

THE EFFECTS OF MILITARY EXPENDITURE ON ECONOMIC
DEVELOPMENT IN DEVELOPING COUNTRIES:
STRUCTURALIST APPROACH

by

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ABSTRACT

What is the nature of the impact of military expenditure on economic development in developing countries? Results of past studies using diverse approaches to this question are very mixed. Those results include positive, negative, or no effects of military expenditure on economic development. It all depends on different approaches, sample countries, time period, and data sources. In order to resolve these problems, there is a need to decompose the research problem into several separate questions: what kind of impact and how does it occur; the impact of what (measures of defense burden) on what (measures of economic performance); what are the opportunity costs of chosen policies; and what are the policy implications of the impact? In order to perform consistent analysis of these diverse research questions using a uniform set of regression equations, this dissertation will adapt the structuralist approach used by Faini, Annez, and Taylor who modified the “patterns of development” approach developed by Chenery and Syrquin. Seventeen dependent variables are analyzed as a function of military burden, globalization index, net financial inflow, GDP per capita, and population. These dependent variables include investment and savings, private and public consumption, education and health spending, agricultural and industrial output, unemployment rate, export and import, foreign direct investment, urbanization rate, income distribution, life expectancy, literacy rate, and infant mortality rate. Regression analyses were run on the data set consisting of data from 119 developing countries between 1960 and 2010.

Results of the analyses revealed that the nature of the impact of military expenditure on economic development is mostly negative. It has negative impacts on capital formation, industrialization, and social well-being. Structuralists pay particular attention to industrialization and capital formation because they are the most crucial factors of economic development for any developing country. Social well-being, measured by physical quality of life, is central to the expanded definition of economic development. Negative impact of military expenditure on these crucial aspects of economic development is the most significant findings of this dissertation. On the other hand, the increase in military expenditures seems to decrease the unemployment rate, and there seems to be no negative trade-offs between military expenditures and education and health spending.

The policy implication from this analysis is that the military expenditure should not be seen as a tool for economic development in developing countries. It is not development promoting as Benoit suggested, but it is actually development hampering. It may have a power to absorb unskilled workers to alleviate unemployment rate, but its negative impact reaches far greater aspects of economic development. Its negative impact on industrialization, capital formation, and physical quality of life means that the increase in the military expenditure will not help promote economic development in the developing countries.

TABLE OF CONTENTS

ABSTRACT.....	iii
LIST OF TABLES.....	vii
ACKNOWLEDGEMENTS.....	viii
Chapters	
1. INTRODUCTION	1
1.1 Recent Trends of Military Expenditures in Developing Countries	4
1.2 Past Studies of Military Expenditures in Developing Countries	8
1.3 Research Method of This Study.....	14
1.4 Overview of Regression Results.....	16
2. LITERATURE REVIEW	17
2.1 Demand Side Approach.....	19
2.2 Supply Side Approach	21
2.3 Simultaneous Equation Approach.....	23
2.4 Structuralist Approach	26
3. RESEARCH METHOD AND DATA SET.....	33
3.1 Regression Equation	33
3.2 Data Set and Its Sources	43
4. REGRESSION RESULTS FOR RESOURCE ALLOCATION	45
4.1 Investment and Savings.....	45
4.2 Consumption.	48
4.3 Education and Health Spending.....	50
4.4 Summary.....	52
5. REGRESSION RESULTS FOR PRODUCTION AND TRADE.....	53
5.1 Agricultural and Industrial Production.....	53

5.2 Employment	56
5.3 Exports and Imports	58
5.4 Foreign Direct Investment (FDI)	60
5.5 Summary	62
6. REGRESSION RESULTS FOR SOCIOECONOMIC VARIABLES	63
6.1 Urbanization.....	63
6.2 Income Distribution	65
6.3 Physical Quality of Life	67
6.4 Summary	69
7. CONCLUSION.....	70
Appendices	
A. LIST OF PAST STUDIES	73
B. SELECTION CRITERIA AND TIME LAGS.....	77
REFERENCES	82

LIST OF TABLES

Tables

3.1 List of Dependent Variables.....	40
3.2 Descriptive Statistics of Variables	42
3.3 List of Countries.....	44
4.1 Results for Resource Allocation.....	46
5.1 Results for Production and Trade.....	54
6.1 Results for Socioeconomic Variables.....	64
A.1 List of Past Studies.....	73
B.1 Selection Criteria and Time Lags.....	77

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CHAPTER 1

INTRODUCTION

The subject of military expenditures has been on many economists' minds for a long time. As far back as the 18th and 19th centuries, economists discussed the economic impact of military expenditures on society. In *Wealth of Nations*, after recognizing that the first duty of the sovereign was to protect the society from the violence and invasion by means of the military, Adam Smith expressed his concern about increasing costs of the military by stating that the duty of defending grew more and more expensive as the society advanced in civilization (Smith, 1776/1991). Similarly, David Ricardo was concerned about the opportunity cost of unproductive government consumption such as military expenditure in following quote:

Taxes which are levied on a country for the purpose of supporting war, or for the ordinary expenses of the state, and which are chiefly devoted to the support of unproductive labourers, are taken from the productive industry of the country. (Ricardo, 1817/2004, p. 160)

Ricardo seemed to consider an issue of military expenditure crowding out private investment and private consumption. When Paul Samuelson used the “guns vs. butter” example in his classic 1948 textbook *Economics* to illustrate the production possibility frontier, he must have been thinking about the opportunity cost of military expenditures as Smith and Ricardo did (Samuelson, 1948). The fact that Samuelson used the following

quote by President Dwight D. Eisenhower in later editions of the same book suggests that he was indeed thinking about the opportunity costs of military expenditures. “Every gun that is made, every warship launched, every rocket fired signifies, in the final sense, a theft from those who hunger and are not fed” (as cited in Samuelson & Nordhaus, 1995, p. 7). This “guns vs. butter” is a great example to show the concept of scarcity and opportunity cost to 1st-year economics students. The opportunity cost is defined by Schiller as the following: “every time we choose to use scarce resources in one way we give up the opportunity to use them in other ways” (Schiller, 2000, p. 6). So when government decides to spend their budgets on military, they have to give up the opportunity to use them in other services. Every nation faces this “guns vs. butter” dilemma when they make their decision on how much of their government budgets to spend on the military or on other services. Since available resources are very limited for many developing countries, there are high opportunity costs associated with high military spending in most developing countries.

Considering the possibility of a huge impact of military expenditures on economies of these developing countries, one would expect the subject of military expenditures in developing countries to be prominent in the field of development economics. However, this subject has been largely neglected by most textbooks of development economics, hence, there has not been much discussion in classrooms of development economics concerning military expenditures. Among several textbooks of development economics, some of them do not even mention the military expenditures. *Economic Development* by Ray (1998) does not have any entry of either defense spending or military expenditures in its index. Also, *The Puzzle of Latin American*

Economic Development by Franko (1999), *Frontiers of Development Economics* edited by Meier and Stiglitz (2001), and *Leading Issues in Economic Development* (8th ed.) by Meier and Rauch (2005) did not mention military expenditures at all. *The Economics of Developing Countries* (3rd ed.) by Nafziger (1997) mentioned military expenditures in three places, but each mention was only a paragraph long. *Economic Development* (9th ed.) by Todaro and Smith (2006) was the only textbook that devoted nearly four pages of their text to discuss the significance and economic impact of military expenditures in developing countries. Considering how much most developing countries spend on military out of their limited government budget, it is very important to at least discuss the significance and the nature of the impact of military expenditures of developing countries in the classroom of development economics.

The lack of treatment of this subject in development economics and its significance to economies of developing countries are chief motivations of this dissertation to investigate the impact of military expenditures on developing countries. This dissertation will make a contribution to the field of development economics by investigating the nature and significance of the impact of military expenditures on the economies of developing countries by utilizing the research method, which is based on the economic model from the field of development economics. This dissertation will start by asking the following simple question: What is the nature of impacts of high military expenditures to economic development in many developing countries? Is it negative, positive, or neither? The literature review in next chapter will reveal that the answer to this simple question is not that simple, and in fact, it is very mixed. It is a main objective of this dissertation to add better understanding of this complicated subject matter. Before

going into details of how this study will proceed, the next section will illustrate recent trends of military expenditures in developing countries.

1.1 Recent Trends of Military Expenditures in Developing Countries

The military expenditures in developing countries have been rising throughout the last several decades. Figure 1.1 shows the recent trend of military expenditures in constant 2014 US\$ in billions between 1992 and 2014. This graph shows that military expenditures by developing countries started to rise again in the late 1990s after slowing down in the early 1990s. The rise is most noticeable in Asia and the Middle East, although spending in three other regions has also increased. In the last few years, combined total spending by developing countries even surpassed the spending of the United States, which has been by far the largest spender on military in the world. According to Todaro and Smith (2006), the dollar amount of military expenditures in developing countries has increased almost six times between 1960 (\$35 billion) and 2000 (\$200 billion).

Figure 1.2 shows the shares in world military expenditures in the same period of 1992 and 2014. This graph also shows rising trend of military spending by developing countries, especially in Asia and the Middle East. The combined shares of developing countries have also surpassed the share of the United States in the last few years. According to Todaro and Smith (2006), developing countries' share of the world military expenditures increased more than three times between 1960 (8.6%) and 2000 (27.5%).

According to the Stockholm International Peace Research Institute (SIPRI), this increasing trend slowed down a little in 2015 mainly due to declining global oil prices

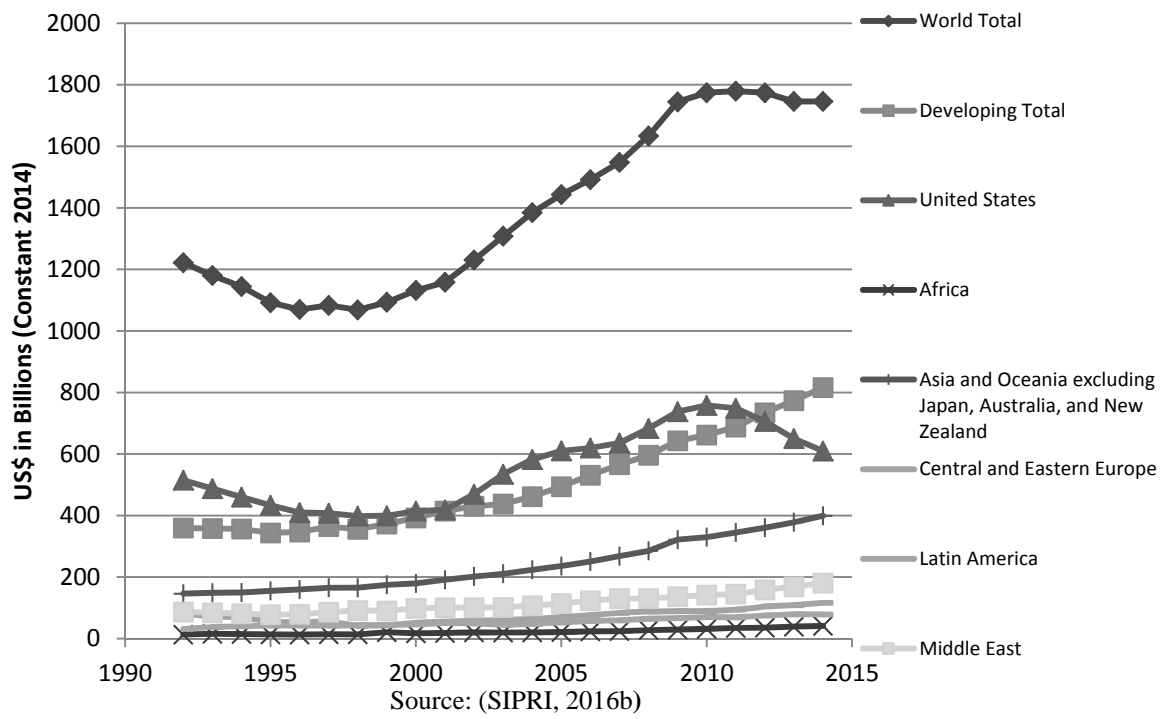


Figure 1.1 Military Expenditures in Constant 2014 Billion US\$

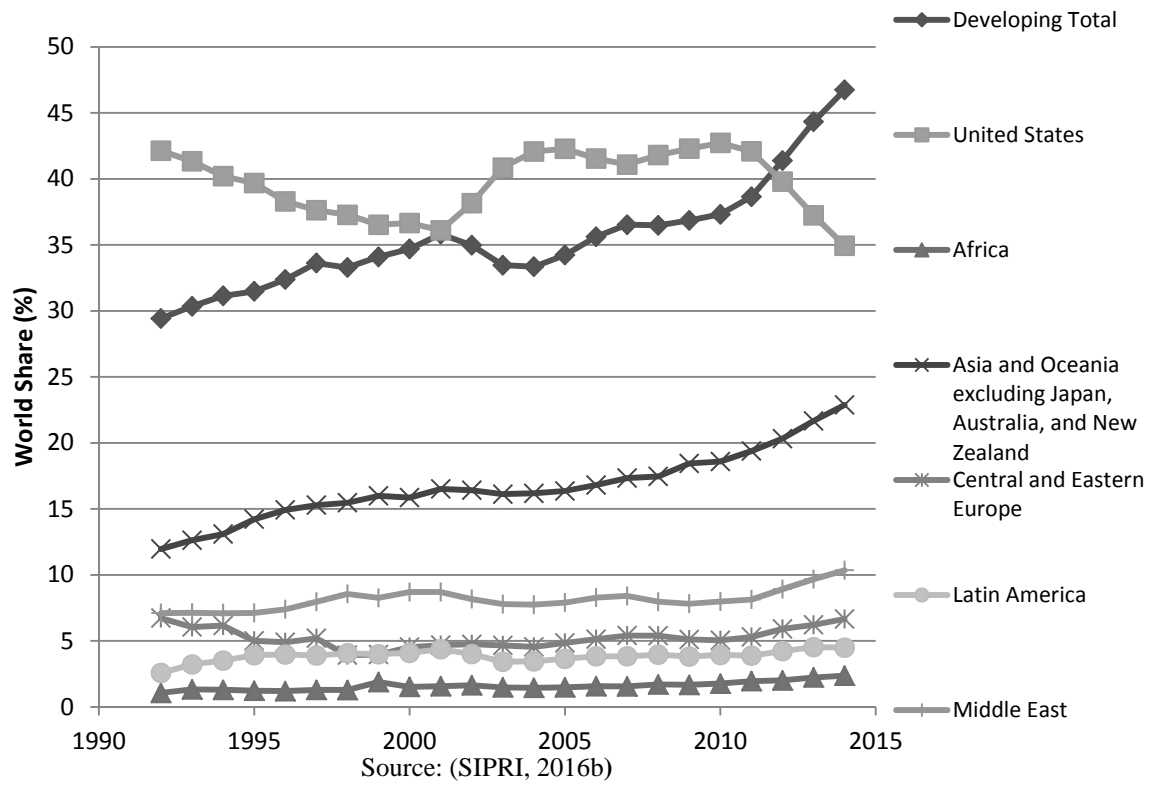


Figure 1.2 Shares in World Military Expenditures

(SIPRI, 2016a). The military expenditures in Africa, Latin America, and the Caribbean decreased in 2015. The decline in Africa was the first decline in 11 years. However, the increasing trend in Central and Eastern Europe, Asia and Oceania, and the Middle East, in which data are available, still continued in 2015 (SIPRI, 2016a).

In addition to the dollar amount of the military expenditures and the share in the world military expenditures, there is another way to measure the military expenditure in the developing countries. It is called a military burden, which is the military spending as a percentage of gross domestic product (GDP) or gross national product (GNP). The majority of past studies of military expenditures in developing countries used this measure of military expenditures because it reflects the economic burden of military expenditure in the country. This dissertation will adopt the military burden as a measure of military expenditures in the analysis. Many developing countries have been suffering from high military burdens. Some countries, especially in Africa and the Middle East, have experienced periods of extreme high military burdens of over 20% or even over 100% under some extreme circumstances, such as engaging in external or internal conflicts. For example, the military burden in Kuwait was 48% in 1990 and 117% in 1991 when Iraq invaded their country (SIPRI, 2016b). Also, when Eritrea was involved in the war with Ethiopia between 1998 and 2000, their military burden was above 30% (SIPRI, 2016b). In Angola, which was in the long period of civil war between 1975 and 2002, the military burden was consistently above 10% with occasional spikes to close to 30% (SIPRI, 2016b). An average of the military burden for 119 developing countries in the period of 1960-2010 in the data set of this dissertation is 3.03%. Regionally, an average of the military burden is 2.52% in Africa, 2.58% in Asia and Oceania, 2.73% in

Central and Eastern Europe, 1.73% in Latin America, and 7.38% in the Middle East and North Africa.

Figure 1.3 illustrates the trend of military burdens for 12 developing countries in the data set of this dissertation between 1960 and 2010. A few countries from each of five regions of the world (Africa, Asia, Central and Eastern Europe, Latin America, and the Middle East and Northern Africa) were selected mainly because of the completeness of their data during the time period. This figure shows that the military burdens in two countries from the Middle East were extremely high from the mid-1960s to mid-1980s,

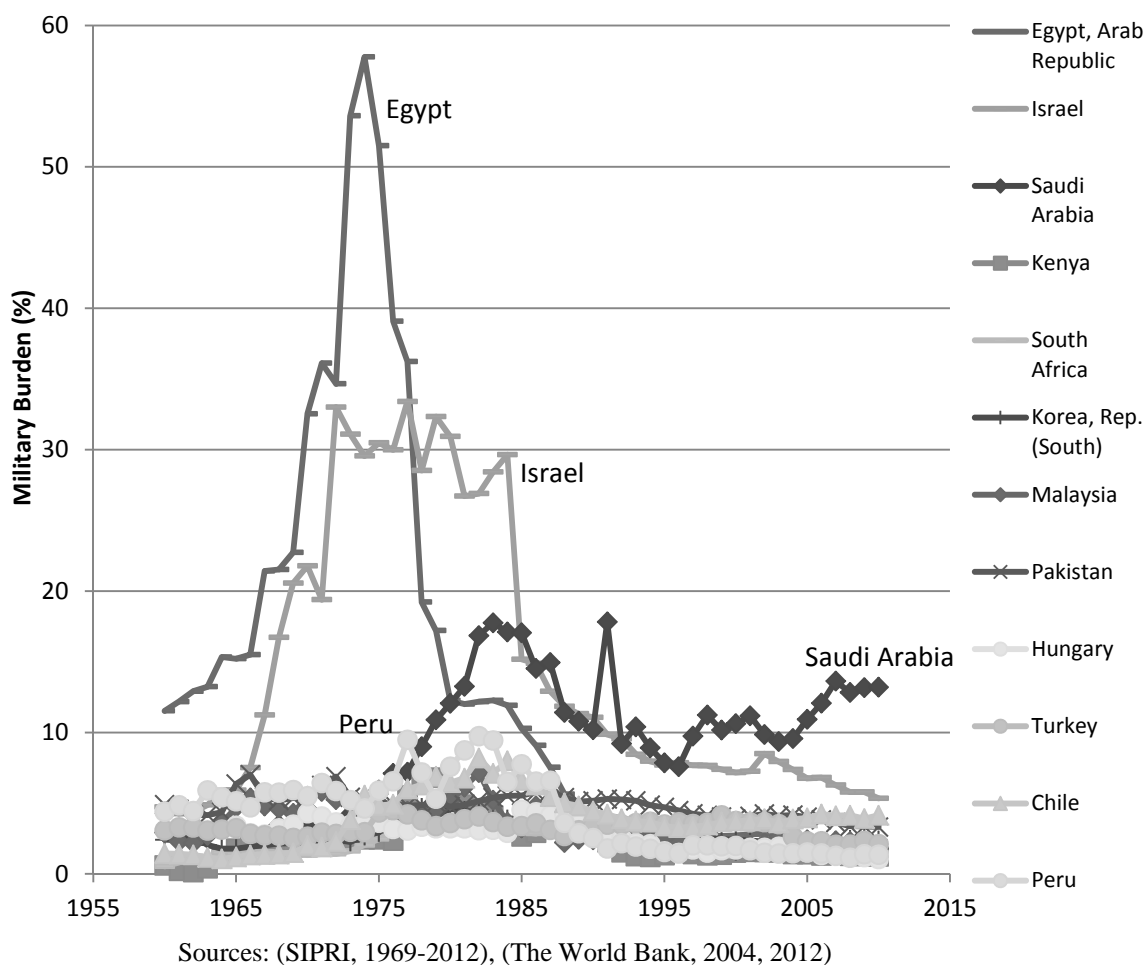


Figure 1.3 Military Burdens in 12 Developing Countries 1960 - 2010

reflecting a volatile situation in the region. These countries were involved in multiple conflicts during that time period. Military burdens of all other countries were generally lower than 10%. Since the late-1980s to early-1990s, military burdens went down below 5% in these countries. One exception is Saudi Arabia, whose military burden has been rising in the 2000s. The fact that military burdens have decreased in most developing countries in the last 2 decades or so in spite of increases in actual dollar amount indicates that their GDPs have been increasing faster than the increase in the military expenditures in many developing countries.

These recent statistics showed that the military expenditure in developing countries has been rising steadily the last few decades at least on actual dollar amount and spending shares of the world. What will be the impacts of this continued high military spending on the economies of developing countries? The next section will briefly review past studies of military expenditure in developing countries.

1.2 Past Studies of Military Expenditures in Developing Countries

Even though there has been a lack of discussion about military expenditures in development economics textbooks, it does not necessarily mean that there has been a lack of literature discussing the military expenditures in developing countries. Ever since Emile Benoit published his seminal book *Defense and Economic Growth in Developing Countries* in 1973, there have been many attempts to analyze effects of military expenditures on economies of developing countries (Benoit, 1973). Benoit found that there was a strong positive correlation between military expenditure and economic growth in 44 developing countries during 1950 to 1965 (Benoit, 1973). After this rather

surprising result was published, many studies followed to examine the effect of military expenditures on the economy of developing countries. Since there is no economic theory specifically developed to analyze the effect of military expenditure, researchers have to adapt some economic model from other economic fields to perform their analyses. That leads to a variety of econometric models reflecting different theoretical perspectives, such as Keynesian, neoclassical, and structuralist (Dunne, Smith, & Willenbockel, 2005).

The Keynesian models usually focus on the level and composition of expenditure on the demand side (Dunne et al., 2005). Researchers using Keynesian models argue that military expenditures are beneficial to their economies by increasing the effective aggregate demand through Keynesian multiplier effect. In economies with excess production capacity, increased aggregate demand by the military spending will drive up output, capacity utilization, and profits rates, which in turn may increase investment (Faini, Annez, & Taylor, 1984). However, since military expenditures have opportunity costs and may crowd out other expenditures, such as investment, private consumption, and other public expenditures, whether the increase in military expenditures leads to economic growth depends on prior capacity utilization rate and how it is financed (Dunne et al., 2005).

Neoclassical models usually focus on the supply side of the economy, especially the availability of technology and factors of production, such as labor, physical and human capital, and natural resources (Dunne et al., 2005). “Some of the demand effects (e.g. crowding out of investment) may also have supply effects by changing the capital stock” (Dunne et al., 2005, p. 451). Military expenditures can divert resources such as capital stock, foreign exchange, and skilled labor, from capital formation, then private

investment and output net of military spending will fall (Faini et al., 1984). Even though the resources used by military are not available for civilian use, there may be externalities, such as training in the military, which can be useful in civilian employment, and military technologies, which may have civilian spin-offs (Dunne et al., 2005). This approach used many different types of growth equations to analyze the effect of military expenditures on the economy.

Structuralists focus “on the mechanism by which underdeveloped economies transform their domestic economic structures from a heavy emphasis on traditional subsistence agriculture to a more modern, more urbanized, and more industrially diverse manufacturing and service economy” (Todaro & Smith, 2006, p. 108). This means that when they discuss the structural change, it includes the change in virtually all economic functions, “including the transformation of production and changes in the composition of consumer demand, international trade, and resource use as well as changes in socioeconomic factors such as urbanization and the growth and distribution of a country’s population” (Todaro & Smith, 2006, p. 113). The structuralists’ approaches were based on two key concepts, namely, dualism and complementarity (Chenery, 1975). An economy is dualistic when it is divided into two different sectors, a modern sector and a traditional sector (Sanchez-Ancochea, 2007). A modern sector is usually identified with manufacturing with high level of income, productivity, capital intensiveness, and wage employment (Sanchez-Ancochea, 2007). A traditional sector is usually identified with agriculture with low productivity, poverty, and low capital intensity (Sanchez-Ancochea, 2007). Structuralists consider a modern sector to be more conducive to economic development and believe modernizing a traditional sector to be important as well. A

wider classification can be applied to urban and rural sectors or large-scale and small-scale productions (Deger, 1992). Another key concept for structuralists is that many investments are complementary in the economy. “The expansion of production in one sector is only profitable if it is accompanied by the expansion of production in other sectors” (Sanchez-Ancochea, 2007, p. 210). This concept implies that the backward and forward linkages in the economy are very important for economic development in the developing countries. These two key concepts indicate that the structuralists consider the interconnection of the disaggregated sectors of economy to be crucial to economic development. This structuralist approach can be applied to the study of the impact of military expenditures on the economies of developing countries. According to Deger (1992), the best structuralist models to analyze the impact of military expenditures in developing countries is a study by Faini, Annez, and Taylor (1984), which takes a series of dependent variables that reflect the concerns of structuralists, namely, investment, imports, industrial production, agricultural production, and tax receipts. Their results show that the military expenditures crowd out investment, and that it has negative and significant impact on agriculture. Their regression model can be easily expanded to include more dependent variables that have significance in structuralists’ perspective.

Results of studies using these diverse approaches are very mixed. Some studies, like Benoit’ study (1973), found positive impact of military expenditures on the economies of developing countries. Other studies found negative impacts of military expenditure on economic growth. Some studies did not find any significant effect of military expenditure on economies of developing countries at all. Sandler and Hartley (1995) argued that most demand side studies ended up with negative results on the one

hand and supply side studies with no significance or small positive effects on the other. However, there were exceptions to this classification. In any case, there is no consensus among researchers concerning the nature of the relationship between military expenditures and economic development in developing countries. Chan (1985) attributed these mixed results of past studies to the problems of different data sources, different samples, different methods, difference between cross-sectional and longitudinal, and the difference in researchers' ideologies. In order to resolve these problems, Chan suggested a need to decompose the research problem into several separate questions: what kind of impact and how does it occur; the impact of what (measures of defense burden) on what (measures of economic performance); what are the opportunity costs of this impact; and what are the policy implications of the impact (Chan, 1985). This dissertation will try to answer these questions, but a question of the impact of what (measures of burden) on what (measures of economic performance) has to be discussed first.

As mentioned earlier, this dissertation will use military expenditures as a percentage of GDP for the military burden variable. A question of what measures of economic performance will be used is more complicated to answer. It all depends on the definition of economic development. Most development economists agree that economic growth is essential but not sufficient for economic development. Sen (1983) argues that economic growth is not synonymous to economic development, and that it is no more than a means to some other objectives. He argues that ultimately, the economic development must be concerned with what people can do or cannot do (Sen, 1983). Then, based on Sen's argument, Todaro and Smith asked the question of whether it is possible to define "development as the sustained elevation of entire society and social system

toward a 'better' or 'more humane' life" (Todaro & Smith, 2006, p. 20). They argued that there are at least three common core values for understanding the meaning of development: sustenance, which is the ability to meet basic needs; self-esteem, which is a sense of worth and self-respect; and freedom from servitude, which is an ability to choose (Todaro & Smith, 2006). Based on these three core values, they argued that development in any society must have at least the following three objectives: to increase the availability and widen the distribution of basic life-sustaining goods; to raise levels of living; to expand the range of economic and social choices (Todaro & Smith, 2006). Ray (1998) includes the following goals to these objectives: the removal of poverty and malnutrition; an increase in life expectancy; an access to sanitation, clean drinking water, and health services; the reduction of infant mortality; and increased access to knowledge and schooling, and literacy. Nafziger (1997) suggested the following three alternative measures for economic development: Physical Quality of Life Index (PQLI), which consists of infant mortality rate, life expectancy, and literacy rate; Human Development Index (HDI), which consists of literacy rate, life expectancy, gross enrollment rate, and GDP per capita; and Basic Needs Attainment such as food, education, health, sanitation, water supply, and housing. These objectives of economic development were included in the United Nations' Millennium Development Goals in 2000 as well (Todaro & Smith, 2006). These expanded definitions of economic development cannot be dealt with in demand side or supply side approaches due to the fact that their main focus is usually only on economic growth. Only structuralist approaches can handle these broad definitions of economic development since many of their focuses coincide with these definitions. Structuralists pay attention to industrialization, structure of production and

trade, agricultural sector, urban and rural sector, income distributions and poverty, and other socioeconomic conditions. Therefore, this dissertation will combine a broad definition of economic development, especially its focus on income distribution and physical quality of life, with a structuralist approach to investigate the impact of military expenditures in developing countries.

1.3 Research Method of This Study

The research questions of this dissertation will be following. What is the nature of the impact of military expenditure on economic development in the developing countries? What are the opportunity costs of high spending? What are the policy implications of the impact? In order to perform consistent analysis of these diverse research questions using a uniform set of regression equations, this study will adapt the structuralist approach used by Faini, Annez, and Taylor (1984) who modified the “patterns of development” approach developed by Chenery and Syrquin (1975). Faini, Annez, and Taylor (1984) added military burden as an additional explanatory variable to the regression model by Chenery and Syrquin (1975), which includes GDP per capita, population, and financial inflow as its explanatory variables. In order to analyze multifaceted issues of economic development in developing countries, Chenery and Syrquin (1975) ran this uniform set of regression equations against many dependent variables (total of 27 variables) that were related to economic development. These dependent variables cover investment and savings, education, consumptions, production, trade, employment, urbanization and population change, and income distributions (Chenery & Syrquin, 1975). They took structuralist approach to expand the definition of

development beyond GDP growth.

This dissertation will follow their approach, with some modifications, to examine the impact of military expenditures on economic development in developing countries. Deger and Smith (1983) listed four possible channels through which military expenditure may influence the economy: resource allocation and mobilization; organization of production; sociopolitical structure; and external relations. Combining these channels with the list of dependent variables of Chenery and Syrquin (1975) and taking a broader definition of development into consideration, this dissertation will have the following 17 dependent variables in the analysis. Resource allocation channel includes investment, savings, private and public consumption, and education and health spending. Production and trade (external relations) channels include agricultural and industrial production, unemployment rate, export and import, and foreign direct investment (FDI). Socioeconomic channel includes urbanization rate, income distribution, and physical quality of life (life expectancy, literacy rate, and infant mortality rate). Even though all dependent variables are identified with a structuralist approach, some of the variables can be identified with two other approaches as well. Investment, savings, private and public consumption, education and health spending, export, import, and income distribution are identified with the demand side approach. Investment, savings, agricultural and industrial production, unemployment, export, import, and foreign direct investment are identified with the supply side approach. Urbanization and physical quality of life are specifically identified with the structuralist approach.

1.4 Overview of Regression Results

Results of the regression analyses of this dissertation reveal that the military expenditures have mostly negative impact on the economies of developing countries with a few exceptions. There are negative impacts on capital formation, industrialization, and physical quality of life. Since structuralists consider industrialization crucial to economic development, this negative impact on capital formation and industrialization is very significant. Also, negative impacts on physical quality of life indicate that the military expenditures hinder broader definition of economic development as well. It has a negative impact on basic human needs. On the other hand, the increase in military expenditures seems to decrease the unemployment rate, and there are no measurable negative trade-offs between military expenditures and education and health spending. These results will be discussed in more details in Chapters 4-6.

The next chapter will review past studies, followed by a chapter of the research method and data set, then followed by three chapters of regression results, and the dissertation will end with some concluding remarks.

CHAPTER 2

LITERATURE REVIEW

Benoit's seminal study in 1973 adopted a regression equation that Sandler and Hartley (1995) called *ad hoc* equation. Benoit used a single equation OLS estimation to analyze the correlation between military expenditure and economic growth. He ran a simple linear regression analysis with cumulative real growth rate of total GDP as a dependent variable and with independent variables including the defense burden as the ratio of defense expenditures to GDP, investment as the ratio of gross capital formation to GDP, and net receipts of bilateral foreign aid as the ratio to GDP (Benoit, 1973). He ran this regression on the data set consisting of 44 developing countries during 1950 to 1965, and found that there was a strong positive correlation between military expenditure and economic growth (Benoit, 1973). His conclusion was repeated in his 1978 paper as he stated that "countries with a heavy defense burden generally had the most rapid rate of growth, and those with the lowest defense burdens tended to show the lowest growth rates" (Benoit, 1978, p. 271). He attributed many factors for this positive correlation. Higher military spending may provide the following benefits: better nutritional and other consumption standards by feeding, clothing, and housing a number of people; education and medical care; better infrastructures; modernization by scientific and technical advances; and the sense of nation building (Benoit, 1978). However, Benoit seemed to be

very skeptical of his own conclusion. He mentioned that this positive correlation might be spurious, caused by other factors influencing both the defense burden and the GDP growth. He also revealed that the positive result was only found in the 1960-1965 period but not found in the 1950-1965 period (Benoit, 1978). Although this surprising result seemed to be not robust, the biggest contribution of his study was the fact that it became the starting point of the subsequent discussions and stimulated so many studies analyzing the relationship between the military expenditure and the economic development in the developing countries. Frederiksen and Looney (1983) used exactly the same equation as Benoit's study and analyzed 37 out of 44 countries of Benoit's study, but they divided them into financially resource-rich countries and financially constrained countries. Their results showed that the higher defense burden was positively correlated with the economic growth in the rich countries and negatively correlated in the poor countries, confirming Benoit's result partially for resource-rich countries (Frederiksen & Looney, 1983).

Benoit's study also generated criticism against it. Ball (1983) examined Benoit's study and found a few problems with his study. The first problem was Benoit's choice of bilateral foreign aid as foreign financial inflow and ignored foreign private investment, multilateral aid, and military assistance (Ball, 1983). These more inclusive measures of foreign resource inflow might be more closely associated with the economic growth than the bilateral foreign aid (Ball, 1983). Second, most of the contributions of the military expenditures to the civilian economy listed by Benoit were unquantifiable. The fact that Benoit based his conclusion on these unquantifiable factors made his conclusion debatable (Ball, 1983). Either agree or disagree with his study, it certainly generated the

discussion and stimulated a lot of subsequent studies concerning the impact of military expenditures in developing countries.

Benoit's single *ad hoc* equation approach quickly gave way to a variety of econometric models, reflecting different theoretical perspectives (Dunne, Smith, & Willenbockel, 2005). "Keynesian, neoclassical and structuralist models were applied using a variety of specifications, econometric estimators and types of sample in cross-section, time-series or panels" (Dunne et al., 2005, p. 449). Since the literature concerning the effect of military expenditure on the economies of developing countries is rather extensive, it may be useful to start the literature review with dividing the past studies into some categories, even though some studies, such as Benoit's, do not belong to any of these categories. Sandler and Hartley (1995) divided past studies on growth and defense into demand side models and supply side models. The demand side approach is closely associated with the Keynesian approach and the supply side approach is associated with the neoclassical approach. In addition to demand side and supply side approaches, some studies combined these two approaches into simultaneous equation models. Furthermore, some studies adopted the structuralist approach. This literature review chapter is divided into four sections. First is the demand side approach. Second is the supply side approach. Third is the simultaneous equation approach. Finally, the fourth section is the structuralist approach.

2.1 Demand Side Approach

Demand side models focus on level and composition of expenditures. Their regression equations are usually derived from national account identities with output on

one side and expenditures, such as consumption, investment, government expenditures, and export and imports, on another side. Demand effects, such as Keynesian multiplier effect, operate through level and composition of expenditures (Dunne et al., 2005). In economies with excess production capacity, increased aggregate demand by the military spending will drive up output, capacity utilization, and profits rates, which in turn may increase investment (Faini, Annez, & Taylor, 1984). However, since military expenditures have opportunity costs and may crowd out other expenditures, such as investment, private consumption, and other public expenditures, whether the increase in military expenditures leads to economic growth depends on prior capacity utilization rate and how it is financed (Dunne et al., 2005).

The first half of the study by Faini et al. (1984) is a demand side model with an “equation which relates the growth rate of output to change in exports, population, defense burden, capital inflows, and capital stock, with GDP per capita included as a scaling variable” (Faini et al., 1984, p. 491). They used a regression analysis for 69 countries over the period 1952-1970, which largely overlapped with Benoit’s study period of 1950-1965, and found a consistently negative sign of the coefficient for the change in the defense burden (Faini et al., 1984).

Stewart (1991) started his study from the same starting point as Faini et al. (1984) but modified it to include nonmilitary government expenditures in independent variables and added the import function equation to the absorptive capacity limitation equation that was in Faini et al. (1984). He then used the regression results to run simulations to find that high defense burden and high nondefense burden are both stimulative to economic growth and that defense burden is more stimulative than nondefense burden (Stewart,

1991). This result contradicts the result of Faini et al. (1984), even though their econometric models were derived from almost the same national account identities, and supports the positive result of Benoit (1973, 1978).

Smith (1980) used the demand side model to 14 OECD countries to test the hypothesis that reduced investment has been a major opportunity cost of military expenditure. He used the share of investment as a function of the share of military expenditure, growth rate, and demand pressure, and found clear, almost one for one, negative effect of military expenditure on investment (Smith, 1980).

2.2 Supply Side Approach

Supply side approaches focus on supply effects that “operate through the availability of factors of production (labor, physical and human capital and natural resources) and technology, which together determine potential output” (Dunne et al., 2005, p. 451). Regression equations of the supply side approach are usually derived from some form of production functions with capital, labor, and technology. Military expenditures can divert resources such as capital stock, foreign exchange, and skilled labor, from capital formation, then private investment and output net of military spending will fall (Faini et al., 1984). On the other hand, even though the resources used by military are not available for civilian use, there may be externalities, such as training in the military, which can be useful in civilian employment, and military technologies, which may have civilian spin-offs (Dunne et al., 2005). Supply side models usually adapt some form of growth equations to do their analyses.

Lim (1983) started his equation from the Harrod-Domar capital-centered growth

equation with the function of incremental output-capital ratio and gross domestic investment to GDP ratio. His final estimating growth equations are functions of incremental output-capital ratio, defense expenditure to GDP ratio (or defense expenditure to total government expenditure ratio), and deficit on current account to gross national saving ratio (Lim, 1983). He ran these regressions with the data from 54 countries over the period 1965-1973, and found that the military spending was detrimental to economic growth (Lim, 1983). Milne (1984) used a similar approach by using a modified Harrod-Domar growth equation. It differed from Lim's study by focusing on Latin America, and also by including military government variable as an additional independent variable (Milne, 1984). His study also found a statistically significant negative relationship between defense spending and economic growth (Milne, 1984). Biswas and Ram (1986) criticized this approach by saying that model used in these analyses is "really an identity, and it is doubtful that this form can provide an appropriate basis for identifying the impact of defense spending on growth" (Biswas & Ram, 1986, p. 366).

Then, Biswas and Ram (1986) considered the externality effect of the military sector on the civilian sector and the magnitude of the relative factor productivity differential across two sectors by using Feder's augmented growth model. Their study was based on two hypotheses that the military sector might generate positive or negative externalities for the rest of the economy, and there might be an important factor productivity difference between two sectors (Biswas & Ram, 1986). They adopted Feder's neoclassical growth model, which was specified in the context of the role of exports in growth, by substituting the military sector for the export sector (Biswas & Ram,

1986). Their two-sector analysis yielded no statistically significant externality effect and no significant factor productivity difference across two sectors for the sample of developing countries in the 60s and 70s (Biswas & Ram, 1986). However, Biswas (1993) analyzed more recent data for the 80s using the same model and found a positive relationship between military spending and economic growth (Biswas, 1993). Many studies, such as Murdoch, Pi, and Sandler (1997), and Birdi, Dunne, and Saal (2000), adopted some variants of this model and also found positive results. “The popularity of the approach lies in the appearance of a direct link from theoretical model to econometric specification” (Dunne et al., 2005, p. 453). This model seems to be well grounded in the neoclassical theory of growth (Dunne et al., 2005). However, Dunne et al. (2005) point out that “the model is, by construction, incapable of accounting for intra-sectoral organizational inefficiencies” (Dunne et al., 2005, p. 455). In addition to theoretical problems, they list more empirical problems like multicollinearity between two terms with military expenditures, and asymmetry in the treatment of investment and labor in the equation as investment in share and labor in growth rate (Dunne et al., 2005). Because of these problems, they recommend not to use this model for future research (Dunne et al., 2005).

2.3 Simultaneous Equation Approach

Deger and Smith (1983) proposed to use a simultaneous equation model for the analysis with both demand side and supply side approaches. They argue that military expenditure is an endogenous not exogenous variable and all endogenous variables are determined simultaneously (Deger & Smith, 1983). They argue that there are four

channels through which military expenditure may influence production (Deger & Smith, 1983). The first channel is the resource allocation and mobilization channel. In resource allocation, military expenditure may have direct opportunity costs in terms of forgone investment and consumption. If the weapons are imported, it may have balance of payments costs (Deger & Smith, 1983). On the other hand, if there is inadequate aggregate demand in the economy, military demand may be met by utilization of underutilized capital and increased employment of labor, which means surplus labor may be mobilized (Deger & Smith, 1983). The second channel is the organization of production. New technology may be introduced to the society through the military and also training in technical skills and discipline may be given in the military (Deger & Smith, 1983). The third channel is the socio-political structure. Military may have an influence on administration, social structure, and internal security (Deger & Smith, 1983). The fourth channel is the external relations. Military may provide security from external threats as well as a major link to larger powers through transfer of technology and provision of aid (Deger & Smith, 1983). They argue that in order to examine these channels, the econometric model has to allow for direct effect of military expenditure on growth through the resource mobilization and modernization effect, indirect effect through savings ratio, and the endogeneity of military expenditure (Deger & Smith, 1983). Their simultaneous equation model includes growth equation, savings equation, and military expenditure equation (Deger & Smith, 1983). The growth equation is derived from production function just as the supply side model, and independent variables include savings ratio, external capital flow ratio, population growth rate, military burden, 1970 per capita income, and annual growth rate of agricultural product (Deger & Smith,

1983). They included growth rate of agricultural product following the “structuralist” approach to development (Deger & Smith, 1983). The savings /investment function is derived from output-expenditure national account identity just as a demand side approach is, and independent variables include average annual growth rate of real GDP, external capital flow ratio, population growth rate, military burden, and product of 1970 per capita income and GDP growth rate (Deger & Smith, 1983). The military equation is a function of strategic, security, and wealth variables (Deger, 1992). Their results showed that the coefficient on military expenditure was positive 0.35 with t -ratio 2.77 in the growth equation, and it was negative -0.43 with t -ratio -3.16 in the savings equation (Deger & Smith, 1983). Deger (1986) included an additional equation of trade balance in the analysis and showed the similar result with a positive coefficient of military expenditure 0.29 with t -ratio 2.5 in the growth equation, a negative -0.56 with t -ratio -3.72 in the savings equation, and a negative -2.45 with t -ratio -2.88 in the trade balance equation .

Many studies adopted this approach. Scheetz (1991) used a simultaneous equation model on pooled data for Argentina, Chile, Paraguay, and Peru. Results for the pooled data showed that military expenditure was negatively correlated to GDP growth, the domestic savings rate, and the current account balance (Scheetz, 1991). Results for individual countries showed very similar results except for a few instances where the sign switched to positive or it was not statistically significant (Scheetz, 1991). Scheetz (2002) re-examined the military expenditures in Guatemala, Argentina, Bolivia, Chile, Paraguay and Peru, and all results showed that military expenditure had a significantly negative effect on GDP growth, investment, and current account balance, in spite of the fact that the military burden had been falling in these countries especially after their transition to

democratic governments. Dunne, Nikolaidou, and Roux (2000) used a Keynesian simultaneous equation to find an overall negative effect of military spending on the South African economy, although the significance of coefficients was low. Sezgin (2001) used a Deger-type simultaneous equation model on Turkey to find that the defense sector stimulated economic growth but had no significant effect on savings and the balance of trade. Galvin (2003) used the similar simultaneous equation model to examine 64 developing countries, but separated countries into low-income countries and middle-income countries in addition to the whole sample. Results showed that the effect of military burden was negative and significant only in the middle-income countries, indicating that the impact was more severe for middle-income countries (Galvin, 2003).

This approach requires that all endogenous variables be determined simultaneously with reciprocal causality. It estimates simultaneous impacts of each endogenous variable on other endogenous variables.

2.4 Structuralist Approach

Syrquin (1988) defined the “structure” in the development economics in following quote:

The most common use of structure in development and in economic history refers to the relative importance of sectors in the economy in terms of production and factor use. Industrialization is then the central process of structural change. In this sense - structure as the composition of an aggregate - the term is also applied to other aggregates that have some bearing on the process of industrialization such as demand and trade. (Syquin, 1988, p. 206)

Then, “the interrelated processes of structural change that accompany economic development are jointly referred to as the structural transformation” (Syquin, 1988, p. 206). Structuralists pay particular attention to this structural transformation, which

includes all aspects of economy, including investment and savings, education, production and trade, employment, urbanization, demographic transitions, and income distributions. The structuralists based their analyses of structural transformation on two key concepts, dualism and complementarity (Chenery, 1975).

Complementarity implies that “the expansion of production in one sector is only profitable if it is accompanied by the expansion of production in other sectors” (Sanchez-Ancochea, 2007, p. 210). This idea leads to the concept of balanced growth, which emphasized government intervention and import-substitution industrialization to achieve a higher rate of growth (Sanchez-Ancochea, 2007). Then, structuralists switched their attention to unbalanced growth, which emphasized the importance of industries with backward and forward linkages with other sectors of the economy (Sanchez-Ancochea, 2007). Sanchez-Ancochea (2007) argued that both approaches shed some light on different dimensions of development process. There is the need for some balance between different sectors of the economy, and there are certain sectors of economy that can act as engines of growth and development (Sanchez-Ancochea, 2007). Perhaps the military sector can be such an engine for development. They both considered “the need for government planning but promoted two different ways of doing it” (Sanchez-Ancochea, 2007, p. 213). In any case, both approaches emphasized the importance of interconnectedness in the economy.

Another key concept is dualism in which an economy is divided into two different sectors, the modern sector and traditional sector. A modern sector is usually identified with manufacturing with high level of income, productivity, capital intensiveness, and wage employment (Sanchez-Ancochea, 2007). A traditional sector is usually identified

with agriculture with low productivity, poverty, and low capital intensity (Sanchez-Ancochea, 2007). This concept was formulated by W. Arthur Lewis in the mid-1950s (Todaro & Smith, 2006). The traditional rural sector is subsistence agricultural economy with overpopulation, and the modern urban sector is industrial sector with high productivity (Todaro & Smith, 2006). Surplus labor with zero marginal labor productivity is gradually transferred to modern industrial sector from rural agricultural sector until all surplus labor is eliminated (Todaro & Smith, 2006). This process of urbanization is very important for early stages of economic development. Also, structuralists consider the elimination of the structural difference between traditional and modern sectors to be the main cause of growth in the first stages of development (Sanchez-Ancochea, 2007). That is why both the agricultural sector and industrial sector are significant for the economic development for structuralists' perspective. A wider classification of dualism can be applied to urban and rural sectors or large-scale and small-scale productions (Deger, 1992). In addition, especially for Latin American structuralists, dualism of a center (developed countries) and periphery (developing countries) in the world economy is significant in the economies of developing countries. They argued that "during early stages of capitalist development, technical progress was distributed asymmetrically among countries and a binary opposition between centers and periphery was created" (Sanchez-Ancochea, 2007, p. 221).

This concept of center-periphery relationship was incorporated in a couple of studies of military expenditures. Davis, Kick, and Kiefer (1989) examined the impact of militarization on the national development in the world system context (center-periphery relationships). Their dependent variables were per capita gross domestic product in 1982

and Gastil's index of basic political rights in 1979, and independent variables included world-system position, average number of soldiers per capita, military regimes, average annual ratio of weapons exported per GNP, the frequency of civil war and interstate war, domestic capital formation, lagged dependent variable, and secondary school enrolment in 1970 (Davis et al., 1989). The military participation rate and weapons exports had positive impacts on economic development but had negative and insignificant impacts on political rights (Davis et al., 1989). The impact of the military regime and the peripheral position in the world system were strong and negative on political rights (Davis et al., 1989). These results indicated that the different components of militarization affected development in different ways (Davis et al., 1989). Kick, Davis, Kiefer, and Burns (1998) conducted a very similar study on 65 developing countries. They added an additional dependent variable, secondary school enrollment ratio, and their independent variables were the initial state of three dependent variables, three militarization measures, namely, the numbers of soldiers per 1000, the count of the number of years of military rules, and averaged value of arms imports per capita, averaged value of net foreign investment per capita, world-system classification, and dummy variable for OPEC countries (Kick et al., 1998). Results showed that military participation had a positive and significant impact on economic development and political rights but not significant on secondary school enrolment, and that military regime and arms import had a negative and significant impact on economic development and political rights but they were not significant on school enrolment (Kick et al., 1998). Being a poor periphery country has significant negative effects on GDP and political rights (Kick et al., 1998). These two studies showed that being poor periphery country has a negative impact on the economy of

developing country. Another interesting result of these studies is that different militarization measures have different impacts on the developing countries. Bullock and Firebaugh (1990) made a distinction between social militarization with more soldiers and economic militarization with more spending and hypothesized that social militarization promoted development while economic militarization hindered it (Bullock & Firebaugh, 1990). Their results supported the first hypothesis that military participation had a strong positive impact on economic development, while they failed to support the second hypothesis because coefficients on military spending were not statistically significant even though the sign was an expected negative sign (Bullock & Firebaugh, 1990).

The second half of a study by Faini et al. (1984) is another example of the structuralist approach to analyze military expenditures in developing countries. They attempted to conduct a consistent analysis of effect of military expenditure on diverse aspects of development using uniform set of regression equations. They added military burden as an additional explanatory variable to the regression model developed by Chenery and Syrquin (1975) as following:

$$X = \alpha + \beta_1 \ln(Y/P) + \beta_2 \{\ln(Y/P)\}^2 + \beta_3 \ln(P) + \beta_3 \{\ln(P)\}^2 + \beta_5(F) + \beta_6(M) + \text{dummy variables} + \varepsilon \quad (2.1)$$

where X = dependent variables, Y = GDP, P = population in thousands, Y/P = GDP per capita, F = net financial inflow (imports of goods and services minus exports of goods and services), M = military burden (military expenditure as % of GDP), dummy variables for 5-year time period, and ε = error term (Faini et al., 1984). They took a series of dependent variables that reflects developmental concern of structuralism, namely, investments, imports, industrial output, agricultural output, and tax receipt, all as shares

of GDP (Faini et al., 1984). Their results showed that military burden had significant and negative impacts on investment and agriculture, and a significant and positive impact on tax receipt, but no significant influence on imports and industrial production (Faini et al., 1984). They chose only five dependent variables out of 27 dependent variables in original study by Chenery and Syrquin (1975). These dependent variables of Chenery and Syrquin cover investment and savings, education, consumptions, production, trade, employment, urbanization and population change, and income distributions (Chenery & Syrquin, 1975). After estimating regression equations for all dependent variables, Chenery and Syrquin ran simulations by putting different levels of per capita income back into each equation (with population of 10 million), and claimed to find “patterns of development” for each dependent variables (Chenery & Syrquin, 1975). Faini et al. (1984) did not attempt to find “patterns” like Chenery and Syrquin did. It is very useful to run regression to find relationships of military expenditures to all these dependent variables, but putting arbitrary per capita income back into equations with an arbitrary population level of 10 million is not a very useful exercise. Also, another weak point of this approach is the fact that it is more empirical than theoretical. In spite of these weaknesses, the approach by Chenery and Syrquin is still very useful to examine the relationships between military expenditure and all dependent variables that are significant for economic development. This approach covers many of structuralists’ concerns, such as dualism and urbanization, industrialization, employment, composition of consumption, production, trade, and demographic transition and income distribution. Chenery and Syrquin (1975) argued that by using this simple uniform set of regression equations for all development processes and their dependent variables, they were able to avoid

difficulties in combining various results into a consistent analysis. Therefore, this model can be a solution to the problem of having inconsistent sometimes opposing results by using so many different approaches.

This dissertation will follow their approach, with some modifications, to examine the impact of military expenditures on economic development in developing countries. Deger and Smith (1983) listed four possible channels through which military expenditure may influence the economy: resource allocation and mobilization, organization of production, sociopolitical structure, and external relations. Combining these channels with the list of dependent variables of Chenery and Syrquin (1975) and taking a broader definition of development into consideration, this dissertation will have the following 17 dependent variables in the analysis. The resource allocation channel includes investment, savings, private and public consumption, and education and health spending. Production and trade (external relations) channels include agricultural and industrial production, unemployment rate, export and import, and foreign direct investment (FDI). The socioeconomic channel includes urbanization rate, income distribution, and physical quality of life (life expectancy, literacy rate, and infant mortality rate).

The table in Appendix A organizes all past studies mentioned in this dissertation into categories.

The next chapter will discuss the research method and data set of this dissertation.

CHAPTER 3

RESEARCH METHOD AND DATA SET

As mentioned earlier in the Introduction, research questions for this dissertation are the following: What is the nature of the impact of military expenditure on economic development in the developing countries? What are the opportunity costs of increased spending? What will be the policy implications from these analyses? In order to answer these questions, the following regression equation and data set will be used.

3.1 Regression Equation

Equation 2.1 in the study by Faini, Annez, and Taylor (1984) was based on the equation developed by Chenery and Syrquin (1975). Chenery and Syrquin argued that intercountry comparisons played an essential part in understanding the processes of economic and social development, and that their study was an attempt to provide a uniform analysis of a mechanism of structural transformation instead of applying independent, different methodologies, hypotheses, and data to each separate process because of difficulties to combine these diverse results into a consistent picture of development as a whole or to trace interrelations among separate processes (Chenery & Syrquin, 1975). By introducing military burden in this equation, Faini et al. (1984) tried to examine the effects of military expenditure on the process of structural transformation

in the developing countries. This dissertation will modify Equation 2.1 slightly to include a new variable, KOF Globalization Index, which captures the level of globalization for each country every year, in place of a 5-year time period dummy variable that was decided arbitrarily by Chenery and Syrquin. Any major shifts in the world should be reflected in the yearly change in the globalization index, which consists of economic, social, and political dimensions of globalization. The equation also includes country dummy variables to allow separate intercept for each country to perform the fixed effect model analysis. It will also include a time lag of 10 years for all independent variables to allow time for slowly evolving determinants to come to equilibrium and to mitigate simultaneity bias. Nonlinearity included in Chenery and Syrquin equation was dropped as well. Jameson argued that “over a twenty-year period, it is unlikely that there would be any marked non-linearity in the relation, and co-linearity of the linear and squared terms affects the results” (Jameson, 1982, p. 435). The regression equation for this study is following:

$$X = \alpha + \beta_1 (M_{t-10}) + \beta_2 (G_{t-10}) + \beta_3 (F_{t-10}) + \beta_4 (Y_{t-10}/P_{t-10}) + \beta_5 (P_{t-10}) \\ + \text{country dummy} + \varepsilon \quad (3.1)$$

where X = dependent variables, M = military burden (military expenditure as % of GDP), G = KOF globalization index, F = net financial inflow (imports of goods and services minus exports of goods and services, as % of GDP), Y = GDP, P = population in millions, Y/P = GDP per capita (constant 2000 US \$ in thousands), country dummy = $n-1$ country dummy variables for the fixed effect model, and ε = error term.

Per capita GDP serves as an overall index of development as well as a measure of output (Chenery & Syrquin, 1975). Deger and Smith (1983) included the level of per

capita income in their analysis to capture any “catch-up” effects. “The higher the per capita income, the smaller the gap between domestic technology and world best-practice technology and the lower the scope for rapid growth through imported technology” (Deger & Smith 1983, pp. 341-342). The population was included to allow for the effects of economies of scale (Chenery & Syrquin, 1975). According to Taylor (1969), population is interpreted as a proxy for the effects of threshold size barriers to growth in certain industries and the influence of trade patterns, which are closely tied to country size. At each income level, larger countries have less trades and less specialization than smaller countries do (Chenery & Syrquin, 1975). Deger and Smith (1983) included the population in their analysis as a proxy for labor.

In Chenery and Syrquin (1975) and Faini et al. (1984), per capita GDP and population are taken natural logarithms and squared. Chenery and Syrquin argued that the major features of structural transformation could be represented with an S-shaped curve that was characterized with an upper and lower asymptote, meaning that many countries experienced a period in which the rate of change had accelerated following an earlier period of little structural change (Chenery & Syrquin, 1975). However, they chose a quadratic function instead of a logistic function, which is required to describe the S-shaped curve. The quadratic function describes only a small portion of the S-shaped curve depending on the signs on coefficients of natural logarithmic term and its square term. They justified this choice of quadratic function on the basis of lack of sufficient data (Chenery & Syrquin, 1975). Not only their choice of a quadratic function is questionable, but also their insistence on nonlinearity is also questionable. As mentioned earlier, Jameson (1982) questioned nonlinearity and his results proved against

nonlinearity. Multicollinearity between logarithmic terms and their square terms is a serious problem for population. In addition, the use of a logarithmic term and its square term makes the interpretation of estimated coefficients of these terms on dependent variables very difficult, because almost all dependent variables are measured in different units, either the share of GDP or the ratio. It is, therefore, easier to interpret the result with simple raw numbers for per capita income and population, and Equation 3.1 includes them instead of the logarithmic term and its square term.

The net financial inflow affects directly or indirectly a number of development processes (Chenery & Syrquin, 1975). Deger and Smith (1983) argued that foreign capital inflow increases growth through financing investment. It is defined as imports of goods and services minus exports of goods and services, as % of GDP, thus it is the current account deficit. In the balance of payments, that is capital account surplus, even though there can be accounting discrepancy in real life. According to the textbook of *World Trade and Payments*, running current account deficit, in other words, capital account surplus can sometimes be beneficial for some developing countries (Caves, Frankel & Jones, 2002).

Developing countries sometimes run large trade deficits. This practice can be perfectly appropriate if they are growing rapidly and need, for example, to import capital goods in order to invest in plant and equipment. Such countries are necessarily borrowing from abroad to finance their current account deficits. If they are spending the funds well, they will in the future have the level of capital stock, particularly export capacity, necessary to generate export earnings with which to repay that debt. (Caves et al., 2002, p. 291)

Therefore, this (import - export) current account deficit can have a potential positive impact on the future economic development of the developing country.

The KOF Globalization Index is published by the KOF Swiss Economic Institute

(2016) at ETH Zurich. It measures the rate of globalization in countries around the world. The index is based on three dimensions: economic, social, and political. Dreher (2006) found that globalization promoted economic growth, especially globalization in economic flows and restrictions, and in information flows even though it was not as robust as economic globalization. This yearly index reflects each country's global position at the time so much better than arbitrary time period dummy variables which were in the study by Faini et al. (1984) and Chenery and Syrquin (1975). As it turned out, it has very strong explanatory power as well. Therefore, it is a very good control variable to be included in the regression equation.

The military burden, military expenditure as % of GDP, is a military expenditure variable in this equation. It is a good indicator of the economic burden military expenditure places on the economy of the developing countries. Deger and Smith (1983) used it to reflect the level of modernization in the economy. In their model, both military expenditure and per capita income act as proxies for the rate of technical change (Deger & Smith, 1983).

The equation also includes $n-1$ country dummy variables where n = numbers of countries, to make it the fixed effect model. The fixed effect model makes it possible to control for variables that have not or cannot be measured (Allison, 2009). Any unobserved variables that do not change over time should be captured by this model by allowing each country to have its own separate intercept (Allison, 2009). Appendix B shows different selection criteria between the fixed effect model with country dummy variables and the pooled model without country dummy variables. Adjusted R^2 are much higher for the fixed effect model than the pooled model. Both Akaike Information

Criterion (AIC) and Schwarz Bayesian Criterion (SBC) are much smaller for the fixed effect model than the pooled model. Therefore, the selection of the fixed effect model over the pooled model is justified.

All independent variables, except dummy variables, are lagged 10 years to allow time for these macroeconomic variables to take impacts on the economy since our theoretical view of development in this analysis has a longer run interpretation. This also makes the model recursive, instead of a simultaneous model, to avoid simultaneity bias. Joerding (1986) found no Granger causality from military spending to economic growth, but found that economic growth Granger caused military spending. However, Babin (1989) argued that if enough time was given, military expenditures could have an impact on national economy. He argued that “at the national level, development usually requires series of changes that occur through systems, which involve organizations, agencies, economic structures, and technological programs (Babin, 1989, p. 249). In other words, economic changes at the aggregate usually involve technological and institutional changes that take time, and also the effect of defense spending on the economy is probably indirect and involves substantial time lags (Babin, 1989). Therefore, the impact of defense spending should be considered in the same way as other developmental processes by taking the time factor into consideration. Babin found significant impact of military expenditures on the economy when the military expenditures variables were lagged 11 years and 16 years (Babin, 1989). Also, Deger (1992) stressed the necessity to include explicitly lagged military expenditure in the analysis in the following quote:

If military spending does reduce growth and create distortions, it probably does so over extended periods of time. Moreover, the adverse impact of defense on development becomes stronger with time, since there is an element of cumulation involved. Thus, empirical models should analyze ‘delayed’ impacts. (Deger, 1992,

p. 43)

There is a need for the models with explicitly lagged effects of military expenditures.

According to Greene (1997), various procedures have been suggested to determine the appropriate lag length, including adjusted R^2 , and AIC. Appendix B also shows these criteria for different lag length, namely, 1 year, 5 year, and 10 year. The equation with 10-year lag has generally the highest adjusted R^2 (in 10 cases out of 17) and the lowest AIC (in all 17 cases) and the lowest SBC (in 16 cases). This result is fairly close to Babin's conclusion of 11-year lag (Babin, 1989). Therefore, all independent variables are lagged 10 years in the analysis. Estimated coefficients for military burden with t -values are included in Appendix B to show if there is any difference in those coefficients depending on which different models are used, the fixed effect model, pooled model, 1-year lag, 5-year lag, and 10-year lag.

As mentioned earlier, by combining channels through which military expenditure may influence the economy and the list of dependent variables of Chenery and Syrquin (1975) and taking a broader definition of development into consideration, this dissertation will have the following 17 dependent variables in the analysis. The resource allocation channel includes investment, savings, private and public consumption, and education and health spending. Production and trade (external relations) channels include agricultural and industrial production, unemployment rate, export and import, and foreign direct investment (FDI). The socioeconomic channel includes urbanization rate, income distribution, and physical quality of life (life expectancy, literacy rate, and infant mortality rate). Table 3.1 shows a list of these 17 dependent variables.

The following definitions of these variables are taken from World Development

Table 3.1 List of Dependent Variables

Resource Allocation Channels	Production and Trade Channels	Socioeconomic Channels
Gross Capital Formation	Agriculture Value Added	Urbanization Rate
Gross Domestic Savings	Industry Value Added	Gini Coefficient
Household Consumption	Unemployment Rate	Life Expectancy
Government Consumption	Exports	Literacy Rate
Public Spending on Education	Imports	Mortality Rate
Public Spending on Health	Foreign Direct Investment	

Indicators published by the World Bank (2004, 2012). Gross capital formation (gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories, measured as % of GDP. Gross domestic savings are calculated as GDP less final consumption expenditure (total consumption), measured as % of GDP. Household final consumption expenditure (private consumption) is the market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households, measured as % of GDP. General government final consumption expenditure (government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees), measured as % of GDP. It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation. Public expenditure on education consists of current and capital public expenditure on education that includes government spending on educational institutions (both public and private), education administration, as well as subsidies for private entities, measured as % of GDP. Public health expenditure consists of recurrent and capital spending from government (central

and local) budgets, external borrowings and grants, and social health insurance funds, measured as % of GDP. Agriculture value added includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production, measured as % of GDP. Industry value added includes manufacturing, construction, electricity, water, and gas, measured as % of GDP. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. Unemployment rate refers to the share of the labor force that is without work but available for and seeking employment, measured as % of total labor force. Exports of goods and services represent the value of all goods and other market services provided to the rest of the world, measured as % of GDP. Imports of goods and services represent the value of all goods and other market services received from the rest of the world, measured as % of GDP. Foreign direct investments are the net inflows of investment to acquire a lasting management interest (10 % or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments, measured as % of GDP. Urban population (% of total population) refers to people living in urban areas as defined by national statistical offices. Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality. Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. Adult literacy rate is the percentage of people ages 15 and above who can, with understanding, read and

write a short, simple statement on their everyday life. Infant mortality rate is the number of infants dying before reaching 1 year of age, per 1,000 live births in a given year (The World Bank, 2004, 2012). Table 3.2 shows descriptive statistics of all variables, including numbers of observations, minimum, maximum, mean, and standard deviation. Most variables are either rates or as % of GDP. Some variables have more than four thousand observations, but a few variables have less than a thousand observations, especially some socioeconomic variables, such as Gini coefficient and literacy rate.

Table 3.2 Descriptive Statistics of Variables

	Number of Observations	Minimum	Maximum	Mean	Standard Deviation
Military Burden ^a	4368	0.01	57.77	3.0335	3.66339
KOF Globalization Index	3930	12.89	88.61	42.9746	14.58575
Net Financial Inflow ^a	4424	-81.7	162.55	4.7873	15.33821
GDP per capita (constant 2000 US\$ in thousands)	4546	0.06	61.38	2.8245	5.61215
Population (in millions)	4554	0.07	1338.3	35.2296	128.52109
Gross Capital Formation ^a	4343	-17.38	76.69	21.733	8.6118
Gross Domestic Savings ^a	4375	-142.55	80.48	16.6735	15.18161
Household Consumption ^a	4359	11.01	227.98	68.6503	15.88322
Government Consumption ^a	4401	2.05	76.22	14.6096	6.41619
Health Spending ^a	1768	0.00	8.2	2.8339	1.43273
Education Spending ^a	1182	0.00	49.52	4.3225	2.7901
Agriculture Value Added ^a	4241	0.04	93.98	22.5758	15.28925
Industry Value Added ^a	4234	1.88	90.51	30.2898	12.84873
Unemployment Rate	1362	0.2	59.5	9.1038	6.34037
Exports ^a	4424	2.09	234.35	33.9438	24.78714
Imports ^a	4428	2.98	212.49	38.7934	25.10066
Foreign Direct Investment ^a	3879	-82.89	90.74	2.6739	5.44113
Urbanization Rate	4557	2.08	100	44.8205	22.9838
Gini Coefficient	725	20.96	74.33	43.0154	10.09421
Life Expectancy at Birth (years)	4538	26.82	81.64	60.1429	10.97557
Adult Literacy Rate	373	9.39	99.79	74.222	23.17433
Infant Mortality Rate	4439	2.1	221.6	66.1106	44.93055

Note: Superscript a indicates that a variable is measured as % of GDP.

3.2 Data Set and Its Sources

The data set for this dissertation consists of cross-sectional time-series data for 119 countries over the period of 1960-2010. Table 3.3 shows the list of countries. There are 40 countries from Africa, 24 countries from Asia and Oceania, 21 countries from Central and Eastern Europe, 19 countries from Latin America, and 15 countries from the Middle East and North Africa. For some countries and for some variables, the data are not a complete set but only a partial set because the data for the entire period are not available. Nevertheless, this data set is much larger than most past studies, and it allows this study to be a cross-sectional time-series data analysis instead of stationary cross-sectional analysis at some point in time. The military expenditure data are taken from multiple issues of *SIPRI Yearbook* (between 1969 and 2012 issues) published by the Stockholm International Peace Research Institute (SIPRI). The current issue is available online from their website at http://www.sipri.org/research/armaments/milex/milex_database. The data for KOF globalization index are published by the KOF Swiss Economic Institute (2016) at ETH Zurich, which is available online at <http://globalization.kof.ethz.ch/>. The data for all other variables are taken from the *World Development Indicators* (2004, 2012) published by the World Bank. The current issue is available online at <http://data.worldbank.org/data-catalog/world-development-indicators>. An electronic copy of this data set in Excel format is attached to this dissertation.

The next three chapters will present regression results. Chapter 4 will present results for resource allocation channels. Chapter 5 will present results for production and trade channels. Chapter 6 will present results for socioeconomic channels. Concluding remarks will follow these three chapters.

Table 3.3 List of Countries

	Available Years for Military Expenditure (% of GDP)	Asia & Oceania	Available Years for Military Expenditure (% of GDP)	Central and East Europe	Available Years for Military Expenditure (% of GDP)	Latin America	Available Years for Military Expenditure (% of GDP)	Middle East & North Africa	Available Years for Military Expenditure (% of GDP)
Africa									
Benin	61-94, 99-06, 08	Bangladesh	72-10	Albania	80-10	Argentina	60-10	Algeria	62-10
Botswana	77-10	Brunei	74-09	Armenia	92-93, 95-10	Belize	85, 88-97, 99-10	Bahrain	80-08
Burkina Faso	76-10	Cambodia	93-10	Azerbaijan	92-10	Bolivia	60-10	Djibouti	88-08
Burundi	62-08	China, P.R.	85-10	Belarus	92-10	Brazil	60-10	Egypt, Arab Republic	60-10
Cameroon	60-10	Fiji	69-10	Bulgaria	80-10	Chile	60-10	Iran, Islamic Rep.	74-08
Cape Verde	85-88, 93-10	India	60-10	Croatia	91-10	Colombia	60-76, 78-10	Israel	60-10
Central African Republic	61-96, 02-05, 07-10	Indonesia	60-10	Cyprus	75-10	Costa Rica	60-95	Jordan	75-10
Chad	61-79, 83-91, 93-05, 07-10	Kazakhstan	93-10	Czech Rep.	93-10	Ecuador	60-10	Kuwait	62-89, 92-07
Congo, Republic of	60-90, 03-08, 10	Korea, Rep. (South)	60-10	Estonia	92-10	El Salvador	60-10	Lebanon	88, 90-10
Congo, Democratic Republic of (Zaire)	60-00, 03-10	Kyrgyzstan	92-10	Georgia	92-10	Guatemala	60-10	Morocco	60-10
Cote d'Ivoire	60-94, 96-97, 03-10	Laos	92-10	Hungary	65-10	Guyana	66-96, 00-10	Oman	75-09
Ethiopia	81-10	Malaysia	60-10	Latvia	93-10	Honduras	60-97, 00-10	Saudi Arabia	68-10
Gabon	60-90, 00-07, 10	Mongolia	81-10	Lithuania	93-10	Mexico	60-10	Tunisia	61-10
Gambia, the	88-07	Nepal	60-10	Macdonia (FYROM)	96-10	Nicaragua	60-10	United Arab Emirates	75-10
Ghana	60-10	Pakistan	60-10	Moldova	93-10	Panama	60-99	Yemen	90-08
Guinea	91-94, 97-04	Papua New Guinea	85-10	Poland	90-10	Paraguay	60-10	15 Countries	
Kenya	60-10	Philippines	60-10	Romania	80-10	Peru	60-10		
Lesotho	85-10	Singapore	67-10	Serbia	96-10	Uruguay	60-10		
Liberia	60-94, 01-10	Sri Lanka	60-10	Slovakia	93-10	Venezuela	60-10		
Madagascar	60-10	Tajikistan	92-04	Turkey	60-10	19 Countries			
Malawi	64-07	Thailand	60-10	Ukraine	93-10				
Mali	67-90, 92-10	Turkmenistan	94-99	21 Countries					
Mauritania	60-86, 88-06, 08-09	Uzbekistan	94-97, 99-03						
Mauritius	76-08, 10	Vietnam	87-94, 03-10						
Mozambique	80-09	24 Countries							
Namibia	85-10								
Niger	60-90, 94-00, 02-05, 08, 10								
Nigeria	60-10								
Rwanda	63-10								
Senegal	60-10								
Seychelles	88-10								
Sierra Leone	60-97, 00-10								
South Africa	60-10								
Sudan	60-06								
Swaziland	82-10								
Tanzania	88-10								
Togo	60-95, 03-05, 08, 10								
Uganda	82-10								
Zambia	60-00, 04-10								
Zimbabwe	73-06, 10								
40 Countries								Total of 119 Countries	

CHAPTER 4

REGRESSION RESULTS FOR RESOURCE ALLOCATION

“Military expenditures divert resources from other uses and so have direct opportunity costs in terms of foregone investment, consumption, and so on” (Deger & Smith, 1983, p. 337). Therefore, in the absence of excess production capacity or domestic arms industry, military expenditure should have negative impact on economy. This chapter will examine the nature of impact of military expenditure on resource allocation processes, namely on investment and savings, consumption, and education and health spending. Table 4.1 shows results of regression analyses, including estimated coefficients and *t*-values (in parentheses).

4.1 Investment and Savings

The hypothesis in terms of the relationship between military expenditure and investment and savings is that the military expenditure will crowd out, at least partially, investment and savings. Results in Table 4.1 indicate that the hypothesis stands for savings but does not stand for investment. The estimated coefficient for military burden in the investment equation is positive but statistically insignificant. The estimated coefficient for military burden in the savings equation is expected negative sign and statistically significant. The last column of the table shows estimated coefficients and

Table 4.1 Results for Resource Allocation

	Military Burden	KOF Globalization Index	Net Financial Inflow	GDP per capita	Population	R^2	Number of Observations	Number of Countries	Short Run Results on Military Burden $t-1$ (top) and $t-5$ (bottom)
Gross Capital Formation	.012 (.267)	-.030 (-1.458)	.036 (2.308)***	-.226 (-2.973)***	.032 (5.164)***	.521	2549	118	.124 (2.878)*** .080 (1.742)*
Gross Domestic Savings	-.155 (-2.744)***	.032 (1.240)	.078 (4.039)***	.443 (4.670)***	.027 (3.496)***	.772	2555	119	-.083 (-1.622) -.270 (-4.404)***
Household Consumption	-.015 (-.278)	-.037 (-1.466)	-.029 (-1.557)	-.367 (-4.028)***	-.030 (-4.035)***	.806	2545	119	-.470 (-8.937)*** -.086 (-1.415)
Government Consumption	.174 (6.091)***	.007 (.516)	-.053 (-5.408)***	-.079 (-1.643)	.003 (.728)	.687	2547	119	.559 (22.675)*** .359 (12.619)***
Education Spending	.094 (4.605)***	.029 (3.734)***	-.004 (-.635)	.006 (.179)	.001 (.276)	.775	914	113	.087 (4.344)*** .096 (4.167)***
Health Spending	.050 (3.532)***	.032 (8.706)***	-.003 (-1.526)	-.029 (-1.224)	-.000 (-.189)	.845	1459	118	.062 (3.528)*** .003 (.144)

Note: The t -values are shown in parentheses, and *** indicates significance at 99%, ** at 95%, and * at 90%.

their t -values on military burden for equations with different time lags, namely 1-year and 5-year lags. It shows that the effect of military burden on investment is positive and significant in the short run. The effect of military burden on savings in the short run remains negative and significant. These results show positive effect on investment in the short run and negative effect on savings in both the short and long run. These results seem to contradict each other and were unexpected, but consistent negative effects on savings suggest that the military burden may have negative effects on capital formation in the long run. The estimated coefficients of the globalization index are negative on investment and positive on savings but they are not statistically significant. The estimated coefficients of financial resource inflow are positive and significant on both investment and savings, which is not surprising because more financial resources are available for the purpose of investment and savings with higher financial resource inflow. The

estimated coefficients on GDP per capita are negative on investment and positive on savings and both are significant. The negative effect of higher GDP per capita on investment may indicate the upper limit of absorptive capacity of developing countries, that is, the inability of these countries to absorb extra capital due to the factors such as the lack of supply of skilled labor, administrative capacity, and entrepreneurship in these developing countries (Deger & Smith, 1983). The higher GDP per capita, on the other hand, will make more funds available for these countries to save, thus it has a positive and significant effect on savings. The estimated coefficients on population are positive and significant on both investment and savings. With higher population, more labor becomes available, which may raise absorptive capacity to encourage more investment. Also, higher population increases the size, which may push the country to go over the threshold size barriers in certain industries. That would lead to increase in investment as well. Explanatory powers of these equations are moderately high with R^2 of .521 for investment and .772 for savings. The estimated coefficients for country dummies for the fixed effect model are not shown here.

The negative result for savings equation is consistent with most past studies. Deger and Smith (1983) found negative and significant effect of military expenditure on savings. Similar results are found in Deger (1986), Scheetz (1991), Scheetz (2002), and Galvin (2003). Dunne, Nikolaidou, and Roux (2000) and Sezgin (2001) found negative but not significant results.

Looney (1994) found similar result to this dissertation. He found positive impact of military expenditure on investment and negative on savings. This result will give a country a policy dilemma.

The standard measures for accelerating growth - curbing defense expenditures and expanding non-defense - would, given the current macroeconomic environment, actually result in a fall in GDP. On the other hand, increases in defense expenditures, while generally expanding private investment, have often reduced gross national savings thus limiting somewhat the longer run effectiveness of this source of growth. (Looney, 1994, p. 424)

Stewart (1991) and Cohen, Stevenson, Mintz, and Ward (1996) also found a positive impact of military expenditure on investment. They argued that this positive effect of military expenditure on investment will lead to its indirect positive impact on economic growth. However, Faini, Annez, and Taylor (1984) and Smith (1980) found a negative and significant effect of military expenditure on investment. In their analyses, there are negative opportunity costs in terms of decreased investment as the hypothesis suggested. Looney (1989) divided developing countries into arms producing and arms nonproducing and found that military expenditure has a positive effect on investment in arms producing countries and negative effect in nonproducing countries. He argued that there is positive effect of military expenditure on investment due to direct linkages in arms producing countries (Looney, 1989). On the other hand, a larger proportion of increased military expenditures are likely to wind up in imported weapons in nonproducing countries, thus reducing investment (Looney, 1989).

Even though results for investment are mixed, consistently negative results for savings suggest that in the longer run, the increase in military expenditure will reduce capital formation, and hamper economic growth in developing countries.

4.2 Consumption

Two hypotheses in this section are that the effect of military expenditure is negative on private consumption by crowding it out, and that it is positive on government

consumption since military expenditure is part of government expenditure. Results in Table 4.1 show a negative but insignificant effect on household consumption, and a positive and significant effect on government consumption. It partially gives support to the hypotheses, even though the result for household consumption is not statistically significant. The last column of the table shows that the estimated coefficient for military burden on household consumption is negative and significant with 1-year lag, and negative but not significant with 5-year lag. The signs are negative for all three time lags. These results suggest that the negative effect of military expenditure on household consumption is very short run, and its effect fades away in the longer run. The same table also shows that a positive and significant effect of military burden on government consumption is present in all three time lags. This result suggests that increased military expenditure crowds out private consumption in the short run, and increased government consumption by increased military expenditure will divert savings away from productive investment. The estimated coefficient on globalization index is negative but not significant on household consumption and positive but insignificant on government consumption. The estimated coefficients on financial resource inflow and GDP per capita are negative and significant on both consumptions. It seems that increased availability of funds from increased financial resource inflow and increased output does not lead to increased consumptions. Instead, increases in these two variables seem to increase savings, indicating the lack of opportunity and commodities to consume in most developing countries. The estimated coefficient on population is negative and significant on household consumption and positive but insignificant on government consumption. Explanatory powers of these equations are high with R^2 of .806 for household

consumption and .687 for government consumption.

Looney (1989) examined the effects of military expenditures on private and public consumptions in arms producing and nonproducing countries. In nonproducing countries, military expenditure has a positive and strong effect on private consumption, and it has a negative and significant effect in arms producing countries. In an arms producing country, increased military expenditure will lead to higher investment in the arms producing capital intensive sector, which leads to a squeeze on the wage goods sector by diverting capacity from them, thus lowering private consumption (Looney, 1989). In that situation, “only the poor lose by slow growth of production in commodities suited to their needs” (Looney, 1989, p. 147). For public consumption, his results show a strong positive linkage between the military expenditure and public consumption in arms producing countries, and an insignificant linkage in nonproducing countries (Looney, 1989).

These results indicate that increase in military expenditure has an overall negative impact on economy by squeezing private consumption in the short run, and diverting savings through increased government consumption.

4.3 Education and Health Spending

Education and health spending play significant roles in the human capital accumulation process. Therefore, analyzing their relationship with military expenditure is very important for economic development. Military expenditure and education/health spending are all part of government spending. Are they substitutes or complements? It is hard to determine either way a priori. If they are substitutes, they will compete for their

share of government budget with each other, hence there will be “guns vs. butter” negative tradeoffs. Looney (1990), Apostolakis (1992), and Ozsoy (2002) found a strong negative impact of military expenditures on both education and health. However, “in many developing countries, the military is intimately involved in the provision of education and health services, particularly in rural areas” (Looney, 1990, p. 9). In that case, military expenditure and education/health spending are complements. To modernize the economy, the military and education/health can be interdependent in contributing to economic development (Babin, 1990). Also in many developing countries, “the military organization was often the only functioning bureaucratic organization in societies which lacked effective operating institutions” (Babin, 1990, p. 270). Adeola (1996), and Yildirim and Sezgin (2002) found mixed result with positive results on education but negative on health. In order to accommodate these complicated effects of military expenditure on education and health spending, Adeola (1996) suggested the following hypotheses: military expenditures, education, and health spending are allies (or complements) to modernization and economic development; or military expenditures, education, and health spending are substitutes in economic development.

Results in Table 4.1 show that there are strong positive impacts of military expenditure on both education and health. This indicates that there are positive tradeoffs instead of negative tradeoffs, thus there are no “guns vs. butter” tradeoffs and military spending can be thought of as complementary with health and education spending. The last column of the table shows positive results for all time lags for education and health except an insignificant result for 5-year lag for health. The estimated coefficients on globalization index are positive and significant on both education and health. All other

independent variables are not statistically significant. Explanatory powers of these equations are very high with R^2 of .775 for education spending and .845 for health spending.

This result of positive impacts of military expenditure on education and health is consistent with results by Verner (1983), Harris, Kelly, and Pranowo (1988), and Babin (1990). Even though past studies show very mixed results concerning the effect of military expenditure on education and health spending, significant positive results of this dissertation suggest that military expenditure seems to contribute to economic development by promoting human capital accumulation through positive impact on education and health spending.

4.4 Summary

Regression results in this chapter show that the increase in military expenditure has significant negative impact on savings, and on private consumption in the short run. It has an indirect negative effect on savings as well by positively affecting government consumption, which in turn crowds out savings. Even though it does not have significant effect on investment, its direct and indirect negative effect on savings will have a negative impact on capital formation in developing countries. On the other hand, the military expenditure turned out to be a complementary to education and health spending instead of being a substitute. That means it plays a positive role in human capital formation in developing countries, but less so for physical capital formation.

CHAPTER 5

REGRESSION RESULTS FOR PRODUCTION AND TRADE

An increase in military expenditure can influence the production of a developing country by introducing modern technology, training technical skills to soldiers, and increasing employment, or by crowding out investment. It also can affect trade by increasing arms imports and crowding out nonarms imports and exports. It can have impact on the inflow of foreign direct investment (FDI) by sending signals to potential foreign investors. This chapter will examine these impacts of military expenditure. Table 5.1 shows results of these regression analyses.

5.1 Agricultural and Industrial Production

Structuralists consider industrialization as the most important process in economic development of developing countries. In addition, a dualistic economy has to modernize the traditional agricultural sector to become a modern industrialized economy. Therefore, these two sectors are very significant for the economic development in the developing countries. The military expenditure can crowd out agricultural investment, which in turn reduces food production and increases poverty (Deger, 1992). If that happens, the negative opportunity costs of military expenditure will hurt the whole economy. The military can influence agricultural production by introducing modern technology and

Table 5.1 Results for Production and Trade

	Military Burden	KOF Globalization Index	Net Financial Inflow	GDP per capita	Population	R^2	Number of Observations	Number of Countries	Short Run Results on Military Burden $t-1$ (top) and $t-5$ (bottom)
Agriculture Value Added	.061 (1.581)	-.303 (-18.205)***	-.021 (-1.746)*	-.094 (-1.508)	-.025 (-5.214)***	.908	2497	118	-.043 (-1.095) -.000 (-.013)
Industry Value Added	-.200 (-4.560)***	-.012 (-.650)	.023 (1.665)*	.034 (.483)	.008 (1.385)	.826	2495	118	-.053 (-1.238) -.138 (-3.135)***
Unemployment Rate	-.054 (-1.939)*	-.069 (-4.501)***	-.007 (-.417)	.120 (1.645)*	.050 (6.224)***	.796	1169	103	-.218 (-4.280)*** -.111 (-3.458)***
Exports	.002 (.337)	.592 (19.608)***	.032 (1.443)	.636 (5.770)***	.015 (1.672)*	.908	2570	119	.119 (1.990)** .116 (1.821)*
Imports	.197 (2.690)***	.524 (15.516)***	-.016 (-.628)	-.028 (-.226)	.019 (1.889)*	.878	2572	119	.301 (4.623)*** .479 (6.393)***
Foreign Direct Investment	-.094 (-2.502)**	.133 (7.641)***	-.014 (-1.085)	-.010 (-1.159)	-.002 (-.460)	.253	2590	119	-.047 (-1.699)* -.058 (-1.900)*

Note: The t -values are shown in parentheses, and *** indicates significance at 99%, ** at 95%, and * at 90%.

improving rural infrastructures, such as road and water supply. The hypothesis of this dissertation is that the crowding out by the military expenditure will outweigh the possible positive effects on agricultural production. Similarly, the industrial sector can either get crowded out by the military expenditures or get positive effects of modernization. The hypothesis of this dissertation is an overall negative effect of military expenditure on industrial sector.

The regression results show that the hypothesis on industrial production was supported, but the hypothesis on agricultural production was rejected even though it is statistically insignificant. The estimated coefficient on military burden in the agriculture value added equation is positive with 88% statistical significance. It seems positive effects outweigh the negative effects in the long run. The last column of the table shows the results for short run analyses, and the signs of coefficients for 1-year and 5-year lags are both negative but statistically insignificant. All other independent variables have

significant negative effects on agricultural production, especially globalization index and population have negative and significant impacts on agriculture. It seems that countries with increasing population and higher integration into the global economy tend to neglect the agricultural sector.

The estimated coefficient of military burden on industry value added is negative and significant, indicating the military expenditure significantly crowds out industrial production. The last column of the table shows that the sign of the coefficient for 5-year lag is negative and significant and negative and insignificant for 1-year lag. The estimated coefficient of net financial inflow is positive and significant for industrial production. Higher net financial resources means that more financial resources are available for industry to invest, which in turn leads to higher production for the industry sector. Other independent variables are not statistically significant. Explanatory powers of these equations are very high with R^2 of .908 for agriculture value added and .826 for industry value added. The estimated coefficients for country dummies for the fixed effect model are not shown here.

Results of Faini, Annez, and Taylor (1984) are opposite of the results of this dissertation. The estimated coefficients on military burden are negative and significant for agriculture and positive but insignificant for industry. Different results may be caused by their lack of consideration of time factor in their analyses. Their analyses are done only for the short run, while this dissertation's focus is long run, and that difference might have caused a difference in results. They argued that increased military expenditures are associated with the shift in economic activity from the agricultural sector to industry (Faini et al., 1984). Since their result on industry is not statistically

significant, their conclusion is not robust. The result of this dissertation shows significant negative impact of military expenditure on industry with 10-year and 5-year lags.

Combined with negative result on savings in Chapter 4, this result indicates that the expansion of military expenditure is detrimental to industrialization in developing countries. The results for agriculture is mixed, therefore it is not clear how the military expenditure will affect agricultural development in developing countries. It all depends on which effect, negative crowding-out effect or positive effect on technology and infrastructure, is more dominant in these developing countries.

5.2 Employment

Expansion of military expenditure can increase employment as large numbers of workers are employed either directly by military-related operations or in a supporting role or in the services sector around military bases (Yildirim & Sezgin, 2003). Increase in military expenditure can alleviate a reduction in civilian jobs during economic downturn by absorbing unskilled workers (Henry & Oliver, 1987). In addition, if the increase in military expenditure raises effective demand in the economy, output will go up, which in turn will increase the employment in the economy. However, if the increase in the military expenditure is mostly aimed at advanced, high technology, labor-saving weapons systems, the increase in employment will be much smaller (Yildirim & Sezgin, 2003). Since most developing countries do not spend a lot of money on highly advanced weapons systems with a few exceptions of very rich developing countries, the hypothesis of this dissertation is that there is significant positive effect of military expenditure on employment in developing countries.

The result in Table 5.1 shows that the estimated coefficient on military burden in unemployment equation is negative and significant, indicating that an increase in military expenditure will increase employment in developing countries. The last column of the table shows the same result in shorter terms as well. It shows that military burden has significant negative effects on unemployment rate both in 5-year and 1-year lags. The globalization index also has significant negative effect on unemployment, indicating that the more globally integrated the country is, the more employment the country can generate. On the other hand, the population has a significant positive effect on unemployment rate, which indicates that the larger the country is, the more unemployment there is. Per capita GDP also has a significant positive effect on unemployment rate. This result is rather counter-intuitive. This indicates that higher output will not lead to higher employment. If the increase in the output mainly happened in labor saving, capital intensive sectors, the increase in output may not lead to higher employment. Financial resource inflow does not have a significant effect on unemployment rate. Goodness of fit of the equation is high with R^2 of .796.

This result is consistent with the result of the study by Azam, Khan, Zaman, and Rasli (2016). Their study of four South Asian countries revealed that the estimated coefficient of military expenditure has a negative and more elastic relationship with the unemployment rate, indicating that military expenditures favor the employment in these South Asian countries (Azam, Khan, Zaman, & Rasli, 2016).

On the other hand, a study by Yildirim and Sezgin (2003) shows that the second lag of military expenditure had a negative effect on employment in Turkey between 1950 and 1997. However, their result with first lag shows the positive and significant effect on

employment, which is consistent with the result of this dissertation (Yildirim & Sezgin, 2003). A study by Dunne and Watson (2000) also shows that the military expenditure had a detrimental impact on long-term manufacturing employment in South Africa between 1961 and 1990.

Except results of Dunne and Watson (2000) and half of the results by Yildirim and Sezgin (2003), it seems that military expenditure has significant positive effects on employment in developing countries by absorbing unskilled workers, which gives these countries a tool to fight a high unemployment rate.

5.3 Exports and Imports

Military expenditure may have negative impact on trade balances in developing countries. “Since an increase in defence spending increase aggregate demand, if there are domestic supply constraints, a rise may reduce exportable goods and/or may result in an increase in imports” (Sezgin, 2001, p. 77). Deger put this process in following words:

Defense spending increases aggregate demand. If the domestic supply is relatively inelastic, to accommodate this increased demand exports might have to be diverted for internal use and/or imports stepped up. Thus the balance of trade will become adverse, and will exacerbate the existing deficits that most LDCs suffer from. (Deger, 1986, p. 140)

Therefore, the increase in military expenditure may crowd out exports and increase imports. This dissertation will follow this argument and hypothesize that the increase in military expenditure will crowd out exports and increase imports. However, military imports may crowd out civilian imports (Deger, 1992). If that is the case, there is a possibility that the increase of military expenditure may crowd out part of imports as well. These arguments are based on demand side arguments of crowding out, even though this

chapter discusses mostly the supply side argument of productions.

Results in Table 5.1 show that the effect of military expenditure is not significant on exports, but it is positive and significant on imports. The part of the hypothesis that the increase in military expenditure will increase imports is supported by this result, but there is no crowding out of exports in the result. As a matter of fact, results in the last column of the table show that effect of military expenditure on exports is actually positive and significant in the short term. The results also show that effect of military expenditure on imports is positive and significant in all three time lags. Thus, the increase in military spending has a significant positive impact on imports and positive impact on exports in the short run. The estimated coefficient on globalization index is positive and significant on both exports and imports. This result is not surprising. If the country is more globalized, it will engage in more trade, exporting and importing more goods and services. Per capita GDP and population also have positive and significant effect on exports. Population has positive and significant effect on imports as well. Per capita GDP is not significant on imports, and financial resource inflow is not significant on both exports and imports. Explanatory powers of these equations are very high with R^2 of .908 for exports and .878 for imports.

Deger (1986) shows that military burden has a significant negative effect on trade balance. Scheetz (1991) also has a similar result that the military expenditure has a significant negative effect on trade balance. These results of negative effects on trade balance are actually consistent with results of this dissertation. Since estimated coefficient on import is larger than that on export (.197 and .002), an increase in the military burden will increase more imports than exports, thus worsening the trade balance.

Dunne, Nikolaidou, and Roux (2000) and Sezgin (2001) show a negative but insignificant effect on trade balance. The signs on these insignificant results are still negative, thus still consistent with the hypothesis of this dissertation. On the other hand, Faini et al. (1984) show a negative effect of military expenditure on imports, although it is statistically insignificant.

In terms of arms imports, Kiefer (2001) examined the effect of arms imports on the growth rate of per capita GDP by using single equation regression analysis on 115 countries over the period of 1978-1988. Control variables include investment, population growth, size of armed forces, and size of government budget (Kiefer, 2001). The result shows that arms import has an expected negative sign, but it is not statistically significant (Kiefer, 2001). Army size has a positive and significant effect on economic growth (Kiefer, 2001). In light of this evidence, Kiefer concludes that the “more arms trade to slower development” claim remains possible but uncertain (Kiefer, 2001, p. 13).

5.4 Foreign Direct Investment (FDI)

“FDI brings host countries capital, productive facilities, new technology and modern management know-how” (Hassan, Waheeduzzaman, & Rahman, 2003, p. 279). Thus, attracting FDI can be a significant part of the strategy to industrialize and modernize the economies of the developing countries. What kind of signals does the increase in military expenditure send to potential foreign investors? On the one hand, it will send a signal of a country’s commitment to internal and external security, which means FDI property rights may be secure in that country. On the other hand, it will also send a signal that the political and security environment surrounding the country may be

unstable. If the potential foreign investors perceive the risk is too high, they will avoid investing in that country. Whether the increase in military expenditure will attract or detract the FDI depends on which force outweighs the other. This dissertation hypothesizes that the increase in military expenditure sends a negative signal to potential foreign investors, since many developing countries are often involved in internal and external conflicts when they increase their military expenditures.

Table 5.1 shows that the estimated coefficient of military burden on FDI is indeed negative and significant, suggesting that the increase in military expenditure is sending a negative signal to potential foreign investors. The last column of the table shows the same result in the short run, although the statistical significances are slightly lower with 5-year and 1-year lags. The globalization index has a significant positive effect on FDI. The more globalized the country is, the more foreign investors are willing to invest. The globalization index has a very significant positive impact on trades and FDI. Estimated coefficients of all remaining independent variables are not statistically significant, but signs are all negative. Goodness of fit of the equation is rather low with R^2 of .253.

Hassan et al. (2003) ran regression on FDI for five countries in the South Asian Regional Cooperation Council between 1980 and 1999, and found the negative and significant relation between military expenditure and FDI. They also found a positive impact of globalization index on FDI. Therefore, their result is very consistent with the result of this dissertation.

Hite-Rubin (2015) investigated the relationship between military expenditure and FDI with consideration of corruption in the host country by including a corruption variable in her analysis. The result shows that the increase in military expenditure attracts

more FDI in perceived corrupt countries, but it reduces FDI inflow in noncorrupt countries (Hite-Rubin, 2015). A possible explanation is that increase in military expenditure will signal international investors that their investment assets are secure (Hite-Rubin, 2015). “Countries that are corrupt have inherently insecure institutional environments, and thus require the expensive signal of military spending to demonstrate to investors that the risk of seizure or conflict is minimized” (Hite-Rubin, 2015, p. 244). This interesting analysis, nonetheless, confirmed the result of this study, at least for noncorrupt countries. Under normal circumstances, the increase in military expenditure will reduce FDI inflow to developing countries.

5.5 Summary

This chapter examined the effects of military expenditures on the production and trade. The military expenditures have negative effects on industrial output and foreign direct investment. On the other hand, the military expenditures have positive effects on employment and imports. Combined with results from Chapter 4 in terms of savings, the military expenditures seem to have a significant negative impact on capital formation through negative impacts on savings and FDI, which may be why the military expenditures have a negative impact on the industrial sector. Even though its positive effect on employment can be used as a tool to fight with the high unemployment rates in many developing countries, its significant negative impact on industrialization has to be taken into consideration by these countries.

CHAPTER 6

REGRESSION RESULTS FOR SOCIOECONOMIC VARIABLES

An expanded structuralist definition of economic development includes many socioeconomic variables such as income equality and physical quality of life. Therefore, we cannot discuss the impact of military expenditures on economic development without discussing their impact on these socioeconomic variables. Are there “guns vs. butter” tradeoffs between military expenditures and these socioeconomic variables? This chapter will examine the impact of military expenditures on urbanization, income distribution, and the physical quality of life. Table 6.1 shows the regression results of these analyses.

6.1 Urbanization

Urbanization, a migration of population from rural areas to urban areas, is a critical process in the structuralist analysis of industrialization. According to structuralists, the urbanization process provides necessary labor supply for industrialization for a developing country to become a modern economy. There is strong positive association between urbanization and income level of developing countries. “Generally, the more developed the country, measured by per capita income, the greater the share of population living in urban areas” (Todaro & Smith, 2006, p. 313). That is why urbanization was used as one of the independent variables in the study by Kim (1996) as

Table 6.1 Results for Socioeconomic Variables

	Military Burden	KOF Globalization Index	Net Financial Inflow	GDP per capita	Population	R^2	Number of Observations	Number of Countries	Short Run Results on Military Burden $t-1$ (top) and $t-5$ (bottom)
Urbanization Rate	.163 (6.157)***	.443 (36.527)***	-.003 (-.300)	.094 (2.125)**	.022 (5.885)***	.980	2617	119	.172 (5.455)*** .198 (6.742)***
Gini Coefficient	-.135 (-1.070)	-.013 (-.439)	.046 (1.732)*	-.349 (-7.740)	.013 (1.234)	.900	600	101	-.085 (-.503) .097 (.641)
Life Expectancy	-.049 (-2.357)**	.275 (28.731)***	.039 (5.447)***	.082 (2.363)***	.015 (5.202)***	.941	2613	119	-.051 (-2.297)** -.028 (-1.259)
Literacy Rate	-.237 (-1.546)	.525 (10.034)***	-.025 (-.406)	-.450 (-2.185)**	.053 (3.409)***	.964	307	109	-.203 (-1.542) -.172 (-.862)
Infant Mortality Rate	.454 (5.949)***	-1.206 (-34.509)***	-.120 (-4.616)***	.348 (2.743)***	-.108 (-10.179)***	.939	2617	119	.574 (6.433)*** .474 (5.606)***

Note: The t -values are shown in parentheses, and *** indicates significance at 99%, ** at 95%, and * at 90%.

an indicator of modernization. However, there was no study conducted so far on the relationship between military expenditure and urbanization. What will be the effect of military expenditures on urbanization? The results of this dissertation so far show that military expenditure has a positive impact on employment. The increase in employment brought by the increase in military expenditure may attract more labor to the area surrounding military installations, which are often near urban areas. However, military expenditure has a negative effect on industrial output, which may deter the migration of laborers. The hypothesis of this study is that potential increase in employment stimulated by the increase in military expenditure will attract more laborers to the area surrounding military installations near an urban area, thus military expenditure will have a positive impact on urbanization.

Results in Table 6.1 show that the estimated coefficient of military burden is positive and statistically significant, rejecting the null hypothesis. The last column of the table also shows significant positive results for time lags of 1 year and 5 years, indicating

it is positive in both short and long runs. Globalization index also has a significant positive effect on urbanization. The more globalized the country is, the more urbanized and modern that country is. Population also has a significant positive effect on urbanization. As the population in the country increases, the more people migrate to urban areas to look for jobs and better opportunity. GDP per capita also has a significant positive effect on urbanization, confirming the observation by Todaro and Smith (2006). Net financial inflow is the only independent variable with an insignificant result. Explanatory power of the equation is very high with R^2 of .980. The estimated coefficients for country dummies for the fixed effect model are not shown here.

What does this positive relationship between military expenditure and urbanization mean to the economic development? It all depends on what developmental stages each country is in. It should have a positive effect in the countries at the early stage of economic development and industrialization, by supplying labor to the industry and services sectors. However, as countries developed further and their urban populations become larger, the increase in military expenditure may exacerbate the problems many developing countries face these days, such as urban crowding and congestion, and urban unemployment. The increase in the employment generated by the increase in the military expenditure may not be enough to alleviate the urban unemployment.

6.2 Income Distribution

For most international developmental organizations, eliminating poverty and achieving more equal income distribution are the most important goals for economic development. What will be the impact of military expenditure on income distribution in

developing countries? Ali and Galbraith (2003) listed several possible impacts. It could be negative since the increase in the military expenditure may crowd out other government spending on social programs that have income equalizing effect (Ali & Galbraith, 2003). “Second, the taxes required to support military spending may fall disproportionately on the middle classes; if so post-tax income inequality may be increased” (Ali & Galbraith, 2003, p. 2). “Third, high levels of military spending may reflect the use of violence as a means of social control, notably against trade unions and other egalitarian social forces” (Ali & Galbraith, 2003, p. 2). On the other hand, there may be a positive impact of military expenditure on income distribution. “The military absorbs low-skilled labor, which may raise wages for the young and unskilled” (Ali & Galbraith, 2003, p. 2). They expect that if the military and home grown arms productions are more labor intensive, military spending is more income equalizing, and that if military spending is more capital and equipment intensive, it negatively affects the income equality (Ali & Galbraith, 2003). Their results show the positive effect of military expenditure on pay inequality, indicating that military expenditure adversely affects income distribution. Abell (1994) also found a strong negative effect of military expenditure on income distribution, even though his study was conducted on the United States instead of developing countries. Considering results of these studies, the hypothesis of this dissertation is that the increase in military expenditure will worsen the income distribution in developing countries.

The result in Table 6.1 shows that the estimated coefficient of military burden on Gini coefficient is negative but insignificant. The sign was opposite of expected, indicating that the increase in the military expenditure is somewhat income equalizing,

even though considerable uncertainty remains. The short-run result with 1-year lag also shows a negative but insignificant result. The equalizing effect of military spending on income distribution is consistent with its positive effect on employment. However, weak significance implies that other negative effects may be offsetting this positive effect. In addition, the result with 5-year lag shows an opposite sign but it is still statistically insignificant. The globalization index and GDP per capita also has negative signs but they are not statistically significant. Financial resource inflow has a positive and significant sign, indicating it has a negative impact on income distribution. Population also has a positive sign but it is not statistically significant. Explanatory power of the equation is very high with R^2 of .900, which is surprising in light of the uncertainty about individual determinants. We remain doubtful about the impact of military spending on the distribution of income.

6.3 Physical Quality of Life

Physical quality of life variables are life expectancy at birth, adult literacy rate, and infant mortality rate, accounting for an expanded definition of economic development and being used as a proxy for general social well-being. It is expected that government social spending will positively influence the physical quality of life. Since the increase in military expenditure may crowd out government social spending, the hypothesis of this dissertation is that the increase in the military expenditure negatively affects the physical quality of life in the developing countries; that is, there is a negative “guns vs. butter” tradeoff between them.

Results in Table 6.1 support this hypothesis. There is a significant negative

tradeoff between military expenditure and physical quality of life. The estimated coefficient of military burden on life expectancy is negative and significant. It is negative but insignificant on literacy rate. It is positive and significant on mortality rate, indicating that the increase in military expenditure will raise the infant mortality rate. All three results suggest that military expenditure reduces the physical quality of life in developing countries. The last column of the table shows that these negative results mostly extend to the short run as well, except three cases with statistically insignificant results. These negative results on physical quality of life seem to contradict the positive results on education and health spending in Chapter 4. A positive effect on education spending should affect literacy rate positively, and a positive effect on health spending should affect life expectancy positively and mortality rate negatively. One possible explanation is that the increase in military expenditure, education, and health spending may crowd out other government spending on social welfare and social safety net. Another explanation is that the relationship between military expenditure and the physical quality of life may be spurious. Such variables as military conflict, civil war, and social unrest can increase military expenditure, and worsen the physical quality of life. Such variables may be available from political science research, and the inclusion of those variables in future analysis as control variables may be beneficial.

Globalization index and population have a very significant positive effect on physical quality of life. They have significant positive effects on life expectancy and literacy rate, and have significant negative effects on mortality rate, suggesting that globalization and population growth will increase general social well-being in developing countries independently of militarization. Financial resource inflow has a similar result

with a significant positive effect on life expectancy and a significant negative effect on mortality rate, but its effect is not significant on literacy rate. GDP per capita has a mixed result. It has a significant positive effect on life expectancy, but it has a significant negative effect on literacy rate and a significant positive effect on mortality rate. Explanatory powers of these equations are very high with R^2 of .941 for life expectancy, .964 for literacy rate, and .939 for mortality rate.

This negative effect of military expenditure on physical quality of life can be found in studies by Adeola (1996) and Kim (1996). Both studies conclude that high military expenditures are inversely related to the physical quality of life. On the other hand, studies by Rosh (1986) and Davis and Chan (1990) found no significant effect of military expenditure on social welfare.

6.4 Summary

Results in this chapter suggest that military expenditure negatively affects various dimensions of social well-being in the developing countries. Even though it may have a possible income equalizing effect, possibly through increased employment opportunities, its significant negative impact on physical quality of life may outweigh its positive effect on income distribution. Considering this strong negative impact on basic human needs, even its positive effect on urbanization may not have a positive impact on social well-being. It may exacerbate problems of urban overpopulation, overcrowding, and unemployment, and may further decrease social well-being of these urban populations. Our structuralist view of development implies that the increase in the military expenditure is not good policy in terms of socioeconomic development.

CHAPTER 7

CONCLUSION

This dissertation tried to answer the following questions: What is the nature of the impact of military expenditure on economic development in the developing countries? What are the opportunity costs of military spending? What are the policy implications from these analyses?

Our regression results reveal that the nature of the impact of military expenditure on economic development is mostly negative. It has negative impacts on capital formation, industrialization, and social well-being. Structuralists and supply side theories pay particular attention to industrialization and capital formation because they are the most crucial factors of economic development for any developing country. Generalized well-being, measured by physical quality of life, is central to the expanded definition of economic development. Negative impact of military expenditure on these crucial aspects of broad definition of economic development is the most significant findings of this dissertation.

On the other hand, there are some positive impacts of military expenditure on other aspects of economic development. It has positive effects on employment, government consumption, education and health spending, and imports. It also has a possible income equalizing effect as well.

From a demand side consideration, the opportunity costs of the increase in military expenditures are decreased gross domestic savings, decreased household consumption in the short run, decreased industrial output, decreased foreign direct investment, and decreased physical quality of life. These opportunity costs are very extensive and far reaching in the economies of developing countries. On the other hand, we do not find any evidence of negative opportunity costs between military expenditure and education and health spending, suggesting that they are allies not substitutes. However, that result indicates that some other government social spending must be sacrificed to pay these costs. They may be social welfare spending or some other social safety net spending. Military expenditure has positive effects on government consumption and imports as well. It may be simply because military expenditure is a part of government expenditure and arms import is a part of imports. The increase in government expenditure and imports may crowd out the savings and export sector. Military expenditure also has a negative effect on unemployment rate, indicating that it has a positive effect on employment. That suggests military expenditure can be used to absorb unskilled workers and help reduce unemployment rate. This result reduces other opportunity cost considerations associated with military spending. A positive effect on urbanization is ambiguous in terms of the relationship to economic development. It can be positive if it supplies labor for the industry, but it can be negative if it exacerbates many urban problems such as urban overcrowding and unemployment.

Overall, I conclude that the policy implication from this analysis is that the military expenditure should not be used as a tool for economic development in developing countries. It is not development promoting as Benoit (1973, 1978) suggested,

but it is actually development hampering given a broad interpretation of the development concept. It may have a power to absorb unskilled workers to alleviate unemployment rate and it may be equalizing the income distribution somewhat, but its negative impact reaches far greater aspects of economic development. Its negative impact on industrialization, capital formation, and physical quality of life means that the increase in military expenditure will not help promote economic development in the developing country.

I conclude that military expenditure has significant negative impacts on economies of developing countries.

APPENDIX A

LIST OF PAST STUDIES

Table A.1 List of Past Studies

AUTHORS	MODEL	SAMPLE	PERIOD	DEPENDENT VARIABLES	INDEPENDENT VARIABLES	RESULTS
Benoit Single Equation Approach						
Benoit (1973, 1978)	Simple Linear Equation	44 LDCs (less developed countries)	1950-1965	GDP Growth	Defense Burden, Investment, Foreign Aid	Strong Positive
Frederiksen & Looney (1983)	Simple Linear Equation	37 LDCs with Resource Rich and Resource Poor	1950-1965	GDP Growth	Gross Capital Formation, Foreign Aid, Defense Burden	Positive for Resource Rich, Negative for Resource Poor
Demand Side Approach						
Faini, Annez & Taylor (1984)	Demand Side Growth	69 Countries	1952-1970	GDP Growth	Export Growth, Population Growth, Change in Military Burden, Capital Inflow Change, Capital Stock Change, GDP per capita	Consistently Negative
Stewart (1991)	Demand Side Growth	Africa, Latin America	1952-1970	Investment Share, Import Share	Government Spending, Defense Spending, Export Share, Investment Share, Capacity Utilization	Strong positive to Investment, Negative to Import
Smith (1980)	Keynesian Demand	14 OECD countries	1954-1973	Investment Share	Military Expenditure Share, Growth Rate, Demand Pressure	Negative
Supply Side Approach (Harrod-Domar)						
Lim (1983)	Harrod-Domar Growth	54 LDCs	1965-1973	GDP Growth	Incremental Capital-output Ratio, Deficit on Current Account to Gross National Saving Ratio, Defense Burden, Defense to Government Expenditure Ratio	Negative
Milne (1984)	Harrod-Domar Growth	17 Latin American	1968-1973	GDP Growth	Incremental Capital-output Ratio, Deficit on Current Account to GDP Ratio, Defense Burden, Military Regime	Negative
Supply Side Approach (Fedar-Ram)						
Biswas & Ram (1986)	Fedar's Augmented Growth Model	58 LDCs	1969-1977	Growth	Investment, Military Spending, Externality, Factor Productivity Differential	No Externality & No Factor Productivity Differential
Biswas (1993)	Fedar's Augmented Growth Model	74 LDCs	1981-1989	Growth	Investment, Military Spending, Externality, Factor Productivity Differential	Overall Positive
Murdoch, Pi & Sandler (1997)	Modified Feder-Ram Model	8 Asian and 16 Latin American	1955-1988	GDP Growth	Investment, Population Growth, Military Burden, Non-Defense Spending, Primary School Enrolment, Secondary School Enrolment	Positive
Birdi, Dunne & Saal (2000)	Modified Feder-Ram Model	South Africa	1973-1993	GDP Growth	Employment Growth, Capital Stock Growth, Government Spending Growth, Defense related Dummy	Government procurement had a significant positive effect on industrial growth
Simultaneous Equation Approach (Demand & Supply)						
Deger & Smith (1983)	Simultaneous Equations	50 LDCs	1965-1973	Growth, Savings, Military Burden	Savings, Foreign Capital Flows, Population Growth, Military Expenditure, per capita Income, Agricultural Growth Rate, Inflation Rate	Positive on Growth, Negative on Savings
Deger (1986)	Simultaneous Equations	50 LDCs	1965-1973	Growth, Savings, Trade Balance, Military Burden	Savings, Foreign Capital Flows, Population Growth, Military Expenditure, per capita Income, Agricultural Growth Rate, Inflation Rate	Positive on Growth, Negative on Savings & Trade Balance
Scheetz (1991)	Simultaneous Equations	Argentina, Chile, Paraguay, Peru	1969-1987	GDP Growth, Savings Rate, Current Account Balance, Military Burden	Military Burden, Net Domestic Savings Rate, Current Account Balance, Growth of Agricultural Product, Growth of Government Expenditures, Inflation	Negative
Scheetz (2002)	Simultaneous Equations	Argentina, Bolivia, Chile, Guatemala, Paraguay, Peru	1969-1994	GDP Growth, Savings Rate, Current Account Balance, Military Burden	Military Burden, Net Domestic Savings Rate, Current Account Balance, Growth of Agricultural Product, Growth of Government Expenditures, Inflation	Negative

Table A.1 Continued

AUTHORS	MODEL	SAMPLE	PERIOD	DEPENDENT VARIABLES	INDEPENDENT VARIABLES	RESULTS
Dunne, Nikolaidou & Roux (2000)	Simultaneous Equations	South Africa	1961-1997	Growth, Savings, Trade Balance, Military Burden	Labor Growth, Domestic Savings, Military Burden, per capita GDP, Trade Balance, Agricultural Growth, Non-Military Government Spending, Inflation, GDP	Negative but insignificant
Sezgin (2001)	Simultaneous Equations	Turkey	1956-1994	Growth, Savings, Trade Balance, Military Burden	Savings, Military Burden, Growth, Inflation, Exchange Rate, Greek Military Spending, NATO Defense Share	Positive on Growth, Negative but insignificant on Savings and Trade Balance
Galvin (2003)	Simultaneous Equations	64 LDCs	Cross Sectional	Growth, Savings, Military Burden	Savings, Current Account Share, Labor Force Growth, Defense Burden, per capita GDP, Inflation, Threat, Conflict, Oil	Negative and Significant on Middle Income Countries
Structuralist Approach						
Davis, Kick & Kiefer (1989)	OLS	59 Countries	1979, 1982	per capita GDP, Sati's Index of Political Rights	World System Position, per capita Army Size, Military Regimes, Weapons Exported, Civil War & Interstate War, Domestic Capital Formation, Lagged Dependent Variables, Secondary School Enrolment	Military Participation and weapons Export Positive on Growth, Negative on Political Rights, Military Regime Negative on Political Rights
Kick, Davis, Kiefer & Burnes (1998)	MAD (minimum absolute deviation)	65 LDCs	1985	per capita GDP, Secondary School Enrolment, Political Rights	Initial State of Dependent Variables, Military Participation, Military Regimes, Arms Imports, Net Foreign Investment, World System Position, OPEC dummy	Military Participation Positive on GDP & Political Rights, Military Regimes & Arms Imports Negative on GDP & Political Rights, Not Significant on School Enrolment
Bullock & Firebaugh (1990)	Cross Sectional	66 LDCs	1960, 1980	per capita GDP, per capita Gross Domestic Income, Calories, Infant Mortality Rate, Literacy	Military Burden, Military Participation, Lagged Dependent, Exports, Foreign Investment, Debt Dependence, Colonial, OPEC	Military Participation Positive, Military Burden Negative but not Significant
Faini, Annez & Taylor (1984)	Patterns of Development	101 Countries	1950-1970	Investments, Imports, Industrial Production, Agricultural Output, Tax Receipt	per capita GDP, Population, Capital Inflow, Military Burden	Negative on Investments & Agricultural Output, Positive on Tax Receipt
Investment, Savings, and Consumptions						
Smith (1980)	Keynesian Demand	14 OECD countries	1954-1973	Investment Share	Military Expenditure Share, Growth Rate, Demand Pressure	Negative
Deger & Smith (1983)	Simultaneous Equations	50 LDCs	1965-1973	Growth, Savings, Military Burden	Savings, Foreign Capital Flows, Population Growth, Military Expenditure, per capita Income, Agricultural Growth Rate, Inflation Rate	Positive on Growth, Negative on Savings
Deger (1986)	Simultaneous Equations	50 LDCs	1965-1973	Growth, Savings, Trade Balance, Military Burden	Savings, Foreign Capital Flows, Population Growth, Military Expenditure, per capita Income, Agricultural Growth Rate, Inflation Rate	Positive on Growth, Negative on Savings & Trade Balance
Faini, Annez & Taylor (1984)	Patterns of Development	101 Countries	1950-1970	Investments, Imports, Industrial Production, Agricultural Output, Tax Receipt	per capita GDP, Population, Capital Inflow, Military Burden	Negative on Investments & Agricultural Output, Positive on Tax Receipt
Looney (1989)	Linear Equation	Arms Producing & Arms Non-Producing	1981, 1982 Cross-sectional	Consumption, Investment, Inflation, GDP Growth	Savings, Resource Balance, Government Resource, per capita Military Expenditure	For non-producing positive on private consumption, inflation, and negative for the rest. For producing, positive on investment, public consumption, economic growth, and negative for private consumption and inflation
Looney (1994)	10 Equation Policy Model	Pakistan	1974-1991	GDP, Investment, Savings, Fiscal Deficit	Defense, Non-Defense, Government Revenue	Positive to GDP and Investment, both Positive and Negative for Savings and Deficit
Stewart (1991)	Deamnd Side Growth	Afica, Latin America	1952-1970	Investment Share, Import Share	Government Spending, Defense Spending, Export Share, Investment Share, Capacity Utilization	Strong positive to Investment, Negative to Import
Scheetz (1991)	Simultaneous Equations	Argentina, Chile, Paraguay, Peru	1969-1987	GDP Growth, Savings Rate, Current Account Balance, Military Burden	Military Burden, Net Domestic Savings Rate, Current Account Balance, Growth of Agricultural Product, Growth of Government Expenditures, Inflation	Negative
Scheetz (2002)	Simultaneous Equations	Argentina, Bolivia, Chile, Guatemala, Paraguay, Peru	1969-1994	GDP Growth, Savings Rate, Current Account Balance, Military Burden	Military Burden, Net Domestic Savings Rate, Current Account Balance, Growth of Agricultural Product, Growth of Government Expenditures, Inflation	Negative
Cohen, Stevenson, Mintz & Ward (1996)	Indirect Link Approach	Israel	1960-1991	Investment, Labor, Growth	Labor, Capital, Defense Spending, Non-Military Government Spending	Not Significant except Positive on Investment in the long run
Dunne, Nikolaidou & Roux (2000)	Simultaneous Equations	South Africa	1961-1997	Growth, Savings, Trade Balance, Military Burden	Labor Growth, Domestic Savings, Military Burden, per capita GDP, Trade Balance, Agricultural Growth, Non-Military Government Spending, Inflation, GDP	Negative but insignificant
Sezgin (2001)	Simultaneous Equations	Turkey	1956-1994	Growth, Savings, Trade Balance, Military Burden	Savings, Military Burden, Growth, Inflation, Exchange Rate, Greek Military Spending, NATO Defense Share	Positive on Growth, Negative but insignificant on Savings and Trade Balance
Galvin (2003)	Simultaneous Equations	64 LDCs	Cross Sectional	Growth, Savings, Military Burden	Savings, Current Account Share, Labor Force Growth, Defense Burden, per capita GDP, Inflation, Threat, Conflict, Oil	Negative and Significant on Middle Income Countries

Table A.1 Continued

AUTHORS	MODEL	SAMPLE	PERIOD	DEPENDENT VARIABLES	INDEPENDENT VARIABLES	RESULTS
Education & Health Spending						
Verner (1983)	Linear & Quadratic Equation	18 Latin American	1948-1979	Education Spending	Defense, per capita Income Change	Negative in Venezuela, No Significance in 7 Countries, Positive in 10 Countries (6 Linear & 4 Quadratic)
Harris, Kelly & Pranowo (1988)	Trade-Offs	50 Countries & 12 Asian Middle East	1980	Education, Health, Housing & Welfare, Economic Services	Defense, GDP Growth	Negative Trade-Offs are Rare
Looney (1990)	Simple Regression	Asia	1974-1986	Education, Health	Military Expenditure, Government Expenditure, Education Expenditure, Health Expenditure	Negative on Both
Babin (1990)	Two-Wave Panel Regression	69 LDCs	1965-1980	Commercial Energy Consumed Per Capita	Military Expenditure, Secondary School Enrolment, World System Position, Type of Regime, Type of Head of State	Both Military Expenditure and Education are Positive and Significant
Apostolakis (1992)	Linear Regression	19 Latin American	1953-1987	Health, Education, Social Security & Welfare, Public Works	Military Burden, per capita Central Government Expenditure	Overwhelmingly Negative Trade-offs
Adeola (1996)	OLS	60 LDCs	1985, 1965-1980, 1965-1985	Per Capita Energy Consumption, Per Capita GNP, PQLI	Military Expenditure, Military Burden, Per Capita Military Expenditure, Arms Import, Military Participation Rate, Input/Output Variables of Education and Health, Secondary Enrolment Ratio, Infant Mortality Rate, Calories Consumption Per Diem, Gross Domestic Investment, 5 of Labor Force in Industry, FDI, Total External Debts/GNP, Annual Growth Rates	Military Expenditure & Educations are Allies, Military Expenditures & Health are Adversaries, Military Expenditures & PQLI Negative, Military Expenditures are Detrimental to Social Development
Ozsoy (2002)	Multi Variable Single Equation	Turkey	1925-1998	Education, Health	Defense Burden, per capita Income Growth	Negative on Both
Yildirim & Sezgin (2002)	Three Equation System	Turkey	1924-1996	Education, Health	Growth Rate of Education, Housing, Defense, Taxes, Secondary School Enrolment, GDP	Negative on Health, Positive on Education
Agricultural & Industry Output						
Faini, Annez & Taylor (1984)	Patterns of Development	101 Countries	1950-1970	Investments, Imports, Industrial Production, Agricultural Output, Tax Receipt	per capita GDP, Population, Capital Inflow, Military Burden	Negative on Investments & Agricultural Output, Positive on Tax Receipt
Employment						
Dunne & Watson (2000)	Labor Demand Function	South Africa	1961-1990	Employment	Output, Real Wage, Military Burden	Negative and Significant
Yildirim & Sezgin (2003)	Constnat Elasticity of Substitution Production Function	Turkey	1950-1997	Employment	Real Wage, Military Expenditure	Negative in the Long Run
Azam, Khan, Zaman, & Rasli (2016)	Multivariate Regression	India, Nepal, Pakistan, Sri Lanka	1990-2013	Unemployment Rate	Military Expenditure, Energy Consumption, GDP Per Capita, FDI, Population Growth	Negative on Unemployment Rate, Positive on Employment
Export & Import						
Faini, Annez & Taylor (1984)	Patterns of Development	101 Countries	1950-1970	Investments, Imports, Industrial Production, Agricultural Output, Tax Receipt	per capita GDP, Population, Capital Inflow, Military Burden	Negative on Investments & Agricultural Output, Positive on Tax Receipt
Deger (1986)	Simultaneous Equations	50 LDCs	1965-1973	Growth, Savings, Trade Balance, Military Burden	Savings, Foreign Capital Flows, Population Growth, Military Expenditure, per capita Income, Agricultural Growth Rate, Inflation Rate	Positive on Growth, Negative on Savings & Trade Balance
Scheetz (1991)	Simultaneous Equations	Argentina, Chile, Paraguay, Peru	1969-1987	GDP Growth, Savings Rate, Current Account Balance, Military Burden	Military Burden, Net Domestic Savings Rate, Current Account Balance, Growth of Agricultural Product, Growth of Government Expenditures, Inflation	Negative
Dunne, Nikolaidou & Roux (2000)	Simultaneous Equations	South Africa	1961-1997	Growth, Savings, Trade Balance, Military Burden	Labor Growth, Domestic Savings, Military Burden, per capita GDP, Trade Balance, Agricultural Growth, Non-Military Government Spending, Inflation, GDP	Negative but insignificant
Sezgin (2001)	Simultaneous Equations	Turkey	1956-1994	Growth, Savings, Trade Balance, Military Burden	Savings, Military Burden, Growth, Inflation, Exchange Rate, Greek Military Spending, NATO Defense Share	Positive on Growth, Negative but insignificant on Savings and Trade Balance
Kiefer (2001)	Linear Regression	115 Countries	1978-1988	GDP per capita Growth	Investment, Population Growth, Size of Armed Forces, Military Imports, Size of Government Budget	Positive for Army Size, Negative but Insignificant for Military Imports
FDI						
Hassan, Waheeduzzaman, & Rahman (2003)	Pooled Cross-Sectional	5 South Asian Countries	1980-1999	FDI	Military Expenditure, Globalization Index, Information and Communication Technology, Human Capital, Population Growth, Investment, Government Expenditure, GDP Growth, Inflation, Exchange Rate, Per Capita GDP	Negative
Hite- Rubin (2015)	Pooled Time-Series Cross-Sectional	92 Countries	1990-2008	FDI	Military Expenditure, Corruption, Energy Consumption, Law & Order, Nato, WTO, Government Spending, Investment Treaties, Foreign Debt, Investor Risk Ratings, Budget Balance, Population, Arms Transfer	Negative in Low Corruption, Positive in High Corruption Countries
Urbanization						
Kim (1996)	Longitudinal & Cross Sectional	101 Countries	1986-1994	PQLI, Economic Growth	Defense Burden, Urbanization Rate, Population Growth, Ethnic Diversity	Negative on PQLI, No Effect on Growth

Table A.1 Continued

AUTHORS	MODEL	SAMPLE	PERIOD	DEPENDENT VARIABLES	INDEPENDENT VARIABLES	RESULTS
Income Distribution						
Abell (1994)	OLS	US	1972-1991	Two Measurements of Income Distribution	Military Expenditure, Non-Military Expenditure, Taxes, Inflation, Interest Rate, Economic Growth	Positive Coefficient on Military Expenditure, meaning Military Expenditure associates with Increasing Income Inequality
Ali & Galbraith (2003)	Panel Regression	160 Countries	1987-1997	Inequality	Military Expenditure, Size of Armed Forces, GDP Growth, per capita Income	Positive Effect on Income Inequality
PQLI						
Rosh (1986)	Cross Sectional	68 Countries	1970, 1975, 1980	PQLI	Military Burden, per capita GNP, Commodity Concentration in Exports, Degree of Democracy, Arms Imports	No Effect
Davis & Chan (1990)	Three Stage Least Square	Taiwan	1961-1985	PQLI, GNP Per Capita, Social Spending, Savings Rate, Export Rate	Military Expenditure, Military Participation, Social Spending, GNP Per Capita, Savings Rate, Export Rate, Birth Rate	No Significant Influence on Social Welfare
Adeola (1996)	OLS	60 LDCs	1985, 1965-1980, 1965-1985	Per Capita Energy Consumption, Per Capita GNP, PQLI	Military Expenditure, Military Burden, Per Capita Military Expenditure, Arms Import, Military Participation Rate, Input/Output Variables of Education and Health, Secondary Enrolment Ratio, Infant Mortality Rate, Calories Consumption Per Diem, Gross Domestic Investment, 5 of Labor Force in Industry, FDI, Total External Debts/GNP, Annual Growth Rates	Military Expenditure & Educations are Allies, Military Expenditures & Health are Adversaries, Military Expenditures & PQLI Negative, Military Expenditures are Detrimental to Social Development
Kim (1996)	Longitudinal & Cross Sectional	101 Countries	1986-1994	PQLI, Economic Growth	Defense Burden, Urbanization Rate, Population Growth, Ethnic Diversity	Negative on PQLI, No Effect on Growth

APPENDIX B

SELECTION CRITERIA AND TIME LAGS

Table B.1 Selection Criteria and Time Lags

			Estimated Coefficients on Military Burden and <i>t</i> - values	Adjusted <i>R</i> ²	Akaike Information Criterion (AIC)	Schwarz Bayesian Criterion (SBC)	Numbers of Observations	Numbers of Countries
Investment	Fixed Effect	<i>t</i> -1	.124 (2.878)***	.502	12766.633	13530.926	3511	119
		<i>t</i> -5	.080 (1.742)*	.468	11276.271	12024.766	3091	119
		<i>t</i> -10	.012 (.267)	.497	8946.772	9665.517	2549	118
	Pooled	<i>t</i> -1	.083 (2.267)**	.158	14493.080	14530.062	3511	119
		<i>t</i> -5	.050 (1.331)	.117	12727.127	12763.345	3091	119
		<i>t</i> -10	-.016 (-.445)	.117	10266.176	10301.237	2549	118
Savings	Fixed Effect	<i>t</i> -1	-.083 (-1.622)	.784	14033.781	14798.884	3534	119
		<i>t</i> -5	-.270 (-4.404)***	.706	13175.212	13924.348	3107	119
		<i>t</i> -10	-.155 (-2.744)***	.761	10099.351	10824.231	2555	119
	Pooled	<i>t</i> -1	.023 (.537)	.649	15636.477	15673.498	3534	119
		<i>t</i> -5	.001 (.015)	.447	15021.996	15058.244	3107	119
		<i>t</i> -10	.086 (1.502)	.352	12532.052	12567.127	2555	119
Private Consumption	Fixed Effect	<i>t</i> -1	-.470 (-8.937)***	.788	14176.901	14941.406	3517	119
		<i>t</i> -5	-.086 (-1.415)	.735	13041.823	13790.439	3094	119
		<i>t</i> -10	-.015 (-.278)	.796	9855.798	10580.192	2545	119

Table B.1 Continued

			Estimated Coefficients on Military Burden and <i>t</i> - values	Adjusted <i>R</i> ²	Akaike Information Criterion (AIC)	Schwarz Bayesian Criterion (SBC)	Numbers of Observations	Numbers of Countries
	Pooled	<i>t</i> -1	-.716 (-14.813)***	.576	16496.653	16533.645	3517	119
		<i>t</i> -5	-.557 (-9.906)***	.437	15260.913	15297.136	3094	119
		<i>t</i> -10	-.472 (-8.157)***	.388	12539.918	12574.970	2545	119
Public Consumption	Fixed Effect	<i>t</i> -1	.559 (22.675)***	.705	8852.194	9616.805	3520	119
		<i>t</i> -5	.359 (12.619)***	.656	8361.346	9110.042	3096	119
		<i>t</i> -10	.174 (6.091)***	.671	6597.173	7321.664	2547	119
	Pooled	<i>t</i> -1	.698 (28.107)***	.290	11832.551	11869.549	3520	119
		<i>t</i> -5	.557 (20.683)***	.231	10736.581	10772.808	3096	119
		<i>t</i> -10	.387 (14.122)***	.196	8759.556	8794.612	2547	119
Education	Fixed Effect	<i>t</i> -1	.087 (4.344)***	.741	934.206	1534.178	1052	116
		<i>t</i> -5	.096 (4.167)***	.707	918.275	1511.912	1040	119
		<i>t</i> -10	.094 (4.605)***	.742	468.640	1037.144	914	113
	Pooled	<i>t</i> -1	.135 (5.307)***	.058	2184.585	2214.336	1052	116
		<i>t</i> -5	.137 (5.180)***	.069	2012.979	2042.660	1040	119
		<i>t</i> -10	.108 (4.492)***	.104	1504.347	1533.254	914	113
Health	Fixed Effect	<i>t</i> -1	.062 (3.528)***	.831	-1648.933	-980.321	1623	119
		<i>t</i> -5	.003 (.144)	.828	-1600.173	-934.343	1587	119
		<i>t</i> -10	.050 (3.532)***	.831	-1585.923	-935.806	1459	118
	Pooled	<i>t</i> -1	.051 (3.457)***	.296	555.612	587.964	1623	119
		<i>t</i> -5	.042 (2.817)***	.263	599.472	631.689	1587	119
		<i>t</i> -10	.030 (2.284)**	.244	488.102	519.815	1459	118
Agriculture Value Added	Fixed Effect	<i>t</i> -1	-.043 (-1.095)	.882	11188.168	11943.892	3443	118
		<i>t</i> -5	-.000 (-.013)	.900	9220.918	9961.006	3032	118
		<i>t</i> -10	.061 (1.581)	.904	7504.843	8221.053	2497	118

Table B.1 Continued

			Estimated Coefficients on Military Burden and <i>t</i> - values	Adjusted <i>R</i> ²	Akaike Information Criterion (AIC)	Schwarz Bayesian Criterion (SBC)	Numbers of Observations	Numbers of Countries
	Pooled	<i>t</i> -1	-.497 (-9.877)***	.565	15580.679	15617.544	3443	118
		<i>t</i> -5	-.442 (-8.810)***	.568	13536.432	13572.534	3032	118
		<i>t</i> -10	-.342 (-6.491)***	.550	11233.858	11268.795	2497	118
Industry Value Added	Fixed Effect	<i>t</i> -1	-.053 (-1.238)	.805	11755.718	12511.335	3440	118
		<i>t</i> -5	-.138 (-3.135)***	.801	10236.858	10976.824	3029	118
		<i>t</i> -10	-.200 (-4.560)***	.817	8114.453	8830.564	2495	118
	Pooled	<i>t</i> -1	.630 (12.188)***	.360	15740.566	15777.425	3440	118
		<i>t</i> -5	.537 (9.973)***	.298	13946.716	13982.812	3029	118
		<i>t</i> -10	.426 (7.628)***	.254	11506.306	11541.238	2495	118
Unemployment Rate	Fixed Effect	<i>t</i> -1	-.218 (-4.280)***	.793	2883.586	3452.973	1308	105
		<i>t</i> -5	-.111 (-3.458)***	.798	2692.336	3252.732	1263	104
		<i>t</i> -10	-.054 (-1.939)*	.775	2509.935	3056.836	1169	103
	Pooled	<i>t</i> -1	.091 (1.403)	.094	4718.012	4749.070	1308	105
		<i>t</i> -5	-.002 (-.037)	.088	4499.558	4530.405	1263	104
		<i>t</i> -10	.025 (.656)	.064	4082.375	4112.758	1169	103
Exports	Fixed Effect	<i>t</i> -1	.119 (1.990)*	.892	15225.371	15991.139	3553	119
		<i>t</i> -5	.116 (1.821)*	.892	13462.276	14211.929	3120	119
		<i>t</i> -10	.022 (.337)	.903	10930.084	11655.690	2570	119
	Pooled	<i>t</i> -1	-.071 (-.750)	.363	21409.910	21446.963	3553	119
		<i>t</i> -5	-.083 (-.833)	.350	18942.753	18979.027	3120	119
		<i>t</i> -10	-.229 (-2.190)**	.349	15714.516	15749.626	2570	119
Imports	Fixed Effect	<i>t</i> -1	.301 (4.623)***	.873	15871.444	16637.281	3555	119
		<i>t</i> -5	.479 (6.393)***	.851	14503.723	15253.534	3124	119
		<i>t</i> -10	.197 (2.690)***	.872	11508.034	12233.736	2572	119

Table B.1 Continued

			Estimated Coefficients on Military Burden and t - values	Adjusted R^2	Akaike Information Criterion (AIC)	Schwarz Bayesian Criterion (SBC)	Numbers of Observations	Numbers of Countries
	Pooled	$t-1$	-.014 (-.146)	.344	21592.747	21629.804	3555	119
		$t-5$	-.012 (-.113)	.284	19291.075	19327.356	3124	119
		$t-10$	-.323 (-3.047)***	.289	15799.818	15834.932	2572	119
Foreign Direct Investment	Fixed Effect	$t-1$	-.047 (-1.699)*	.331	9592.116	10356.126	3503	119
		$t-5$	-.058 (-1.900)*	.329	8922.434	9672.166	3122	119
		$t-10$	-.094 (-2.502)**	.216	8177.599	8904.167	2590	119
	Pooled	$t-1$	-.075 (-3.712)***	.142	10347.046	10384.014	3503	119
		$t-5$	-.083 (-3.651)***	.087	9770.071	9806.348	3122	119
		$t-10$	-.095 (-3.800)***	.089	8452.139	8487.295	2590	119
Urbanization Rate	Fixed Effect	$t-1$	.172 (5.455)***	.963	10743.833	11510.262	3572	119
		$t-5$	.198 (6.742)***	.970	8800.696	9552.320	3170	119
		$t-10$	.163 (6.157)***	.979	6419.942	7147.796	2617	119
	Pooled	$t-1$	.761 (11.365)***	.600	19113.732	19150.817	3572	119
		$t-5$	.756 (11.085)***	.604	16917.462	16953.831	3170	119
		$t-10$	.624 (8.998)***	.615	13876.632	13911.851	2617	119
Gini Coefficient	Fixed Effect	$t-1$	-.085 (-.503)	.886	1771.431	2286.614	678	109
		$t-5$	.097 (.641)	.892	1662.261	2151.419	657	104
		$t-10$	-.135 (-1.070)	.879	1573.895	2039.969	600	101
	Pooled	$t-1$	-1.282 (-5.416)***	.065	3102.460	3129.575	678	109
		$t-5$	-1.247 (-6.212)***	.093	2965.394	2992.320	657	104
		$t-10$	-.872 (-4.774)***	.083	2699.902	2726.284	600	101
Life Expectancy	Fixed Effect	$t-1$	-.051 (-2.297)**	.910	8278.108	9044.085	3559	119
		$t-5$	-.028 (-1.259)	.920	6955.759	7707.070	3162	119
		$t-10$	-.049 (-2.357)**	.938	5164.693	5892.356	2613	119

Table B.1 Continued

			Estimated Coefficients on Military Burden and t - values	Adjusted R^2	Akaike Information Criterion (AIC)	Schwarz Bayesian Criterion (SBC)	Numbers of Observations	Numbers of Countries
	Pooled	$t-1$	.097 (3.005)***	.554	13850.387	13887.450	3559	119
		$t-5$	.107 (3.149)***	.529	12446.096	12482.450	3162	119
		$t-10$	.094 (2.557)**	.496	10523.137	10558.346	2613	119
Literacy Rate	Fixed Effect	$t-1$	-.203 (-1.542)	.933	1313.754	1754.757	342	110
		$t-5$	-.172 (-.862)	.927	1325.888	1757.222	336	108
		$t-10$	-.237 (-1.546)	.944	1111.351	1536.212	307	109
	Pooled	$t-1$	-.139 (-.537)	.410	1972.850	1995.859	342	110
		$t-5$	-.332 (-1.029)	.391	1956.354	1979.256	336	108
		$t-10$	-.240 (-.823)	.366	1774.863	1797.224	307	109
Mortality Rate	Fixed Effect	$t-1$	.574 (6.433)***	.907	18085.736	18851.538	3554	119
		$t-5$	.474 (5.606)***	.917	15492.172	16243.679	3167	119
		$t-10$	.454 (5.949)***	.936	11956.208	12684.061	2617	119
	Pooled	$t-1$	.105 (.866)	.592	23209.188	23246.243	3554	119
		$t-5$	.016 (.135)	.576	20544.758	20581.121	3167	119
		$t-10$	-.016 (-.130)	.549	16957.424	16992.643	2617	119

Note: The t -values are shown in parentheses, and *** indicates significance at 99%, ** at 95%, and * at 90%.

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