Military Expenditures and Inequality: Empirical Evidence from Israel

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13. September 2009

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2009

Abstract

The aim of this paper is to examine different shocks to Israel's business cycle from 1960 to 2007 in terms of the relationship between military expenditures and inequality, Gini coefficient. We begin with the assumption that there is a direct effect of higher military expenditures on income inequality levels in Israel. To capture this, we use the structural vector autoregressive (SVAR) model to conduct this kind of different shock analysis and find that military expenditures shock (a rise) has a statistically significant effect on the Gini coefficient index after the first 3 years. This finding implies that military expenditures policies lead to inequality (Gini coefficient) in Israel.

Key Words: *Military expenditures; income inequality (Gini coefficient); Israel; Structral VAR analysis.*

JEL Codes: *C13, D30, H56.*

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Introduction

The relationship between military expenditures and inequality is an interesting subject; however, it has received marginal attention among empirical and theoretical researchers. Moreover, it is not well documented within the empirical literature. Despite this, as Lin and Ali (2009) mentions, numerous studies have uncovered the linkages between military expenditures and other macroeconomic variables, such as economic growth, unemployment, purchasing power parity, black market premium, poverty and investment.

In fact, due to certain limitations, only a few studies within the scholarly literature have focused on the relationship between military expenditures and inequality. The major limitations of these studies are the availability and reliability of data. In addition to the problem of lack of data, the reliability of the official military expenditures data provided by national governments is also unclear. Additionally, there are difficulties in comparing income distributions of countries with different economic structures.

Due to these problems, there are a limited number of studies focusing on this relationship on a global scale. For instance, Lin and Ali (2009) examine the causal relationship between military expenditures and inequality using BVC and SIPRI data across 58 countries from 1987 to 1999. Moreover, Hirnissa, Habibullah, and Baharom (2008) investigate the causality between military expenditures and income inequality in selected Asian countries namely Malaysia, Indonesia, Singapore, Philippines, India and South Korea for the period 1970-2005. The authors analyze the impact of military expenditures on income inequality and the impact of income inequality on military expenditures as well.

Further, Ali and Galbraith (2003) analyze the effect of military expenditures on inequality controlling for the size of armed forces, GDP growth, per capita income and other possible determinants by using a panel regression with country level observations from 1987-1997. Additionally, Hyatt (2003) examines the social cost of security by using a cross-national study of military expenditures and well-being.

Due to the lack of availability information on its statistics and data, analyzing the relationship between military expenditures and inequality for a specific country can provide more reliable empirical evidence. Exploring the impact of a short-term conflict and a temporary increase in military expenditures on inequality is difficult. Therefore, in consideration of the fact that the Israeli-Arab conflict is one of the longest conflicts in recent history, Israel will be analyzed in this study.

The Israeli-Arab conflict is a complicated issue. Abu Qarn and Abu-Baders (2008) show the existence of an arms race between Israel and Arab countries. The findings of this study suggest weak causality that runs from Israel to Arab countries' military expenditures and bidirectional causality between Israel and Syria. There are also political and military interventions by super powers in this oil rich region. In addition to the limitations of global analyses on the relationship between military expenditures and inequality discussed above, the complicated nature of the Israeli-Arab conflict makes it more difficult to analyze this relationship regionally.

In this paper, we analyze the relationship between military expenditures and inequality in Israel for the period 1960-2007 by using Gini coefficient. Because, as Hirnissa, Habibullah, and Baharom (2008) state, we believe military expenditures and income inequality has been an important component in economy. The rest of the paper is organized as follows: Section 2 presents a brief review of the studies that have focused on the relationship between military expenditures and income inequality. In Section 3, we explain the SVAR model for income inequality and defense expenditures and the results of the empirical model. Section 4 will conclude the paper.

Review of the Related Literature

There may be a number of possible links between military expenditures and income inequality. In fact, as Lin and Ali (2009) mention, theoretically, there are several ways in which military expenditures may affect inequality. However, this link is constructed based on the spending impacts of military expenditures. Furthermore, the results of the few studies that have been done in this area are often mixed. In other words, the papers investigating this relationship give conflicting results. Within this regard, the results of Henderson et al. (2008) indicate that an increase in the military expenditures of a country will improve income equality. However, other studies such as Abell (1994), Auvinen and Nafziger (2002), Ali and Galbraith (2003), and Ali (2007) find an opposite effect.

On the other hand, Abell (1994) examines the relationship between military expenditures and income inequality in the United States during the post-Vietnam War period. In the paper, two measures of income were used: the difference between the highest and lowest quintiles of aggregate family income and the Gini coefficient. The OLS results indicate that increases in military expenditures are associated with increasing income inequality for both measures. Auvinen and Nafziger (1999) claim that the ratio of military expenditures to income is associated with income inequality. More recent work by

Auvinen and Nafziger (2002) concludes that these two variables can be the source of humanitarian emergencies. By analyzing this result, it can be also claimed that inequality can affect military expenditures. Ali (2007) examines the effect of military expenditures on income inequality using a panel regression at the country level of observation from 1987-1997. Results reveal that there is a positive effect of military expenditures on income inequality.

Further, the findings of the panel unit root tests of Lin and Ali (2009) indicate that two inequality measures (the level of inequality and the Household Income Inequality Data Set) under consideration are likely to be non-stationary. Moreover, the results of Hirnissa, Habibullah, and Baharom (2008) indicate that "one way causality running from military expenditures to income inequality only for the case of Malaysia and bidirectional causality for the case of Singapore. As for the remaining countries, no meaningful relationship could be detected and it can be seen as sign of good governance in these countries" (Hirnissa, Habibullah, and Baharom, 2008).

Ali and Galbraith (2003) estimate that there is a positive effect of military expenditure on pay inequality. Within this regard, their results show a positive and significant relationship between military expenditures and inequality. Given the close relationship between pay and income the result suggests that a country's reduction in military expenditures could reduce income inequality. Hyatt (2003) suggests increase in military spending may reduce life expectancy at birth. His findings also suggest that there is a differential in the impact of military expenditures by gender. The author shows that "The negative effect of resource allocation for security may be as much as 50 percent greater on the life expectancy of women than for that of men" (Hyatt, 2003).

On the other hand, there are several academic studies that have focused on the spending impacts of military expenditures on certain variables, such as employment and economic growth. In fact, as Ali and Galbraith (2003) mention, much work has been done on the relationship between military expenditures and economic growth. The relationship between military expenditures and economic growth has been analyzed frequently in the literature. In the literature, as Kalyoncu and Yucel (2005) state, there is much controversy over whether this military expenditure is associated with higher or lower growth rates. Nevertheless, pioneering work by Benoit (1973), Karagol and Palaz (2004), Klein (2004), Kollias et al. (2004), Dunne et al. (2005), Heo and Eger (2005), Reitschuler and Loening (2005), and some others have had controversial findings. Within this regard,

Kalyoncu and Yucel (2005) have used an analytical approach to investigate relationship between military expenditures and economic growth for Turkey and Greece.

The authors found that long-run equilibrium exist between military expenditures and income for Turkey and Greece. Further, Looney (1993) examines the relationship between defence spending and budgetary allocation in twelve Middle Eastern and North African/Mediterranean countries. His main findings show that defence budgetary trade-offs in the third world are complex.

It might be expected that a variable that impacts economic growth also impacts employment. However, there is little empirical evidence that military expenditures affect employment. Smith (1978), Chester (1978), and Dunne and Smith (1990) claim that military expenditures do not have a significant effect on employment. However, Abell (1990) and Yildirim and Sezgin (2003) argue that military expenditures negatively affect employment. Economic growth, stimulated demand, and employment are the most common links between military expenditures and income inequality, but there may be other links, such as budget reallocation, tax policies, or the creation of employment for unskilled labor. Therefore, avoiding this complicated issue and focusing on the empirical evidence of a direct relationship between these two variables can lead to a stronger conclusion.

As we mentioned above, the problem of lack of data and the difficulty in comparing different economic and social systems has led us to analyze this relationship for a specific country, Israel. Due to the long-standing Israeli-Arab conflict, Israel has one of the highest defense burdens in the world. This conflict, as well as interventions by super powers to these oil rich lands, makes this area one of the most volatile regions in the world; thus, Israel has attracted the most attention by defense economics researchers. This historical background and high defense burden also makes Israel a suitable country for investigating the relationship between military expenditures and income inequality.

Methodology and Inference

In this section, we empirically examine the impact of military expenditures on inequality in Israel for the period 1970 to 2007. We assume that higher military expenditures have a direct effect on inequality level in Israel. To capture this, we use the Gini coefficient[1] for income inequality and military expenditures variables. We use data taken from the Central Bureau of Statistics in Israel, which includes income surveys,

[1] Gathered by the authors from several sources (including the world income inequality database, income surveys, and several scholarly papers).

military expenditures series, and several databases. All data were converted to natural logarithmic form before analyzing.

We use the Structural Vector Aoutoregressive (SVAR) model to analyze the relationship between income inequality and military expenditures for Israel. Structural vector autoregressions can be used to address the following questions: How does the economy respond to different economic shocks? What is the contribution of the different shocks to the business cycle in terms of the relationship between income inequality and military expenditures?

Sims (1981, 1986), Bernanke (1986), and Shapiro and Watson (1988) put forward a new kind of econometric model that is now known as structural VAR (SVAR), or identified VAR approach. The major point of structural VAR estimation is to obtain non-recursive orthogonalization of the error terms for impulse-response analysis. This alternative to the recursive Cholesky orthogonalization requires the user to impose enough restrictions to identify the orthogonal (structural) components of the error terms.

Let y_t be a k-element vector of the endogenous variables, and let $\sum = E[e_t e_t']$ be the residual covariance matrix. The SVAR model developed by Amisano and Gannini (1997) is used for the following analysis. The model can be written as;

$$\Gamma e_t = \Psi u_t \qquad \textbf{(1)}$$

where e_t and u_t are vectors of length *k*. e_t is the observed (or reduced form) residuals, while u_t is the unobserved structural innovations. Γ and Ψ are $k \times k$ matrices to be estimated. The structural innovations u_t are assumed to be orthonormal, its covariance matrix is an identify matrix $\sum = E[e_t e_t'] = I$. The assumption of orthonormal innovations u_t imposes to the following identifying restrictions on Γ and Ψ:

$$\Gamma \sum \Gamma' = \Psi \Psi' \qquad \textbf{(2)}$$

equation (2) is symmetric, where this imposes a $k(k+1)/2$ restriction on the $2k^2$ unknown elements in Γ and Ψ. In order to identify Γ and Ψ, we need to supply at least $2k^2 - k(k+1)/2 = k(3k-1)/2$ additional restrictions.

A SVAR model allows one to impose both short- and long-run restrictions, consistent with theory. However, a VAR model does not allow this and a vector error correction model (VECM) only allows one to impose long-run restrictions.

First, with respect to causality analysis, we check the causality between two variables and notice that the military expenditures cause the Gini coefficient in this period. We construct bootstrap percentile 95% confidence intervals to illustrate parameter uncertainty following the approach in Hall (1992). We consider responses of up to 10 years ahead and use 1000 bootstrapped replications. The lag lengths of the VAR model are selected using the Akaike Information criterion and the optimal lag length is one.

The SVAR model includes the Gini coefficient for income inequality denoted as GINI and military expenditures denoted as DE. We use a non-recursive structural VAR model, which has the following restrictions:

$$\begin{bmatrix} u_t^{GINI} \\ u_t^{DE} \end{bmatrix} = \begin{bmatrix} 1 & * \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_t^{GINI} \\ \varepsilon_t^{DE} \end{bmatrix} \qquad \textbf{(3)}$$

Here, u^{GINI} and u^{DE} are the structural disturbances--that is, income inequality shocks and military expenditures shocks, respectively--and ε^{GINI} and ε^{DE} are the residuals in the reduced form equations, representing unexpected disturbances. The first equation represents a contemporaneous response of military expenditures to income inequality shocks. The second equation describes no contemporaneous relationship between military expenditures and income inequality.

The impulse response functions of the impact of an income inequality shock and a military expenditures shock on income inequality and military expenditures are plotted in Figures 1 and 2, respectively:

[insert figure 1 and 2]

We start with the results on the impact of a shock in military expenditures on the Gini coefficient index. Military expenditures shock (a rise) has a statistically significant effect on the Gini coefficient index after the first 3 years for Israel. A Gini coefficient index shock has a statistically insignificant effect on military expenditures for the entire 10-year horizon as anticipated.

Conclusion

We examined the impact of military expenditures shocks on income inequality over short-term horizons. We achieved this goal through using a SVAR model. Our main finding is that military expenditures have a statistically positive impact on income inequality (the Gini coefficient). This finding implies that military expenditures policies will contribute to income inequality in Israel in the future.

Regarding the reaction of military expenditures causing a positive shock to the Gini index, we find that as military expenditures increase, the Gini coefficient increases. This information is useful to make two points: (1) in forecasting military expenditures, policy makers need to model the impact of military expenditures on the Gini coefficient, and (2) in economies where the Gini coefficient is high; there will be added pressure on the efficiency of the business cycle.

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FIGURES

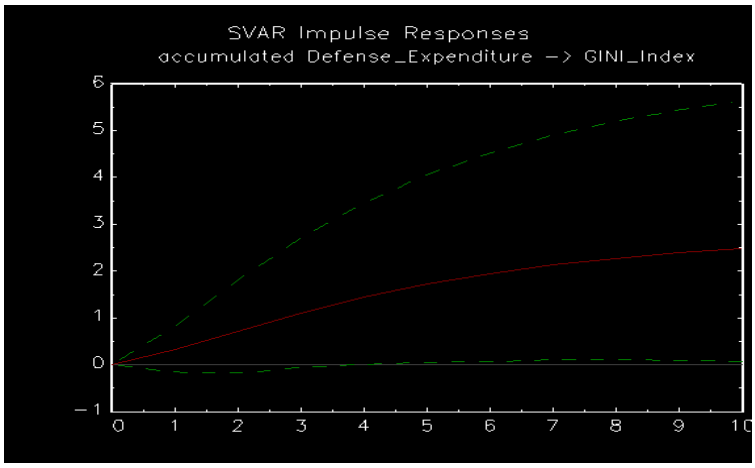

Figure 1: The response of the Gini index (income inequality) to a shock in defense expenditures

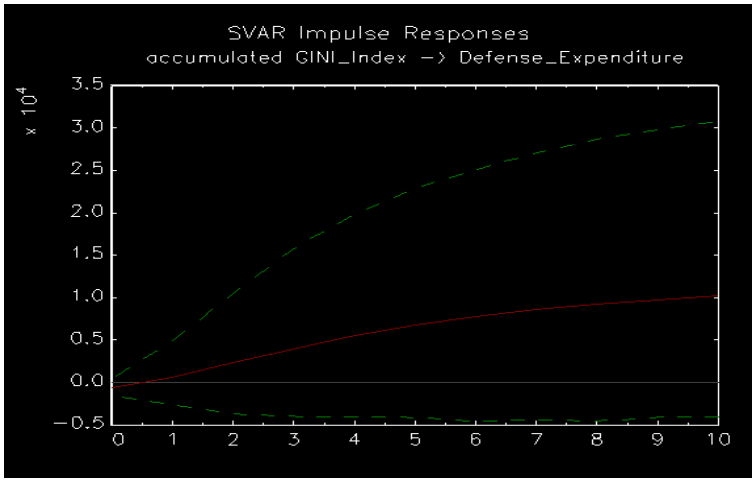

Figure 2: The response of defense expenditures to a shock in the Gini index (income inequality) for Israel.