

# Impact of Defence Burden on Economic Growth

By

Zainab Iftikhar

Amanat Ali

# Introduction

- ◆ Study explores the relationship of economic growth with defence burden in different parts of the world. We follow an endogenous growth model that suggest a negative relationship of growth with income inequality and defence burden. The implications of the model are tested.
- ◆ Conclusion regarding convergence.

# Literature Review

Study	Period of Analysis	Estimation technique	Conclusion
Benoit (1978)	1955-65	OLS	Significant positive relationship between growth and defence expenditure.
Deger,Smith(1983)	1965-73	3SLS	Negative effect of military expenditure on growth.
Deger(1986)	1965-73	OLS	Significant negative relationship of military expenditure with growth.
Blomberg (1996)	1967-82	OLS, GLS	Defence has a direct negative effect on growth though the relation is weak.
Chowdhury (1991)	1961-87	Granger-causality test	The relationship can not be generalized across countries.
Heo(1998)	1961-90	NLS	Relation between growth and defence can go either way.

# Trends in Military Expenditure

- ◆ During the first few years after the end of the cold war, there was an initial period of disarmament, reflected in a significant reduction in world military spending.

1988-1996	↓28 per cent in real terms, average annual reduction of 4.5%
1996-2001	↑ averaging 1.5 per cent per year
2001-2005	↑ 25 per cent in real terms average increase of 6 % per year

# Trends in Military Expenditure

- ◆ 2005 total world ME > \$1 trillion. Corresponding to 2.5% of world GDP and 173 dollars per capita.
- ◆ 2005, the top 5 spenders accounted for 65 per cent of world ME, with the USA as biggest spender, accounting for 48 per cent of the world total.
- ◆ The next 10 major spenders accounted for 19 per cent of the world total. Thus together the top 15 spenders accounted for 84 per cent of world ME in 2005

# Trends in Military Expenditure

- ◆ Largest spender United States, with 48 per cent of the world total.
- ◆ The next four in size are the UK, France, Japan and China, each accounting for 4–5 per cent of the world total.
- ◆ The next five are Germany, Italy, Saudi Arabia, Russia and India, each accounting for 2–3 percent of the world total
- ◆ Followed by South Korea, Canada, Australia, Spain and Israel, with 1–2 per cent each of the world total.

# Trends in Military Expenditure

## Military expenditure by income group

- ◆ 2005, 35 high-income countries = 80 per cent of world ME.
- ◆ 49 low-income countries accounted for 3 per cent.
- ◆ Defense burden as share of GDP is highest in the two countries in the Middle East—Israel and Saudi Arabia, with 8.7 and 8.3 respectively.

# Trends in Military Expenditure

## Military expenditure by income group

- ◆ Big spenders with a defense burden above the world average of 2.5 per cent are the USA, Russia, India, the UK and France, with GDP shares of 2.6–4.0 per cent.
- ◆ The big spenders with the lowest military burden are Japan, Canada and Spain, with one per cent of GDP spent on the military.

# ANALYTICAL FRAMEWORK

- ◆ We are following the model developed by (Persson and Tabellini, 1994) for our analysis.
- ◆ Let the utility of the  $i$ th individual born in period  $t-1$ , but indexed by  $t$ , be:

$$v_t^i = U(c_{t-1}^i, d_t^i)$$

1

$c$  is the consumption when  $i$ th individual is young  
 $d$  denotes the consumption when he is old.

# ANALYTICAL FRAMEWORK

- ◆ budget constraint of the  $i$ th individual is:

$$c_{t-1}^i + k_t^i = y_{t-1} \quad 2$$

$$d_t^i = r[(1 - \theta_t)k_t^i + \theta_t k_t] \quad 3$$

- ◆ Where  $y_i$  is income of the  $i$ th individual when young
- ◆  $k_i$  and  $k_t$  denote the individual and average accumulation, respectively, of any asset,
- ◆  $r$  is the exogenous rate of return on that asset

# ANALYTICAL FRAMEWORK

- ◆  $\theta$  denotes policy variable.  $\theta$  would be interpreted as proportional capital income tax, the proceeds of which are used to equal lump-sum transfers to every old citizen and for defence expenditure.
- ◆ The income when young is defined as

$$y_{t-1}^i = (w + e^i)k_{t-1}$$

4

- ◆  $w$  denotes endowment of “average basic skills”
- ◆  $e^i$  is individual-specific endowment of such skills

# ANALYTICAL FRAMEWORK

- ◆  $k$  could be interpreted as human or physical capital that has a knowledge spill over on the basic skill of the young individuals
- ◆ Defence expenditure affects  $k$  both negatively and positively.
- ◆ Summarizing, the average national income is a linear function of the assets already accumulated,  $(w + r)k$ , where  $wk$  and  $rk$  represents the average wage to the young and profit to the old, respectively.

# ANALYTICAL FRAMEWORK

- ◆ At the start of period  $t-1$  the eligible voters choose  $\theta$ . The investors choose  $k$ . there is one-period-ahead commitment of policy. We assume that only the young generation participates in the voting, as the old generation in period  $t-1$  is not affected by the policy enacted in period  $t$ .

# ANALYTICAL FRAMEWORK

- ◆ The ratio of consumption in the two periods is a function only of inter-temporal prices and does not depend upon wealth: that is

$$d_t^i / c_{t-1}^i = D(r, \theta), \text{ with } D_\theta < 0 \text{ and } D_r > 0.$$

- ◆ It is also assumed that every individual has the same “saving rate”. So individual with more skills accumulates more  $k$ .

# ANALYTICAL FRAMEWORK

- ◆ By repeated substitutions we solve for the growth rate of  $k$

$$g_t = G(w, r, \theta_t) = \frac{k_t}{k_{t-1}} - 1 \quad 6$$

- ◆ In equation (6)  $Gw > 0$ ,  $G\theta < 0$  (since  $D\theta < 0$ ), and  $Gr > < 0$ .

# ANALYTICAL FRAMEWORK

$$\partial v_t^i / \partial \theta_t = U_d(.) \left[ (k_t - k_t^i) + \theta_t \partial k_t / \partial \theta_t \right] r \quad 7$$

- ◆ This expression reflects trade-offs facing the voters.
- ◆ the growth rate in the politico-economic equilibrium is

$$g^* = G(w, r, \theta^*(w, r, e, m)) \quad 8$$

# DATA AND VARIABLES

- ◆ Panel data (1984-2003) consisting of a sample of 80 developing and developed countries. The data sources are WDI and WIDER.
- ◆ Dependent variable is annual percentage growth rate of per capita GDP represented as *PCIG*.
- ◆ We use Gini index for the measurement of income inequality. The expected sign of this variable is negative.
- ◆ Gross capital formation (% of GDP) is represented as *INVEST*. The expected sign of this variable is positive.

# DATA AND VARIABLES

- ◆  $w$  in our model measures the average basic skills level in the economy. This variable is affected by the level of development.
- ◆ We use level of development of a country, defined as the ratio of that country's per capita income to the highest per capita income at a point in time. This variable, is represented as *DEVELP*.

# DATA AND VARIABLES

- ◆ For political participation We take percentage of total population between the age of fifteen and sixty as a proxy of political participation. This variable is represented as *POP*. Expected sign is both negative and positive. WDI (2006).
- ◆ Military expenditure as a percentage of GDP gives the defence burden on the economy. We represent this variable as *DGDPR*. Expected sign is both negative and positive. WDI (2006).

# Table: 1 Results for Low-Income Group

◆ Variables	Coefficients	t-Values	p-Values
◆ POP	0.4968	5.4771*	0.0000
◆ DGDPR	-0.2640	-0.9589	0.3386
◆ GINI	-0.1745	-4.6529**	0.0103
◆ INVEST	0.1926	3.5928 *	0.0004
◆ DEVELOP	105.3975	2.5696**	0.0108
◆ <i>Adjusted- R2</i>	0.61	<i>DW</i>	1.983
◆	*, **, and *** indicate that the coefficients are significant at 1%, 5% and 10% level of significance respectively.		

# Table: 2 Regression Results for High-Income Group

◆ Variables	Coefficients	t-Values	p-values
◆ POP	0.1169	1.3762	0.1694
◆ DGDPR	-0.4315	-2.5352**	0.0115
◆ GINI	-0.0118	-0.4157	0.6678
◆ INVEST	0.1776	5.3380*	0.0000
◆ DEVELOP	9.2122	2.7656*	0.0059
◆ <i>Adjusted- R2</i>	0.58	<i>DW</i>	2.2

# Table: 3 Regression Results for the World

◆ Variables	Coefficients	t-Values	p-Values
◆ GINI	-0.08207	-3.76650 *	0.0002
◆ POP	0.32954	7.10415*	0.0000
◆ DGDPR	-0.46853	-4.11113*	0.0000
◆ DEVELOP	10.74875	3.15219*	0.0000
◆ INVEST	0.19242	7.61498**	0.0017
<i>Adjusted- R2</i>	0.67	<i>DW</i>	1.96

# RESULTS

- ◆ The sign of this variable, *DEVELP*, is positive in and it is significant for all three groups. This result indicates no tendency for convergence.
- ◆ The value of coefficient is very high (105.3) in case of low-income countries as compared to its value (9.2) in high-income countries. The difference in the two values is consistent with the productivity slow down approach. The main explanation of this approach is based on the “depletion hypothesis” suggested by William Nordhaus (1982).

# RESULTS

- ◆ According to this hypothesis the growth rate, of developed economies, declines as the major technological advances of the past have now been largely exploited, but the commercially significant new technologies have not arrived fast to maintain the early rate of high productivity growth.
- ◆ The effect of defence burden negative but insignificant for low-income countries.

# RESULTS

- ◆ Impact negative and significant for the rest of the three groups.
- ◆ Gini negative for all three groups but insignificant for high-income countries.
- ◆ POP insignificant for high-income group.
- ◆ POP +ve and significant for world and the low-income group.

# RESULTS

- ◆ The sign of *INVEST* is positive and significant for all three groups. The coefficient of this variable is high for low-income group as compared to the high-income group. This is consistent with the microeconomic theory.

# CONCLUSION

- ◆ We followed an endogenous growth and policy model which relates income inequality and defence burden to economic growth. The theoretical result of the model is that income inequality is harmful for growth as higher income inequality leads to policies that could diminish investment. While defence burden can affect growth both positively and negatively but the negative impact of defence burden on economic growth is assumed to be stronger. We tested the implications of our model on the data of low-income and high-income countries. The theoretical results for income inequality and defence burden are supported by the estimation results of the low-income group, high-income group and the results for the world.

# CONCLUSION

- ◆ Defence burden and income inequality exert a negative pressure on the growth of economies across the world. We from our analysis, suggest if high growth is the target of the government, Policies that put some limit on defence expenditure and reduce income inequality could be helpful in minimising the adverse affects of these two variables on economic growth.
- ◆ The results of our study did not support convergence at all three levels of analysis. The hypothesis of poor countries catching up with rich countries was rejected in more homogenous group of countries as well. So our results do not support even a conditional convergence.

**Thank you**