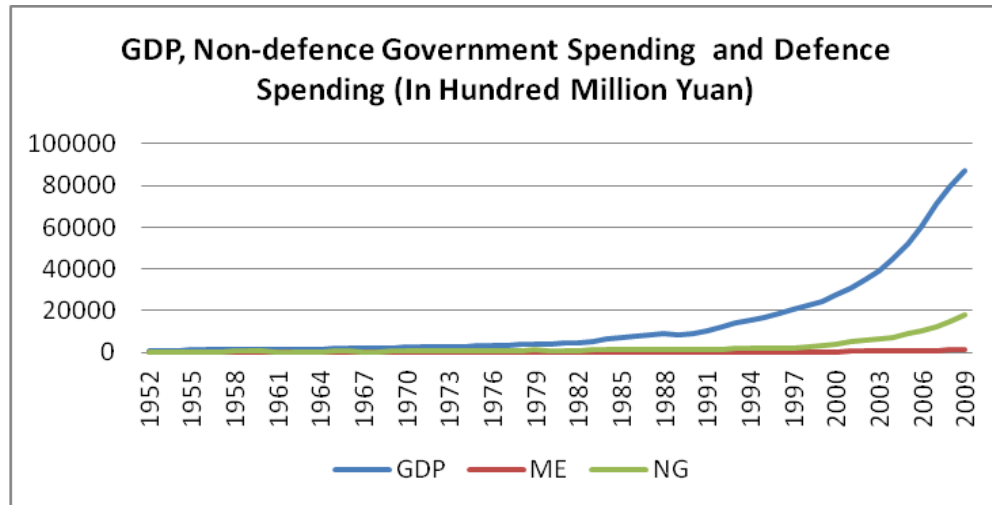


Figure 2: GDP, Military Expenditure and Non-defence Government Spending (source: adapted by Yiwen, 2003)

The above debate related with increases in China's military burden captivated the interest of the current paper. Furthermore, a relative analysis of the Chinese performance related with the military burden can provide new perceptions on the nature of economic growth as it will help to highlight further Chinese economic developments. Additionally, it will help us understand China's existing policies and institutions.

Thus, the purpose of this paper is to analyze the defense-growth relationship in China during 1950-2010. We estimate the economic growth equation based on Barro's (1991) neoclassical growth model for China for 1950-2010. Typically, we assume that the defense expenditures are a burden on the economy but sometimes the military spending might wield a favorable effect on the real economic activity and unemployment (Balfoussias & Stavrinou, 1996). Thus, and by taking all the above into account, the main focus of this paper is on verifying how defense expenditure affects economic growth in China over the period 1950-2011.

The rest of the paper is divided as follows: section 2 reviews the existing literature, section 3 analyses the data and sources, section 4 presents the results related with the

relationship between military expenditure and economic growth in China, and finally section 5 concludes the study.

2. EXISTING ARGUMENTS

Various schools of thought were developed related with the effect of defense expenditure on economic growth. Firstly, the military Keynesians who support the view that military expenditure have a positive effect on economic growth (Wilkins, 2004). Military Keynesians further content defense expenditure as a stimulator to economic growth by increasing demand into the market and by using defense as a tool of fiscal policies planning. However, concerns related with the prolonged school of thought, are the interrelated governmental monetary and fiscal policies (e.g. the rate of taxation which should not be increased because of excess public spending on defense). Secondly, the Marxist school of thought who contents that defense spending is necessary, especially in western countries due to under consumption (Wilkins, 2004). The Marxists support the view that military expenditures have a negative effect on economic growth and the governmental decisions to use defense spending as a fiscal tool will hinder the economic growth in any country (Wilkins, 2004). The Marxist school of thought can be considered with reference to LDC. However, there are studies that support the fact that military expenditures have no effect on economic growth.

To begin with, previous surveys of the military spending growth literature include Chan (1986), who found a lack of consistency in the results related with the above relationship, Ram (1995) who reviewed 29 studies, concluding confirmation of a positive effect of defense expenditures on growth. Dunne (1996) by covering 54 studies notes that

military spending had no effect on growth and was likely to have a negative effect, but there was no evidence of positive effects. Smith (2000) suggesting the large literature did not indicate any robust empirical evidences, positive or negative, though he designates that there is a small negative effect in the long run, but that requires considerably more sophisticated techniques to find.

Furthermore, Smaldone (2006) in his review of African countries considers the military growth nexus to be heterogeneous, indefinable and compound, but denotes that the variations in results in the previous literature can be explained by including other intervening variables. Smaldone (2006) further denotes that the results can be both positive and negative but are usually not prominent, although the negative effects tend to be wider and deeper in African countries. The above occurs either because of the level of corruption in the government², or because the defense expenditure take over a significant proportion of the governmental investment³, or from political pressures⁴, or even it generates budgetary constrains⁵. Dunne and Uye (2009) in a survey of 102 studies on the economic effects of military spending, show that almost 39% of the cross country studies and 35% of the case studies find a negative effect of military spending on growth, with only around 20% finding positive for both types of studies leaving the rest with neutral results.

Moreover, Dunne and Uye (2009) state that empirical models that follow a demand side effects, and by excluding investment from their investigation, are likely to find negative results, unless there is some reallocation to other forms of government spending

² For more see :Aizenman and Glick, 2006

³ For more see: Birdi and Dune, 2001.

⁴ For more see: Landau, 1996.

⁵ For more see: Dune and Uye, 2008.

(e.g. social expenditure), whilst those with only a supply side find positive or insignificant effects. According to Brauer (2002) the supply side models find positive effects because those models are essentially controlled to find such results.

Furthermore, there has been some literature that focuses on the military economic growth nexus in China. Chen (1993) investigates the causal relationship between defense expenditure and economic growth in China over the period 1950-1991. His findings reveal that defense spending is not cointegrated with the real economic growth rate, which implies lack of any long-run equilibrium correlation between the prolonged variables. Masih et al. (1997) examine further the causal relationship between defense spending and economic growth in China. Their results show a positive but unidirectional causality that runs from defense expenditure to economic growth. They further, designate that defense spending and economic growth have a common trend over their chosen period, but it was rather the defense spending that boosts growth.

Wolde-Rufael (2001) investigates the long-run relationship between economic growth and defense spending in China over the period 1950-1991 and note that the two series were integrated of the same order but not Granger-causally related to each other in any direction. Lai et al. (2005) investigate the relationship between national defense spending and economic growth for China by employing both linear and non-linear models for the period 1953-2000. Their findings show that China's national defense spending boosts economic growth. Furthermore, Pradhan (2010) finds a bidirectional causality relationship between economic growth and public debt in China and their findings show a unidirectional causality from defense spending to economic growth. Hence, Yiwen (2011) the effect of defense spending on aggregate output is investigated from 1952-2009

and the findings show that defense spending affect in a positive way the Chinese economy after contacting a cointegration test for the aforementioned period. However, Yiwen (2009) notes that in the long run a rise in the defense spending brings a slight decrease in the Chinese economy.

Given the fact that the previous literature finds unclear results could be interpreted as a need to provide further evidence against there being a positive impact of military spending on the economy with reference to China (as a case study).

3. DATA AND METHODOLOGY

The analysis is based on data for China for the period 1950-2011. The annual data used come from different sources. Gross Domestic Product (GDP) per capita, aggregate non-defense (non-military) spending (GE), state total Employment Rates are available from the OECD statistics. The military spending (ME) is from the Shambaugh (2002) data which main advantage is that they are based on the Contemporary China Series editing group (military logistical work in Contemporary China). The average years of Schooling for China are from the Barro-Lee Dataset and the data for disputes are from the Militarized Incident Database and for the Intergovernmental Organizations version 3.2 are from the Correlates of War Projects Inter-governmental Organization dataset.

Additionally, and in view of the limitation of the analysis to those indicators we believe are essential to pinpointing the relationship between defense spending and economic growth for China from 1950-2011 (by following the Barro (1991) model) the model is formalized as follows:

$$\text{GDP per capita}_t = \alpha_0 + \beta_1 (\text{ME})_t + \beta_2 (\text{LGE})_{t-1} + \beta_3 (\text{Average_years-schooling})_t + \beta_4 (\text{Investment})_t + \beta_5 (\text{Employment})_t + \beta_6 (\text{Interstate_Disputes})_t + \varepsilon_t$$

Where: t denotes years and ε is a stochastic term with the assumptions of normal distribution and zero mean and L denotes the natural logarithm.

4. RESULTS AND DISCUSSION

To accommodate our results the OLS model is employed, as a starting point of our analysis over the period 1950-2011. The first step is to examine the unit root properties of the variables involved by using the augmented Dickey-Fuller test. Also, the regression equation was tested for normality of the residuals (by using the Jarque-Bera test, for heteroskedasticity of the residuals), (and we additionally employed the Breusch-Pagan and Engle ARCH test since we expect that the heteroskedasticity will behave in an auto-correlated way). This expectation is tested using the Breusch-Godfrey test –LM test –for testing the first-order serial correlation of the error term. The details of our model and the tests are reported in Table 1 below.

TABLE 3- ESTIMATION RESULTS			
CHINA 1950-2011			
Dependent variable LGDP _t	(1) OLS	(2) OLS	(3) OLS
CONSTANT	5.92 (4.37)*	5.70 (4.42)	6.08 (4.68)
LMILITARY_SPENDING	0.12 (2.36)*	0.13 (2.60)*	0.12 (2.38)*
LGOVERNMENTAL_EXPENDITURE	-0.32 (-0.50)		
LGOVERNMENTAL_EXPENDITURE _{t-1}		1.05 (1.70)**	
D(INVESTMENT)	1.46	1.50 (8.05)*	1.46 (7.72)*

	(7.63)*		
	8.25 (1.27)	0.01 (1.83)**	8.38 (1.31)
D(EMPLOYMENT _{it})			
D(AVERAGE_YEARS_SCHOOLING)	-47.30 (-0.91)	-62.10 (-1.26)	-53.45 (-1.07)
DISPUTES	0.13 (0.09)	-0.24 (-0.18)	0.02 (0.01)
R ²	0.69	0.71	0.69
N	50	51	51
Durbin-Watson stat	1.92	1.83	1.88
White test	N*R ² =32.18 p-value=(0.19)		
Breusch-Pagan-Godfrey	N*R ² =7.22 p-value=(0.30)		
Arch Test	N*R ² =0.003 p-value=(0.86)		
Breusch-Godfrey Serial Correlation LM test	N*R ² =2.12 p-value=(0.035)		
t-statistic is reported in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.			
D denotes the first difference, L denotes logarithms.			
Ho= Homoskedastisity Var(ε _{it}) = σ ² H ₁ = Heteroskedastisity Var(ε _{it}) = σ _t ²			

Table 3 above shows firstly, the positive effect between military spending and economic growth. The positive effect might be due firstly to the fact that the military burden is relative small in relation to the whole economy in China which makes the economic benefits greater than the costs related with the military spending (3.4% of GDP an average from 1952-1978, and 1.4% of GDP an average from 1978-2009 in relation with the growth of GDP of 5.9% from 1952-1978 and 10.5% from 1978-2009) an average of 1.7% since 1952 (Yiwen, 2011). The aforementioned makes the result consistent with Deger and Sen (1995). Since in the model though exist the rest of the governmental expenditure (governmental spending in social security) then the case of non-linearity created due to a mis-specified model which will create bias in the results⁶ is not a case in the current situation. In addition, military expenditure will affect the overall economy in an indirect positive way by educating the civilians in vocation and technical issues that

⁶ For more information in the nonlinearities and model misspecification due to that see: Dunne and Perlo-Freeman, 2003; Aizenman and Glick 2006; among others.

boosts human capital. Moreover, military forces can engage in certain R&D and production activities that boosts the economic output productivity in LDC (less developed countries) (Benoit, 1978). Then the military spending in China follows the Keynesian effect (expansion of aggregate demand) which leads to allocation of governmental capital in such a way that increases employment and profits which in turn increases investment and finally economic growth.

Governmental investment and governmental spending (lagged by one year – effects of the previous period) affect growth positive which makes the above results consistent the previous literature. The average years of schooling and the disputes have an insignificant effect on economic growth in the case of China under the years of study. Furthermore, employment positively affects economic growth since it boost aggregate demand (e.g. Bloom and Freeman, 1988; Barlow 1994; Crenshaw et al, 1997 among others). Furthermore, the average years of schooling and disputes have an insignificant effect on economic growth in China for the chosen period.

5. CONCLUSIONS

The military expenditure -economic growth nexus has long been debated in the defense economics literature, without reaching conform results. Even though there are empirical studies concerning the aforementioned relationship both for individual or a group of countries, such as Latin American countries and OECD countries, the empirical evidence in the global context is inadequate reporting positive, negative and neutral effects.

REFERENCES

- Aizenman, J. and Glick, R. (2006) Military expenditure, threats, and growth. *Journal of International Trade & Economic Development*. **15** 129-155.
- Balfoussias, A. and Stavrinou, V. (1996) The Greek Military Sector and Macroeconomic Effects of Military Spending in Greece, pp. 191-213 in Gleditsch, N.P., Bjerkholt, O. Cappelen, A. Smith, R.P. and Dunne, J.P. (eds), *The Peace Dividend*, North Holland.
- Barlow, R. (1994) Population Growth and Economic Growth: Some More Correlations. *Population Development and Review*. 20 153-165
- Barro, R. J. (1991) Economic Growth in a Cross Section of Countries. *Quarterly Journal of Economics*. 106 407-443.
- Benoit, E. (1973) Defense and Growth in Developing Countries. Boston MA: Heath, Lexington Books.
- Benoit, E. (1978) Growth and Defense in Developing Countries. *Economic Development and Cultural Change*. 26 (2) 271-280.
- Birdi, A. and Dunne, J. P. (2001) An Econometric Analysis of Military Spending and Economic Growth in South Africa. Paper presented at the 1999 *Econometrics for Africa Conference* in Johannesburg.
- Bloom, D., E. and Freeman, R. B. (1988) Economic Development and the Timing and Components of Population. *Journal of Policy Modeling*. 10 (1) 57-81.
- Brauer, J. (2002) Survey and Review of the Defense Economics Literature on Greece and Turkey: What Have We Learned? *Defense and Peace Economics*. 13 (2) 85-107.
- Chan, S. (1987) Military Expenditures and Economic Performance in *World Military Expenditures and Arms Transfers*, US Arms Control and Disarmament Agency, US Govt Printing Office.
- Chen, S. and Feffer, J. (2009) China's military spending: Soft rise or hard threat? *Asian Perspective*. 33 (4) 47-67.
- Chen, C-H. (1993) Causality between defense spending and economic growth: the case of mainland China. *Journal of Economic Studies*. 20 37-43.

- Chung-Nang Lai, Bwo-Nung Huang and Chin-Wei Yang (2005) Defense spending and economic growth across the Taiwan straits: a threshold regression model. *Defense and Peace Economics*. 16 (1) 45-57.
- Crenshaw, E. M., Ameen, A. Z. and Christenson, M. (1997) Population Dynamics and Economic Development: Age-Specific Population Growth Rates and Economic Growth in Developing Countries, 1965-1990. *American Sociological Review*. 62 (6) 974-984.
- Deger, S and Sen, S. (1995) *Military expenditure and developing countries*. In handbook of Defense Economics, Volume 1, edited by Hartley, K. and T. Sandler, Amsterdam: Elsevier, pp. 275-307.
- Dunne, J. P. (1996) Economic Effects of Military Expenditure in Developing Countries: A Survey, eds. Gleditsch et al, *The Peace Dividend*, Amsterdam: Elsevier, pp. 439-464.
- Dunne, P. and Perlo-Freeman, S. (2003) The Demand for Military Spending in Developing Countries. *International Review of Applied Economics*. 17 23-48.
- Dunne, J. P. and Uye, M. (2008) Does High Spending on Arms Reduce Economic Growth? A Review of Research. Report for Oxfam. March 2008.
- Lai, C. L., Huang, B. N. and Yang, C. W. (2005) Defense spending and economic growth across the Taiwan straits: a threshold regression model. *Defense and Peace Economics*. 16 (1) 45-57.
- Landau, D. (1996) Is One of the 'Peace Dividends' Negative? Military Expenditure and Economic Growth in the Wealthy OECD Countries. *The Quarterly Review of Economics and Finance*. 36 (2) 183-195.
- Masih, A. M. M., Masih, R. and Hasan, M. S. (1997) New evidence from an alternative methodological approach to the defense spending-economic growth causality issue in the case of mainland China, *Journal of Economic Studies*. 24 123- 40.
- Pradhan, R. P. (2010) Defense Spending and Economic Growth in China, India, Nepal and Pakistan: Evidence from Cointegrated Panel Analysis. *International Journal of Economics and Finance*. 2(4)

- SIPRI Yearbook (2011) *Armaments, Disarmament and International Security*. Oxford: Oxford University Press.
- Smaldone, J. P (2006) African Military Spending: Defense versus Development? *African Security Review*. 15 (4) 18-32.
- Shambaugh, D. (2002) *Modernizing China's Military. Progress, Problems, and Prospects*. Berkeley, Los Angeles and London: University of California Press.
- Smith, R. P (2000) Defense Expenditure and Economic Growth, in Gleditsch, N. P, Goran Lindgren, Naima Mouhleb, Sjoerd Smit and Indra de Soysa (2000) *Making Peace Pay: A Bibliography on Disarmament and Conversion*. California: Regina Books, pp15-24.
- Wilkins, N. (2004) Defense Expenditure and Economic Growth: Evidence from a Panel of 85 Countries. Available at: <http://cama.anu.edu.au/macroworkshop/Nigel%20Wilkins.pdf> (accessed at November 2011).
- Wolde-Rufael, Y. (2001) Causality between defense spending and economic growth - The case of mainland China: a comment. *Journal of Economic Studies*. 28(3) 227-230.
- Yiwen, J. (2011) Defense spending and aggregate output –Evidence from China 1952-2009. *Department of Defense Economics*, Military Economics Academy, Wuhan, P.R. China