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# War and Economy



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## Introduction

War has historically been and continues to be one of the costliest endeavors for citizens, governments, and states. Countless lives are lost in war, and civilians make up the majority of war casualties (UNICEF, 1996). In 2011 over 26 million people were displaced from their homes due to war, many of them children (Internal Displacement Monitoring Center, 2012). Although current data is unavailable, from 1986-1996, at least 2 million children lost their lives in wars, and around 5 million more were maimed or permanently disabled (UNICEF, 1996).

There are direct and indirect impacts on the economies of states aside from the loss of life and the incidence of disability. Among these are military expenditures, the loss of physical capital, destruction of infrastructure, the decline of internal and external investment, and the opportunity costs associated with war spending that by necessity decreases government spending in other areas of the economy, unless the war in question is financed entirely through taxation and/or borrowing. The question of whether or not these costs are associated with a decline in economic growth is unresolved in the literature.

This paper addresses two questions: How does the cost of war as measured in increased military spending (Milex) affect the economies of nation-states? How does this cost affect short- and long-term economic growth? The theoretical prediction is that there will be an initial positive association between war and economic growth which will eventually plateau and shift to a negative relationship. When war occurs, there may initially be an increase in internal investment and production. However, war may also create uncertainty within markets and eventually discourage investment (Mintz & Huang, 1990). Additionally, there may be a retraction of other sectors of the economy in response to the expansion of the defense sector, and this might impact growth positively or negatively (Marwah & Klein, 2005).

## War and Economy

Historically, war has been believed to be of benefit to states, economies, and the advancement of humanity. In 1891, S.B. Luce contended:

War is one of the great agencies by which human progress is effected. Scourge though it be, and much as its practice is to be deplored, we must still recognize war as the operation of the economic laws of nature for the government of the human family. It stimulates national growth, solves otherwise insoluble problems of domestic and political economy, and purges a nation of its humors. (Luce, 1891, 672)

Conventional wisdom holds that once all tokens are cast, military expenditures and war stimulate state economy. This idea in part hails from the World War II era, when America emerged from the Great Depression as a buttress of the European nations and Russia (Blattman & Miguel, 2009). As economists Stiglitz and Bilmes (2008) point out, “There was a problem of insufficient demand... World War II created a demand for tanks and armaments; the economy ran at full steam; everyone who wanted a job could get one-and the war even demanded that those who could work two shifts did so” (Blattman & Miguel, 2009, 115).

However, there is evidence that war has the potential to harm economies as well. Poast (2006) describes this apparent contradiction as “The Iron Law of War” (21). He theorizes that war is only economically beneficial to a country under certain conditions:

When that country has slow economic growth and low use of resources prior to the war; when there are large and sustained government expenditures during the war; when the war is not local, is of moderate duration, and is financed responsibly. (21)

This is in line with Stiglitz and Bilmes’ claim that insufficient demand prior to WWII helped create the economic conditions that made the war effort fruitful for America. However, the effects on the European economy after the World

Wars were negative and differed from the American experience (Milward, 1970).

Economic Growth Theory explains that war can be expected to affect economies in such ways as depleting human capital and physical capital stock, increasing or slowing the development of technology, strengthening or weakening existing institutions, and affecting prices by raising the cost of capital. After a war, political and economic uncertainty has the potential to increase perceived risk and decrease expected returns, leading to shorter investment horizons. This in turn may reduce investment and raise the cost of capital (Blattman & Miguel, 2009).

There are also social and structural changes that are in part or fully a consequence of war. They are beyond the scope of this paper, but deserve mention. A primary example is the change in the productive capacity and the technological landscape of the United States after World Wars I and II. Productive capacity rose astonishingly, while there was a boom in technological advancement:

Many were completely new industries of great importance for the future....The development of radio receivers, of nuclear fission, of radar, of better tractors, of the jet engine, of new alloys, of optical glass, of measuring tools, of synthetic materials, of electronic computing and control systems and of a wide range of therapeutic drugs were all due largely to research for military purposes. (Milward, 1970, 35)

There was also an increase in the cooperative efforts within Europe after WWII, most particularly between France and Germany. Cooperation was not only a by-product of the quest for unity, the devastation in Europe after the war was so great that the road to quickest recovery was through cooperation in industry and a free flow of trade, as well as American support (Marwick, 1974).

Additionally, the Second World War helped to create the conditions under which American and Russian interests increasingly clashed. A decimated Europe laid the groundwork for the Cold War and a focus of the United States on containment, having raised American concerns about Russian influence in the region. The effects of the cold war on the lives of Americans

were various and pervasive; fallout shelters and the fear of a nuclear war with Russia was an immense part of American existence (Marwick, 1974).

Internal disturbances within a state that might approximate war effects are political instability and regime change. Alesino, Ozler, Roubini, and Swagel (1996), found that in countries and time periods with a high degree of political instability, growth is significantly lower than otherwise.

There are both direct and indirect costs of war, as described by Arunatilake, Jayasuriya, and Kelegama (2001) in their analysis of the cost of the civil war in Sri Lanka. Direct costs of war include the military costs borne by the government, costs of damage to physical and social infrastructure, damage to capital assets and land, and the costs of providing for the displaced and disabled. The total direct cost of the war in Sri Lanka from 1987 to 1996 was calculated at over US\$ 6 billion or 61.9% of Sri Lanka's GDP in 1996.

Indirect costs included lost income due to the loss of human capital, forgone investment and foreign investment, and lost income from reduced tourism. The research found that government military expenditure had a negative and significant effect on investment in the long run, suggesting that military spending decreased government investment. However, this reduction seemed to have no direct effect on economic growth in Sri Lanka (Arunatilake, et al., 2001).

Marwah and Klein (2005) sought to uncover the "hidden costs" of military expenditures through their macroeconomic analysis of the impact of military expenditures on productivity for the Southern Cone of Latin America from 1971-1990. The results indicate that each country's productivity and growth is impacted negatively by its military spending, with the loss of growth varying from 4.8% to 17.3%.

The effects of military expenditures on economies have been examined and some findings suggest that although defense expenditures do not affect growth directly, there is an indirect and delayed negative effect of expenditures on growth (Mintz & Huang, 1990; Stroup &

Heckelman, 2001). In the long term in the U.S. (at the minimum, five years), lower military spending encouraged investment, which promoted growth, while higher military spending eventually crowded out investment, thereby reducing growth (Mintz & Huang, 1990).

An analysis of the relationship between international wars, civil wars and income per capita is provided by Sevastianova (2009). Correlates of War (COW) data is used to measure war incidence and duration in a cross-section of 90 countries during the period 1970-2000. One, two, and five-year intervals are examined to establish the relationship between war and growth. Sevastianova finds that war tends to reduce income growth on average. Civil war has a negative effect in almost all cases, while the findings regarding international war are more complex-- the negative effects of war are greater in the short run (six month and one year intervals) than in the long run (five year intervals).

Conversely, in an examination of 114 countries, Koubi (2005) determines that the average rate of growth in per capita real output over the period 1960-89 was influenced by both inter-state and civil war. Koubi also explains how growth over the period 1975-89 was affected by the wars that took place in the previous period (1960-74). When all types of war are included, this research suggests that there is a positive relationship between war and long-term growth: the greater the duration and severity, the higher the subsequent growth, while contemporaneous growth is negative.

Analyzing a data set of 158 countries from 1960 to 2000, Yamarik, Johnson, and Compton (2010) study inter-state wars as well as incidents of "Use of Force" by examining 1,463 conflicts. A fatality weighted variable for conflict is constructed as well as independent variables that address levels of fractionalization, democracy, and rule of law, among others. The regression, using the dependent variable of real GDP per capita, finds that a one standard deviation increase in fatality-weighted conflict results in an average reduction in real GDP per capita of between 0.09 and 0.14 of a standard deviation. The authors claim that war permanently alters the economic potential of a country.

It is reasonable to conclude that a

variety of factors influence and mediate the effects of war on economic growth. Some ways in which the effects of war might vary include the size of the state economy prior to the war, the type of war, whether or not the war is waged on home territory, how the war is financed, and the severity and duration of the war, to name a few. Clearly, more research is needed in order to determine what variables mediate war effects, and how, especially in regard to economic effects of war.

### **Research Design**

This paper examines the effects of increased military spending during civil and international war on the economies of 71 countries from 1956 to 2007 through a quantitative analysis of existing Milex data. Observations of changes in military spending before, during, and after war are made and compared to changes in the dependent variable of GDP per capita growth within nation-state economies. Only countries that experienced one type of war during the observation period were used in the statistical analysis.

Thirty-nine countries experienced inter-state or extra-state war, while 32 experienced civil war. The average duration of a war in the sample was 36 months. Inter-state and extra-state wars are treated identically for the purpose of this paper. This is justified on the basis that extra-state wars function very similarly to inter-state wars in regard to the state that is a system-member, and only system-member states are examined.

All definitions of war are those used by J. David Singer and Melvin Small for the Correlates of War (COW) project (Sarkees & Wayman, 2010). War is classified by COW as sustained combat between or among military organizations involving substantial casualties of 1,000 deaths. Inter-state war is defined as a war wherein two members of the inter-state system are engaged in combat. Extra-state war is defined as the involvement of a system-member state in combat with a political entity that is not a recognized member of the system. This may be a state that has not yet been recognized, or a non-state entity. Extra-state wars are fought outside the system-member's own territory (Sarkees & Wayman, 2010, 41-42). Civil

Wars are defined as armed conflict that involves military action inside state borders between the national government and an entity within its borders. There must be effective resistance by both sides, and it must incur at least 1,000 battle deaths during each year of the war (Sarkees & Wayman, 2010, 43).

This cross-sectional Ordinary Least Squares multiple regression analysis consists of four independent variables and two dependent variables; units of analysis are countries at war. The independent variables are: total population of a state prior to the war as a control variable for state size, duration of the war as defined in months, cost of the war as defined in military expenditures or Milex, and battle deaths. Independent variables are necessarily restricted to the most meaningful due to the small sample size.

Data for the total population variable was gathered from the Penn World Tables, version 7.0 (2006). Data for cost (Milex), duration, and battle deaths were drawn from the Singer and Small COW project dataset version 4.0 (1994). Number of battle deaths are defined by COW as deaths of military personnel only and do not include the deaths of civilians. It is exceedingly difficult to locate reliable data regarding civilian casualties.

The cost variable requires some elaboration due to its complexity. Cost is defined as the direct cost of the wars as reflected in military spending. Milex spent during the war period was observed and compared to pre-war spending. For wars of one year or less, the second year before war began was used as a baseline for pre-war spending. For wars two years or longer, the four-year pre-war average was used, excluding the last year before the war began. Cost was derived from observed differences in spending. Negative cost, or a decrease in spending during a period of war, eliminated a state from the cost variable, and those cases were not observed in the model.

The first dependent variable is defined as short-term change in economic growth. This is measured by observing per capita GDP growth during the war period, then finding the difference between the average rate of growth during the war period and the average rate of growth during the

five years prior to the war. The second dependent variable is defined as long-term change in economic growth, measured via the difference between the five year post-war average rate of growth and the five year pre-war average rate of growth. Data for the dependent variables were obtained from the University of Groenengin's Angus Maddison database of World Per Capita GDP (2003).

The sample size was affected by the strict inclusion criteria used to control for contiguity, as well as by the missing data for the variables of cost and battle deaths. Countries at war that experienced a simultaneous war of a different type were excluded, as were countries that experienced a war at any time during the five-year pre-war period or the five-year post-war period. This was necessary in order to observe the effects of a single war on the economic growth of a state during war and after war, while avoiding the distortion caused by the observation of multiple wars.

### **Results**

There are no significant relationships observed between the independent variables and either short-term economic growth or long-term economic growth in the OLS multiple regression analysis. No linear relationship between the response variables and the parameters was observed. Because of this, we needed a way to descriptively explain the association between the variables. A table 1 displays Pearson's correlation for all wars across the entire sample and describes the relationship between the response variables and the parameters as well as the relationship between parameters.

**TABLE 1- War Variables and Economic Growth All War-Pearson's Correlations**

Independent Variable	<i>Short-Term Growth</i>	<i>Long-Term Growth</i>	<i>Population</i>	<i>Duration</i>	<i>Cost</i>	<i>BD</i>
Population	.095	-.061	1	-.145	-.062	.076
Duration	.002	.123	-.145	1	.295*	.180
Cost	.101	-.008	-.062	.295*	1	-.146
Battle Deaths	-.147	.059	.076	.180	-.146	1
No. of Observations	68	60	70	68	68	56

\*denotes significance level of \*p<0.05

We computed the OLS correlations (Pearson's Tables 1-3) and three significant relationships were observed. Within the first table above, cost and duration are significantly although weakly correlated. Table 2 describes the effects of inter-state and extra-state war, and an identical but slightly stronger correlation is observed.

**TABLE 2- War Variables and Economic Growth Inter-state and Extra-state War-Pearson's Correlations**

Independent Variable	<i>Short-Term Growth</i>	<i>Long-Term Growth</i>	<i>Population</i>	<i>Duration</i>	<i>Cost</i>	<i>BD</i>
Population	.000	-.172	1	-.170	-.116	.361
Duration	-.109	-.103	-.170	1	.380*	-.196
Cost	-.012	-.096	-.116	.380*	1	-.195
Battle Deaths	.135	.171	.361*	.196	-.195	1
No. of Observations	37	29	37	37	37	34

\*denotes significance level of \*p<0.05

Finally, within the third table that describes civil war effects, there is a moderate correlation observed between the duration of the war and increases in fatalities.

**TABLE 3- War Variables and Economic Growth Civil War-Pearson's Correlations**

Independent Variable	<i>Short-Term Growth</i>	<i>Long-Term Growth</i>	<i>Population</i>	<i>Duration</i>	<i>Cost</i>	<i>BD</i>
Population	.233	-.013	1	-.051	.115	-.186
Duration	.106	-.308	-.051	1	.334	-.529*
Cost	.146	-.074	-.115	.334	1	.190
Battle Deaths	-.062	.167	-.186	.529*	.190	1
No. of Observations	31	31	31	31	31	22

\*denotes significance level of \*p<0.05

Several interesting trends were observed utilizing paired t-tests (See Paired Sample Tests Tables 4-6). In Table 4, an average decrease in growth for all countries during all types of war (short-term growth) of 1.223 percent did not reach significance, but was observed at the .08 level. No change in long or short-term growth was observed for countries that waged inter-state and extra-state war (Table 5). GDP was observed to decrease significantly during civil war at the .009 level at an average of 3.495 percent (Table 6). However, during the 5 year postwar period after civil wars, no significant decreases in growth were observed.

**TABLE 4- Paired Samples Test-All Wars**

<b>Difference Variable</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>T</b>	<b>Df</b>	<b>Sig. (2-tailed)</b>
AW Milex-BW Milex	61	3134961.37	1.085E731	2.2561	60	.028*
AWGrw-BWGrw (long-term growth)	60	602	4.397	1.061	59	.293
WarGrw-BWGrw (short-term growth)	68	-1.223	5.729	-1.76031	67	.083

\*denotes significance level of \*p<0.05

For all types of war, described in Table 4, there was an increase in Milex that predictably occurred during war, but that continued to climb in the postwar period. This finding was significant at the .028 level. The 95% confidence interval suggests that the increase is between 2.2% and 36.6%. By taking the mean difference between the post- and pre-war period and dividing it by average pre-war spending, it suggests that on average this upward trend was 19.4% more than the pre-war average. This effect was more pronounced with civil wars (.044) than with inter-state wars (.057); significance was lost when civil wars were removed.

It is worth noting that countries that experience civil war are generally lower in income than countries that experience

inter- or extra-state war (Cerra & Saxena, 2008; Sevastianova 2009). Further investigation of long-term increases in military spending in lower income countries versus higher income countries could shed more light on the economic impacts of such spending.

These longer-term increases in Milex lend credence to the idea of the “ratchet effect” of military spending, which states that defense spending that rises during a war does not appear to return to pre-war levels (Diehl & Goertz, 1985). This suggests that the incidence of war stabilizes defense spending at a higher level, possibly reflecting a tendency for the defense sector of a state to resist retraction once it is expanded. This, by logical necessity, would mean a retraction

within other sectors of an economy and an increase of the dependency of an economy on the defense sector. There was an average decrease in short-term growth for all states (average growth during war). Using a simple t-test, it was observed that GDP per capita decreased by 1.2%, significant at the .04 level (Table 4). For all states, when pre-war growth was compared to post-war growth, there were no significant changes. However, when states experiencing civil war were examined independently, it was found (via t-test) that GDP per capita decreased during war-time by 3.5% on average, significant at the .009 level (Table 6).

**TABLE 5- Paired Samples Test-Inter-state and Extra-state War**

<b>Difference Variable</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>T</b>	<b>Df</b>	<b>Sig. (2-tailed)</b>
AW Milex-BW Milex	33	4966899.667	1.443E7	1.977	32	.057
AWGrw-BWGrw (long-term growth)	29	1.195	3.451	1.865	28	.073
WarGrw-BWGrw (short-term growth)	37	.680	3.497	1.183	36	.245

\*denotes significance level of \*p<0.05

**TABLE 6- Paired Samples Test-Civil War**

<b>Difference Variable</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>T</b>	<b>Df</b>	<b>Sig. (2-tailed)</b>
AW Milex-BW Milex	28	975891.250	2442227.405	2.114	27	.044*
AWGrw-BWGrw (long-term growth)	31	.048	5.123	.052	30	.959
WarGrw-BWGrw (short-term growth)	31	-3.495	6.988	-2.784	30	.009*

\*denotes significance level of \*p<0.05

This paper examines only the effects of increased government expenditures due to war on nation-state economy; there are many other avenues by which war can affect an economy either negatively or positively. Warfare can affect economies through massive loss of life, the destruction of physical infrastructure, increasing or slowing the development of technology, strengthening or weakening existing institutions, and affecting prices by raising the cost of capital. Additionally, the flow of refugees and illicit trade in drugs and arms stimulated by war are harmful not only to the states of origin but to the regions the states occupy (Blattman & Miguel, 2009).

All of this being said, there are many avenues by which an economy can be affected other than through the phenomena of war. Economic policies that boost production may induce further investment in physical capital and in human capital through education. Endogenous growth theory emphasizes the commitment to research and development and its positive effects on growth, as well as the many channels through which investment can influence levels of productivity and growth (Barro & Lee, 1994).

Many factors have the ability to negatively affect growth: low levels of physical capital investment or human capital investment (education, health care), and market distortions due to a variety of causes such as political instability or economic and capital market policy (Barro, 1991; Barro & Lee, 1994; Alesina, et al., 1996). A country may also experience economic decline due to financial crises (Cerra & Saxena, 2008) and natural disasters (West & Lenze, 1994).

### **Conclusion**

This paper examines the relationship between cost of war as quantified through increases in Milex, battle deaths, duration of war, and the economic growth of states, as well as how that relationship changes over time. There were no significant correlations observed in the multiple regression analysis and no linear relationship was observed. After the Pearson's coefficients were computed, three significant relationships were observed.

For all types of war (Table 1) across the entire sample, cost and duration are

significantly although weakly correlated. In regard to inter-state and extra-state war, an identical but slightly stronger correlation is observed (Table 2). Finally, concerning civil war effects, there is a moderate correlation observed between the duration of the war and increases in fatalities (Table 3).

In addition, some interesting relationships were observed after the computation of several simple t-tests. A significant decrease of 1.2 percent in average short-term growth rates (during war) occurred over the entire sample (Table 4). Military spending increases that occur during war may not return to pre-war levels, signifying a greater reliance on the military sector within state economies post-war. The average increase in Milex post-war was 19%. This effect was more significant for civil (.044) than for inter- or extra-state wars (.057).

This analysis is limited by sample size, and further research that uses methods that continue to control for the contiguity of conflicts while allowing for a larger sample size with greater depth may yield more information about the effects of war on economies. The sample could be enlarged by obtaining data on countries at war before 1960. In the present model, there are no significant relationships observed between increases in military expenditures during times of war and negative or positive growth in the economies of states.

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