MEASURING THE RELATIVE UNIT EFFECTIVENESS PARAMETER IN
COMBAT: A CASE STUDY APPROACH

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MEASURING THE RELATIVE UNIT EFFECTIVENESS PARAMETER IN COMBAT: A CASE STUDY APPROACH

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Dedicated to my loving parents, Gamini and Daya Weerasinghe
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Summary

Many papers address causes of ethnic/civil war and their duration, and these attributed reasons vary not only in their explanatory power but also with the respective disciplines. These promulgated reasons might also be related to why combatants stay in their belligerent stances and not sue for peace. My thesis focuses on a significant parameter in the theoretical conflict economics literature called the relative unit effectiveness parameter (denoted mainly by \( \theta \)). This is defined as the ratio of the unit effectiveness of two forces. It is a parameter that captures the comparative combat efficiency of one fighting force vis-à-vis its opponent. Interestingly, it is also one of the key determinants of conflict initiation, duration, and termination according to the theoretical economics literature. I use the Sri Lankan civil war as the backdrop for my paper and construct a model that examines the different aspects of this parameter by transforming it into a functional variable. I find that morale is an important component in \( \theta \) while leadership and third party intervention do not increase the unit effectiveness of either of the combatants in Sri Lanka. This preliminary work, which opens up new avenues of research, has implications for a broad spectrum of international issues, from resolving civil conflict to combating international terrorism.
Chapter 1 - Introduction

Many papers address causes of ethnic/civil war and their duration, and these attributed reasons vary not only in their explanatory power but also with the respective disciplines. For example, economic literature on causes of civil war tends to focus on rational expectations of economic profits, while some political science and sociology literature mention emotive reasons and grievances as legitimate causes of civil unrest and war. These promulgated reasons might also be related to why combatants stay in their belligerent stances and not sue for peace. My thesis focuses on a significant parameter in the theoretical conflict economics literature called the relative unit effectiveness parameter (denoted mainly by $\theta$). This is defined as the ratio of the unit effectiveness of two forces. It is a parameter that captures the comparative combat efficiency of one fighting force vis-à-vis its opponent. As one can imagine, such a consideration would be of primary importance in the battlefield. Interestingly, it is also one of the key determinants of conflict initiation, duration, and termination according to the theoretical economics literature.

I use the Sri Lankan civil war as the backdrop for my paper and construct a model that examines the different aspects of this parameter by transforming it into a functional variable. This variable is defined in my context as the effectiveness of the rebels, the guerillas of the Liberation Tigers of Tamil Eelam (LTTE), relative to soldiers of the Sri Lankan Army (SLA). To my knowledge there are no empirical papers that primarily look at the unit effectiveness parameter, although a considerable amount of literature on
various aspects of civil/ethnic conflict exists. The theoretical literature in defense economics maintains that the decision to resolve conflicts is intricately related to the values of this parameter, so understanding this variable at length is paramount to not only ending longstanding conflicts but also in preventing conflict in the first place. This will be my chief contribution.

I explain that a battle-by-battle analysis is the only way to capture the different dimensions of $\theta$, rather than an a priori calculation of relative unit effectiveness, as some economics papers contend. This in itself is a contribution to the literature that so far has abstained from empirically testing $\theta$. I feel that this is tied to another broader issue in conflict resolution, which is that many intervention attempts aimed at resolving conflicts attempt to do so without significant study of the conflict dynamics involved. I maintain that studying this variable gives us a richer understanding of the conflict in question, and thereby providing us with more productive and sustainable way of ending conflict. It also has broad implications for the global war against terrorism. For example, to counter “terrorist” groups we first need to understand the factors that contribute to the operational efficiency of these groups. I do so by studying the LTTE, which is now widely acknowledged to be such a group.

Another contribution of this paper is that it explicitly ties the economics literature to the military studies literature, which has always been preoccupied with measuring this variable and others related to it. This link has not been firmly established to my knowledge. Borrowing from the military literature I argue that $\theta$, which is alluded to in
political science literature and in empirical papers in economics as well, is composed of two broad categories of variables, namely behavioral and operational. These two categories encompass political, psychological, and technological aspects of conflict. I try to estimate the important components of $\theta$ by performing econometric testing on it using logit and OLS analysis.

We can test several interesting hypotheses regarding this variable, which I will break down into four different groups. First, the military literature suggests that third party intervention is sometimes an important factor in determining success in the battlefield. The economics and political science literature maintain that the results of third party interventions (TPI) in conflict can have mixed results, especially for conflict resolution. The proxies I use for TPI in my study captures this variable in terms of economic, military and technological assistance as well as political support. Without appreciating the broad range of TPI categories we cannot comment on its efficacy vis-à-vis conflict resolution. This realization brings us to four sets of hypotheses each for the LTTE and the SLA. I first state these for the rebels.

**Hypothesis 1a:** Having the support of the international community in the form of financial backing has, on average, a significant positive effect on the unit effectiveness of a rebel group, in this case the LTTE.
Hypothesis 2a: Having the support of the international community in the form of military assistance has, on average, a significant positive effect on the unit effectiveness of a rebel group (LTTE).

Hypothesis 3a: Having political support from the international community has, on average, a significant positive effect on the unit effectiveness of a rebel group (LTTE).

Hypothesis 4a: Having technological assistance from the international community has, on average, a significant positive effect on the unit effectiveness of a rebel group (LTTE).

We can derive four similar hypotheses for the SLA.

Hypothesis 1b: Having the support of the international community in the form of financial backing has, on average, a significant positive effect on the unit effectiveness of an incumbent government force, in this case the SLA.

Hypothesis 2b: Having the support of the international community in the form of military assistance has, on average, a significant positive effect on the unit effectiveness of an incumbent government force, in this case the SLA.

Hypothesis 3b: Having political support from the international community has, on average, a significant positive effect on the unit effectiveness of an incumbent government force (SLA).
Hypothesis 4b: Having technological assistance from the international community has, on average, a significant positive effect on the unit effectiveness of an incumbent government force, in this case the SLA.

The implications of these hypotheses are profound, as I alluded to before. If external support does not significantly affect the outcomes of battles, then political pressures by the international community might not be the best way to resolve conflicts. Also, if TPI in the form of military or technological assistance significantly helps one group’s unit effectiveness, then doing so might be beneficial in terms of ending a conflict. Finally, if a group is able to effectively function in the face of increasing opposition from the international community, then it raises pressing questions regarding the effectiveness of international actions concerning civil conflict.

Second, the effects of psychological factors such as resolve and morale on battle performance has not been empirically tested in a civil war setting, at least in the defense economics literature. I could not find empirical papers that specifically addressed this issue in political science either. There is a strong relationship between these two concepts and therefore I subsume resolve in morale, and create an index that captures changes in the psychological milieu of the combatants. This logically leads to another pair of hypotheses, namely:

Hypothesis 5a: Changes in morale have a significant positive effect on the unit effectiveness of a rebel group (LTTE).
Hypothesis 5b: Changes in morale have a significant positive effect on the unit effectiveness of a government force (SLA).

Once again the implications are significant since government regimes engage in psychological warfare to encourage defections within rebel groups and break the resolve of the opposition, and the rebel groups in turn seize on every opportunity to promote propaganda campaigns promoting their cause. From the standpoint of conflict resolution, if morale plays a vital role in battle success, then maybe the international community needs to pay more attention to emotive reasons surrounding conflicts, and be wary of leaders who might exploit these to their advantage.

Third, do political, broadly translated as socio-political, pressures influence effectiveness of combatants, as measured by outcomes in the battlefield? The military literature suggests that this is indeed the case, although a battle-by-battle analysis is rarely presented for a civil war case. From the governmental regimes' point of view, political considerations such as proper leadership, internal cohesion, and consensus on the issue at hand are important for it to "win" the war with the rebels, both from a domestic as well as an international perspective. For the rebels, issues of cohesion are at the heart of the sustainability of a rebellion. Therefore another set of hypotheses is:

Hypothesis 6a: Military leadership has a significant positive effect on the unit effectiveness of a rebel group (LTTE).
Hypothesis 6b: Civilian leadership has a significant positive effect on the unit effectiveness of a government force (SLA).

Hypothesis 6b: Military leadership has a significant positive effect on the unit effectiveness of a government force (SLA).

Another set of possible hypotheses would involve the interaction effects of the variables mentioned above on the relative per unit effectiveness of rebels in terms of soldiers. Namely:

Hypothesis 7a: The morale of a rebel group (LTTE) interacted with their leadership, has a significant positive effect on their unit effectiveness in the battlefield. That is, leadership in the presence of high morale has a significant positive effect on their unit effectiveness in the battlefield.

Hypothesis 7b: The morale of a government force (SLA) interacted with their leadership, has a significant positive effect on their unit effectiveness in the battlefield. That is, leadership in the presence of high morale has a significant positive effect on their unit effectiveness in the battlefield.
Hypothesis 8a: The morale of a rebel group (LTTE) interacted with economic assistance from abroad has a significant positive effect on their unit effectiveness in the battlefield. That is economic assistance, in the presence of high morale, has a significant positive effect on their unit effectiveness in the battlefield.

Hypothesis 8b: The morale of a government force (SLA) interacted with economic assistance from abroad has a significant positive effect on their unit effectiveness in the battlefield. That is economic assistance, in the presence of high morale, has a significant positive effect on their unit effectiveness in the battlefield.

Hypothesis 9a: The morale of a rebel group (LTTE) interacted with military assistance from abroad has a significant positive effect on their unit effectiveness in the battlefield. That is military assistance, in the presence of high morale, has a significant positive effect on their unit effectiveness in the battlefield.

Hypothesis 9b: The morale of a government force (SLA) interacted with military assistance from abroad has a significant positive effect on their unit effectiveness in the battlefield. That is military assistance in the presence of high morale, has a significant positive effect on their unit effectiveness in the battlefield.
**Hypothesis 10a:** The morale of a rebel group (LTTE) interacted with political support from abroad has a significant positive effect on their unit effectiveness in the battlefield. That is political support, in the presence of high morale, has a significant positive effect on their unit effectiveness in the battlefield.

**Hypothesis 10b:** The morale of a government force (SLA) interacted with political support from abroad has a significant positive effect on their unit effectiveness in the battlefield. That is political support, in the presence of high morale, has a significant positive effect on their unit effectiveness in the battlefield.

**Hypothesis 11a:** The morale of a rebel group (LTTE) interacted with technological assistance from abroad has a significant positive effect on their unit effectiveness in the battlefield. That is technological assistance, in the presence of high morale, has a significant positive effect on their unit effectiveness in the battlefield.

**Hypothesis 11b:** The morale of a government force (SLA) interacted with technological assistance from abroad has a significant positive effect on their unit effectiveness in the battlefield. That is technological assistance in the presence of high morale, has a significant positive effect on their unit effectiveness in the battlefield.

The structure of this paper is as follows: I present the literature review in the next Chapter, which is comprised of three parts. The first two parts deal with research into the causes of civil war and reasons for its duration. The treatment is divided into political
science literature and economics literature. At first glance the reasons for wanting war and for staying in it might not be relevant to the calculus of unit effectiveness, but I use some of the variables utilized in these papers to derive my model later on. Since I am using the Sri Lankan conflict as the backdrop, I am more interested in the factors that affect conflict duration than causation, but it is important to note the key findings in each area. The third part of the literature review explicitly deals with the unit effectiveness parameter or $\theta$. I use research in defense studies and in defense economics in particular, to examine $\theta$, its manifestations and its implications. Theta is linked to conflict initiation, sustenance, and termination. Therefore, this literature is not mutually exclusive with the other two parts of the review. As mentioned above, very little research has been done on this parameter.

In the next section (Chapter 3) I look at the case study, which is the Sri Lankan civil war from 1975 to present. I briefly explain the conflict and the progression of events until July 2003. This will provide the reader with not only an overview of the conflict, but also of equally important political, economic and sociological incidents, both domestic and foreign, that possibly influenced the conflict.

In Chapter 4, I explicitly build a model that will enable me to measure the effects of the explanatory variables of interest on the unit effectiveness variable. I derive the model from existing theoretical economics research, and tie this with existing military literature. There is a very similar concept in the military literature called the Combat Effectiveness Value (CEV), and I construct an argument for why these two are equivalent concepts. By
merging these two I am able to build a foundation for a model that explicitly utilizes the regressors mentioned above.

The next Chapter (Chapter 5) strictly deals with operationalizing the unit effectiveness variable in terms of the morale, leadership and TPI variables. I present a complete discussion on the nature of the variables in question and possible proxies for them. Due to the data limitations that I encountered in this empirical exercise, I had to create "less than perfect" measures for these variables.

Data issues are the preoccupation of Chapter 6 in which I first mention general issues in civil conflict studies and then explain how I went about constructing a suitable database for my study. Here I explain my proxies for the key variables at length, including the coding procedures used, the distributions of the variables with time, and key observations about the variables.

I present my results in Chapter 7 and explain my findings. Some of these results were quite unexpected and I explain possible reasons for my findings. I conclude in Chapter 8, and state the findings of my paper, vis-a-vis the above stated hypotheses. I also point out the possible shortcomings of this study along with questions it raises. The implications of my study, if the same results are shown to be robust elsewhere, are very interesting and cut across many debates in the current political science and economics literature.
It is important to realize that this is an initial attempt at quantifying $\theta$ and also analyzing a civil war with this in mind. This is one of the first attempts at quantifying battle relationships in the Sri Lankan conflict to my knowledge. Therefore, the results and methods employed are merely the first tools in an ongoing study undertaken by me to understand the civil war and to gauge whether the results obtained in the process are comparable with civil wars elsewhere.
Chapter 2 - Literature Review

2.1 Causes of Civil War

The salient purpose of this paper is not to examine the widely attributed reasons for why ethnic/civil conflict arises nor is it on the termination of such conflict, but on a parameter that is important to these calculations. Yet, we need to examine these issues, albeit not in considerable depth, to comprehend the nature of \( \theta \). The political science literature on war causation and continuance can be broken into two main approaches: behavioral explanations and structural explanations. There is a third approach, and the newest of the three, which deals with emotive reasons for conflict initiation and resolution. The behavioral explanations emphasize actions of the two actors at the early stages of their interactions, and maintain that initial behavior will establish the nature and direction of future interactions. Stinnett and Diehl (2001) give a good overview of the literature that uses this approach, which could be labeled the evolutionary approach to conflict initiation. They point out that factors such as conflict outcomes, conflict severity, whether the two states were the original participants in the confrontation, and nexus between the nascent rivalry and an existing rivalry, are the variables often cited as being instrumental in rivalry development of the behavioral approach to conflict in the political science literature. Hensel (1999) and Bennett (1998) are good examples of this approach.

The structural approach, also known as the punctuated equilibrium approach, emphasizes the "characteristics of the disputants and the subject matter of their confrontation, rather than with the interactive processes or outcomes of the initial confrontations" (Stinnett and
Diehl, 2001, p. 722). Previous research in this approach has highlighted the balance of military capabilities, whether the states are major powers, the role of territorial issues, geographic contiguity, exogenous political shocks, and the pacifying effects of democracy as being important in conflict initiation and rescinding. Structural and behavioral explanations are generally modeled in terms of interstate conflict, while the structural approach is inherently non-reductionist. Hence, they do not directly address civil/ethnic war initiation and duration, and is therefore not as important as the last of the three approaches.

The third approach, which is not mentioned in Stinnett and Diehl (2001), is the emotive approach, and is the newest of the three. It is closely related to the sociological and psychological literature on human and other primate behavior. Scheff (1994, 1999), Billig (1995) and Breeke and Long (2002) are prime examples of this nascent approach to conflict initiation and endurance. It highlights not only the behavior of the parties involved in the conflict as being instrumental in determining the fate of their future interactions, but also because of the structural nature of their relationship in the present contributing to future of their relationship. Scheff (1999) provides an enlightened look at how the existing behavioral and structural explanations of war causation greatly ignore emotive reasons, namely the emotional dimension of ethnocentrism, shame-anger relationship and pride. Billig (1995) points out that a strong, and sometimes blinding attachment to one’s own nation is probably the most important factor in wars between nations. He says that modern practitioners take this emotional attachment for granted and do not see how it translates into other emotions or into direct action. Thus “banal
nationallism," or the most common form of nationalism, is the reason for most of the wars in the past century.

There are a few papers in economics that deal with the causes of civil/ethnic war, and these could be broken into two categories: empirical and theoretical. I will first look at the empirical papers and then deal with the theoretical papers in the last part of the review when I examine the nature of θ. One of the empirical papers is Collier and Hoeffler (1998). They examine whether civil wars have economic causes. These economic causes range from distribution of incomes to land pressures and contests for natural resources. They contend that civil war will result as long as the incentive for rebellion is larger than the costs incurred. They state that, "the objective of rebellion is either to capture the state or to secede from it" (Ibid, p. 564), and say that rebels face constraints that government forces do not with relation to the technology of conflict. They also say "in the limit, for a given population the military capability of rebellion is unrelated to the domestic economy (for example, being financed externally), whereas the military capability of the government depends upon its military expenditure" (p. 564). To overcome endogeneity issues between military expenditure, tax rates and the risk of rebellion, they use per capita taxable base of the economy as an exogenous indicator of the capacity of military expenditure. Thus the probability of rebel victory would be diminishing in the per capita taxable base of the economy. Also, the taxable base determines the capacity of the future rebel regime to compensate its supporters. Therefore this tax base both reduces the probability of rebel victory and increases the gain in the event of victory for the rebels. As proxies for taxable base, they use per capita income and natural resource endowment.
Per capita income is estimated by the Penn World Tables and natural resource endowment is measured by the share of primary exports in GDP, as used by Sachs and Warner (1995).

The latter assertion does not hold true for our study, since we are dealing with secession as the reason for civil war and not taking over the entire state. There might be other distributional considerations as the gains conditional upon victory in this case. The authors do not delve into this but instead state “one variable which is likely to capture the desire for secession is the size of the population. The effect of the population size on the desire for secession is most apparent when considered at the extremes” (p. 564).

They consider the cost side of the ledger: the cost of labor of rebellion and the economic activity that is disrupted in the process mean that civil war is costly to the rebels. Thus, the cost is directly related to per capita income: the higher the per capita income, the more that society loses in the face of a civil war. They use Singer and Small (1982, 1994) data set on civil wars from 1816-1992. By running tobit and probit models, they find that higher per capita income reduces the duration of civil wars and the probability of its occurrence. The possession of natural resources first increases the duration and the risk of war and then reduces it. They interpret this as “…being due to the taxable base of the economy constituting an attraction for rebels wishing to capture the state” as the reason for the former and “…being due to the enhanced financial capacity of the government, and hence its ability to defend itself through military expenditure, gradually coming to dominate” (p. 571). Countries with larger populations have higher risks of war, and these
wars last longer. The reason for this is that larger the population, the greater the attraction for secession. They test for robustness of the results by including population growth, population density, years since independence and income inequality and find that none of them are significant and do not affect the variables in question.

Collier (2000) also develops a rational choice model of conflict based on predation. He says that “one reason why economists are somewhat dismissive of grievance as a cause of rebellion is that the provision of justice, or grievance alleviation, is a public good and so faces acute collective action problems” (p. 839). Collier and Hoeffler (1998, 2000) find evidence to support the claim that greed is in fact more important than grievance as a predictor of rebellion. He tries to differentiate between a rebellion and a civil war. In the criteria that are used in empirical studies, “a civil war occurs only if the mortality rate from combat exceeds a particular threshold. The most common threshold is 1,000 battle deaths during a year. The deaths must occur in the context of violence between a government and an identified organized group, and at least 5% of the deaths must be on each side” (p. 841). They find that the occurrence of war depends on the product of the rebel and the government labor force exceeding a certain threshold. Yet they point out that most of the rebellions that have subsequently turned into civil wars also faced constraints such as start-up finances and technologies, constraints that yield an entry threshold. So they suggest three ways in which the entry threshold might be surmounted, and among them is receiving support from foreign agents. This foreign support gives the rebellion “start-up finance.” And is therefore a crucial component in the advent of a civil conflict.
Another way they can overcome this entry threshold is to harness grievances. "The political entrepreneurs who instigate rebellions may seek start-up finance from a constituency that is indeed willing to pay for vengeance" (p. 852). They also say, "although rebellions do not appear to be caused by objective grievances, rebel organizations appear to be group specific and to invoke group grievance in their discourse" (p. 850). Their model is consistent with other findings that show that "controlling for other characteristics, the incidence of civil conflict is lower in societies with higher levels of per capita income" (p. 848).

Azam et al (2001) give an overview of the existing literature on conflict. They say, "We find little evidence that objectively measurable grievances have any bearing on either the initiation or the duration of conflict. Rather, the risk of military conflict appears to be related to the opportunities for it to be financially and militarily feasible" (p. 2). As possible sources of finance for rebels they mention foreign governments, natural resources and donations from diaspora populations. They say that, "there is strong evidence that countries with a high share of natural resources in their exports are more likely to experience a war..." and "there is a wealth of case study evidence on the importance of diasporas in the finance of conflict" (p. 4). As an example they cite the exile-Tamils in Europe and North America supporting the Tamil Tiger's rebellion against the government of Sri Lanka. They surmise that on average countries with a relatively large diaspora populations have a higher risk of conflict. Other variables that are linked with the incidence of conflict are ethnic and religious diversity, with more diverse societies having a lower risk of conflict, certain geographic features such as mountains
that favor rebellion, and location of population, with the less concentrated population leading to more rebellion. They mention that mountainous terrain and geographic dispersion of the population are statistically significant, while there is no evidence that a large proportion of forests increases the likelihood of a civil war occurring.

Collier and Hoeffler (2001) find weak evidence that democratic countries have lower risks of war, and that more polarized societies are not characterized by a higher probability of conflict. They use proxies for four objective measures of grievance: ethnic or religious hatred, political repression, political exclusion, and economic inequality, and test whether these cause civil wars to erupt. They use a dataset of civil wars over the period 1960-99 and logit regressions to predict the risk of the outbreak of war in each five-year episode and find that the variables that proxied the opportunities for financing rebellion, namely extortion of natural resources, donations from diasporas, and subventions from hostile governments performed well. The objective indicators for grievance add very little explanatory power.

The cost of rebellion, which is a second factor influencing opportunity, were captured by male secondary education enrollment, per capita income and the growth rate of income, and proved to be very significant in reducing conflict. The third aspect of opportunity was military advantage and this was proxied by population dispersion, mountainous and forest terrain. Both of these increase the risk of conflict, although the former is significant while the latter is positive but not significant, and forest terrain has no effect. In the final
assessment economic viability appears to be the predominant systematic explanation of rebellion. Most of these results are also mentioned in Collier and Hoeffler (2002).

2.2 The Duration of Civil Wars

There are many political science papers on this subject and those that stress behavioral purport conflict outcomes and conflict severity as two key reasons why wars perpetuate, and the structural approach emphasizes realpolitik issues as being vital for understanding war duration. In a seminal paper, Bennett and Stam (1996) try to test these two approaches while maintaining that the decision to continue fighting is fundamentally a political decision. Although their analysis is predominantly inter-state, it has many ramifications for civil conflicts as well. In their general model they assume rationality of actors and use two basic and several alternate approaches to run their regressions. The first approach is the Realpolitik Approach which they use to generate twelve hypotheses. These are related to maneuver strategy, punishment strategy, terrain, strategy and terrain interaction, balance of capabilities, total military capabilities, total population, population ratio, military quality, surprise, mobilization, and issue salience. The second approach is titled Domestic Political Approach: Regime Behavior and Type and is used to generate two hypotheses relating to repressive regimes and democratic regimes. They also examine several alternate approaches, which in turn generate hypotheses relating to duration dependence, previous disputes and the number of actors involved.

They test these hypotheses using hazard analysis and conclude that balanced forces is key to war duration with the more mismatched the opponents' capabilities the faster the war
progression. Strategy appears to be important in determining the duration of inter-state war along with terrain and the interaction between strategy and terrain. Democratic and repressive regimes both have low war duration, while in between states have high war duration. War also does not appear to be duration dependent.

The creative approach to war duration emphasizes the role of significant events aimed at addressing emotional issues as being vital for war termination. A good example is Brecke and Long (2002). They deal primarily with rediverst conflict and add, “future violence is less likely to occur, and societal order more likely to be restored, if principals to a conflict engage in a formal, public reconciliation event indicating a desire for improved relations” (p. 2).

In the theoretical economics literature, Grossman (1991, 1999) assumes that initiation and the duration of conflict are interdependent. As Azam et al. (2001) point out, these two Grossman papers assume that “the length of war determines the discounted gains from the conflict and since the rebels base their decision on whether or not to go to war on these gains they may not fight if they anticipate the war to last for a very long time” (Azam et al., p. 6).

A few empirical papers maintain that there is no systematic relationship between the causes of civil war and the reasons why the wars last. By using a hazard analysis Collier et al. (1999) conclude that although the causes and duration of civil war are explainable in terms of a few socio-economic variables, the two processes differ significantly. Ethno-
linguistic fractionalization, which was insignificant as a causal variable for war initiation proves to be a powerful determinant of conflict duration, although its effects are non-monotonic. Also there is a good chance that civil war will end in its first year of initiation, after which its hazard of peace goes down dramatically. They maintain that many wars are essentially “mistakes” since they did not use a rational cost-benefit calculus at the onset of the war and thus result in military stalemates. These military stalemaes persist due to the time consistency problem, “with the government being unable credibly to commit to settlement terms” (p. 16).

A few papers investigate the role of third party intervention in war prolongation, both in economics and political science. I will leave an elaboration for later, but for now cursorily present the major findings of some of this research. Regan (2002) finds clear evidence that outside intervention, solely military, prolongs rather than shortens civil war duration. “Civil conflicts in which there are interventions are about 96 percent more likely to continue at any given time than are conflicts without interventions” (p. 13). Evidence is mixed that interventions supporting the government would shorten the conflict, while support for the opposition will lengthen it. Neutral interventions will likely lead to shorter wars and the timing of the intervention does not matter in the expected duration of a conflict.

Elbadawi and Sambanis (2000) treat external intervention as an endogenous variable and finds that it is positively associated with war duration. Regan (1998) explores the policy implications of interventions, and Regan (1996) finds clear proof that the strategy of
intervention is vital for war termination. Mixed strategies are more important than
strategies aimed at either economic or military initiative. Here he finds evidence that
military or economic intervention on behalf of the government is three times more likely
to shorten the war.

2.3 The Relative Unit Effectiveness Parameter, $\theta$

This parameter comes from theoretical pieces in economics and is alluded to in political
science and socio-psychology. In the economics literature, $\theta$ is found in two main
branches of research, both of which utilize the Contest Success Function (CSF) as its
modeling foundation. The first of these develop models of conflict initiation, duration and
termination built on general equilibrium theory. The second branch deal with issues such
as what would lead two actors to stay in a belligerent relationship, the paradox of power,
why are some borders safe while others are not, and modeling conflict outcomes. The
modeling of outcomes is the preoccupation of military studies although the literature does
not directly refer to the relative unit effectiveness by name. Depending on the context, $\theta$
is used either as the relative unit effectiveness of one group with respect to the other in
battle or the spending effectiveness of one with respect to the other. I will primarily use $\theta$
in the first context.

Grossman (1995) develops a general equilibrium model of insurrection, defined as “any
organized use of force to defy the established system of property rights and/or taxation”
(p.193). He treats insurrections and their deterrence or suppressions as economic
activities. Thus, these activities compete with other economic activities such as
production and consumption for resources that are scarce. The paper identifies three key economic decision makers, namely the ruler who presides over the state or territory and who has the power to collect taxes and raise an army, the leader of an insurrectionary movement that gathers, organizes, and mobilizes an insurrectionary force and the general population who comprise of peasants engaged in competing economic activities. The ruler maximizes economic profits to himself and his clientele, while the leader of the insurrection does the same. The peasants can engage in market production, home production, insurrection or suppression of insurrections (soldiering), all of which are rival activities. The technology of insurrection is such that the proportion of the ruler's income that the leader of the insurrection wants to capture is directly related to θ, which measures the “effectiveness of insurgents relative to soldiers” (p.198). The relationship of θ to the probability that the insurgent leader captures all of the economic profits from the incumbent ruler \((1 - p)\) is \(p = \frac{1}{1 + x}\) and \(x = \frac{θI}{S}, θ ≥ 0\), where \(I\) and \(S\) are the times dedicated to insurrection and soldiering by a peasant family, from which the incumbent ruler draws his soldiers and the insurrectionary leader attracts his rebels.

Grossman's paper does not explicitly deal with the measurement of \(θ\) or of its constituent components. As an explanation he states that "... The modeling of the effect of resource allocation decisions on the expected outcome of an insurrection (is critical). But, it is not necessary to be explicit about any non-economic factors that help to determine the expected outcome of an insurrection. Also, assuming that agents maximize expected income or wealth, it is not necessary to model the random and idiosyncratic events that cause the actual outcome of an insurrection to differ from the expected outcome."

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Yet, $\theta$ is used not only to model the technology of resurrection, but also for the minimum number of resources needed to deter the insurrection. For example, his results highlight the negative relationship, in equilibrium, between the probability of a revolution that bears fruition and the expected income of an average peasant or worker family, among others. It also concludes that the equilibrium values for $p$ are $p = \min \{ 1 / 2 \theta, 1 \}$, which is that $\theta$ the fraction of the gross income of the ruler's clientele that the insurgent leader expects to capture, $1 - p$, depends only on $\theta$, the measure of the effectiveness of insurgents relative to soldiers. If $\theta$ is less than or equal to 1/2, then there is no insurrection and $1 - p$ equals zero. Alternatively, if $\theta$ exceeds 1/2, then the potential insurgent leader organizes an insurrection and $1 - p$ is positive and is an increasing function of $\theta^n$ (p. 201). Therefore, it is important to explore this parameter in detail.

Grossman (1991) also looks at a general equilibrium model of insurrections. In his discussion of the technology of insurrection and its suppression he states that a plausible form to model the probability of a successful insurrection, $\beta$, is $\beta = t^{\theta} / (S^\sigma + t^{\theta})$, where $0 \leq \theta < 1$, $0 < \sigma < 1$, and $I$ and $S$ are the nonnegative time devoted to insurrection and soldiering respectively. The $\theta$ (in this case, this is not the same as the $\theta$ denoting the relative unit effectiveness parameter), and $\sigma$ represent the technology of insurrection. He does not explicitly examine these two parameters but states that "An extended analysis could relate $\theta$ and $\sigma$ to such factors as qualitative human characteristics, geography, and the quantity and quality of armaments" (p.915).
Hirshleifer (1988) explores “peaceful” production and “appropriative” efforts as two ways of generating income and uses a resource partitioning function, a social production function, a combat power function and an income distribution equation to generate equilibrium conditions under both symmetric and asymmetric assumptions. He claims that the “outcome of the struggle depends upon the technology of conflict” (Ibid, p.203, given in italics). He also adds, “Like the familiar technology of production, the technology of conflict is a relation between inputs (armies or guns or lawyers) and outputs (incomes or resources gained or lost)” (Ibid, p. 203). For the combat power function, which “summarizes the relevant aspects of the technology of conflict” (p. 207), he uses ratio and logistic forms of the contest success function. For example, he uses a generalized ratio form, \( p_i = \frac{b_1 G_1^m}{(b_1 G_1^m + b_2 G_2^m)} \), where \( p_i \) is the proportionate share of total income as payoff, the \( G \) subscripts denote the respective appropriative efforts, the \( b \) subscripts measure the respective fighting effectiveness coefficients and the \( m \) superscript is the mass effect parameter that captures the returns to scale effects. In this case, \( b_2 / b_1 = \theta \) or the relative fighting effectiveness of force 2 vis-à-vis force 1. He does not explicit deal with the \( b \) subscripts and assumes that \( b_1 = b_2 = 1 \) throughout the paper.

There are many different applications of \( \theta \) in non-equilibrium settings. Gershenson and Grossman (2000) attempt to build a model of civil conflict that asks the question: given two parties that vie for power, under what necessary condition/s does one party acquiesce to the other and what entraps them in a cycle of never ending conflict. Civil conflict is defined as “an armed confrontation between groups that are contesting political dominance” (Ibid, p. 808). They use a contest success function of the form, \( P_A = H_A / (H_A + H_B) \)
+ \theta G_A), where \( P_A \) is the probability that group A remains politically dominant in the next period, \( H_A \) is the non-negative amount that group A spends on defending its political dominance and \( G_B \) is the non-negative amount that group B spends on challenging the political dominance of group A. The nonnegative parameter \( \theta \) "measures the effectiveness of spending by the group that is not politically dominant on challenging the political dominance of the politically dominant group relative to the effectiveness of spending by the politically dominant group on defending its political dominance," or the technology of conflict. The authors note that both groups are assumed to have access to the same technologies for challenging and defending political dominance.

The authors find that if \( X_A / X_B \geq 2\theta \), then the initial political dominance of group A does not result in civil conflict, where the \( X \) subscripts are the values that each respective group attaches to being politically dominant in the next period, given that the alternative is the other group is politically dominant in the next period. If \( X_A / X_B < 2\theta \leq X_B / X_A \), then the political dominance of group A results in civil conflict and ends after group B finally gains power. If \( X_A / X_B < 2\theta \) or \( X_B / X_A < 2\theta \), civil conflict is never ending. The paper can also be extended to include gaining political power militarily, and therefore is very relevant to our analysis. Therefore, a "decrease in the relative effectiveness of spending by the group that wants to become politically dominant" will result in civil conflict as long as the other group remains politically dominant. The authors add "we have no way of directly observing \( \theta \)..." (Ibid, footnote on p. 818).
Hirsheifer (2000) deals explicitly with the technology of conflict and struggle. He asks, “How do the commitments of forces on each side enter into determining the outcome of the struggle?” (p. 773). He notes that military theorists differentiate between two main modes of combat, attrition and maneuver, but “…at the point of contact, all clashes ultimately come down to attrition” (pp. 774-775). He does not elaborate on the constitutive components of unit effectiveness and merely states, “…no attempt is made to specify in greater detail the elements of fighting efforts as independent variables of the CSF…” (p. 775). He then looks at conventional CSF functions in the ratio form and fixes $b_1 = b_2 = 1$. He is more interested in $m$ or the decisiveness parameter, which scales the degree to which a side’s greater fighting effort translates into enhanced battle success.

Towards the end of his paper he examines some inputs to the CSF functions, mainly the determinants of fighting efforts or the $F_i$ s. In his discussion of “right makes might” he adds, “The answer must be yes, if (to mention only one possible consideration) soldiers fight more effectively for a cause perceived as just. However, it may not be immediately clear how intangibles such as truth or justice can be factored into conflict success” (p. 789). He draws on “litigation success functions” by Katz (1998) and Kobayashi and Lott (1996), who incorporate a parameter that measures the defendant’s degree of fault. Expanding on this he adds, “Turning back to warfare, belligerents, even in this quintessential domain of force and pressure, nevertheless almost always do claim to be fighting in a just cause. Such claims would not be made were it not believed that perceptions of truth and morality do influence the outcome” (p. 790).
Hirshleifer (1989) examines the structural differences between the logistic and the ratio forms of the CSF. Neary (1987) examines a hybrid between the ratio and the difference forms of CSF functions, but none of these explicitly deal with $\theta$. Hirshleifer (Nov. 1991) examines the paradox of power or why initially weaker or poorer contenders end up triumphing over initially stronger or wealthier opponents. He says that, "while wealth certainly provides the wherewithal for successfully exploiting a poorer opponent, the initially disadvantaged group is typically rationally motivated to fight harder" (p. 178, italics included). He looks at the ratio form of the CSF and uses Nash-Cournot solutions to look at the problem at hand and does not directly address the unit effectiveness parameter, and instead looks at how outcomes change when the mass effect parameter is varied.

Grossman (2002) addresses an interesting topic, which is why are some borders between sovereign states fortified, why most are fortified but are peaceful, and most importantly, why some territorial disputes end up in armed conflict. His paper shows that "credible agreements to limit arms and to settle territorial disputes peacefully depend on effectiveness of spending on arms by one state relative to another ..." (p. 2). He assumes the ratio form of CSF and assumes that actors behave as if relative effectiveness of spending is "both deterministic and constant" (p.4), and later when it is "neither fixed nor necessarily common knowledge" (p.14). This relative effectiveness of spending is $\theta$

Hirshleifer (1991) says that modeling of conflict has its origins with Frederick Lanchester (1916, and revised in 1976). Here he focuses on the logistic CSF but does not deal with unit effectiveness explicitly, and assumes that the efficiency parameters are unity.
Lanchester (1976) deals with the microtechnology of unit-on-unit conflict and spawned a plethora of military literature. He deals with attrition rates of military forces in a battle, where each side's casualty rate is proportioned to the enemy's force size and kill probability. Thus a reduced Lanchester system can be written as:

\[ \frac{dF_1}{dt} = -\kappa_2 F_2 \quad \text{and} \quad \frac{dF_2}{dt} = -\kappa_1 F_1, \]

where \( F_i \) are the force sizes and \( \kappa_i \) are unit “kill probabilities.” As Hirschkoifer (2000) points out, these Lanchester equations are related to the CSF in ratio form. “The kill probabilities \( \kappa_i \) correspond to the unit effectiveness parameters \( b_i \ldots \)” (p. 783).
Chapter 3 - The Sri Lankan Civil War: A Synopsis

In order to analyze the Sri Lankan civil war we need to understand a host of issues: the
dynamics of not only how the conflict evolved through time, but also peripheral socio-
economic, psychological, and political developments. These either directly or indirectly
contributed to full-scale civil war. Therefore this section is divided into two parts. The
first part examines theories of how and why the rivalry between Tamils and Sinhalese
turned into violent conflict, and an explanation, from a theoretical perspective, of the
events that unfolded. I will not be promulgating any “natural homeland” arguments,
which have dominated most of the propaganda concerning the conflict, nor will I
advocate one side’s opinion or point of view as more accurate than the other’s. The Tamil
Tigers website at www.tamiltigers.net, the Tamil Eelam homepage at www.eelam.com
and Tamil Canadian services website at www.tamilcanadian.com, among many others,
will provide the curious reader more material advocating the Tamil “cause.” Similar
nationalistic arguments from the Sinhalese perspective can be found at the Sinhela Centre
website at www.sinhalacentre.demon.co.uk, and at www.vyh34.ukgateway.net, which is
the Justice for the Hela Nation homepage.

The next part provides a timeline of the events that transpired. It is a brief examination of
societal issues and events that were pivotal in the way the conflict progressed from its
inception. It also deals with a cursory examination of important aspects of the conflict
itself, from the proverbial “first shots” to where it is right now. Placing the conflict, and
the battles that are an intricate part of the conflict, in these larger terms aides us to see the
relationships between societal and psychological factors of those involved. Their effects on the performances of the combatants in the battlefield can thus be more accurately gauged from this macro perspective.

The sources for this historical timeline (Appendix A) are varied. Tambiah (1992, 1986), Accord Programme (1998), Swamy (2002) and Philipson (1999) provide the main timelines for both parts of the history and other sources will be cited whenever deemed apropos. See additional works in my bibliography or bibliographies of the works cited above, and the works themselves, for a more detailed history of the country and conflict.

_Sri Lanka: A Case Study_

Sri Lanka had always been a multi-ethnic, multi-cultural and multi-religious country. So what brought about communal strife in this island paradise? Sahadevan (1999) is a brief but important study of the nature of conflict in South Asia, including Sri Lanka. He first looks at the demographics of Sri Lanka and notes that, “In Sri Lanka, language is a basis for intra-group unity amidst an internal cleavage along religious lines...” (p. 1). As a unique characteristic of conflicts in the region, he says that despite a large loss of life, regional actors have called for the least amount of international peacemaking.

Another characteristic of conflicts in the region is “convergence” or “nest in social space,” that is “groups coalesce as allies against an adversary or coalition of adversaries” (p. 2). As an example he points out that, “While waging a war against the Sri Lankan Army and the Indian Peacekeeping Force (IPKF) in Sri Lanka, the Liberation Tigers of
Tamil Eelam (LTTE) had allegedly cultivated or developed military network with a number of militant groups in India" (p. 2). He further states, "The Sri Lankan Tamils could not have launched and sustained a secessionist movement at the present scale if the chances of securing the ideological, political and material support of their brethren in Tamil Nadu were remote" (p. 8). He then adds that, "India's supply of arms and extension of sanctuary to the Tamil militants, and the Sri Lankan government's procurement of arms from various countries and involvement of mercenaries led to internationalization of the Eelam war" (p. 14).

Cross-cutting and contagion are two characteristics of conflict in South Asia, according to him. Cross-cutting of conflict happened in Sri Lanka when a number of militant groups were decimated or severely enervated as the LTTE emerged as the dominant militant group. Contagion of conflict is when the existence of one ethnic movement prompts other groups to assert their rights and demands. This was the case in Sri Lanka when "... the moderate Sri Lankan Tamil Parties' demand for a single Tamil linguistic unit in northeastern Sri Lanka has influenced the Sri Lankan Muslims' claim for a separate Muslim province in the East" (p. 2).

Nationalism is often cited as a primary reason for the conflict in Sri Lanka. The growth of ethnic nationalist movements has, according to the literature in political science, some key factors at its heart. As Slaastri (1990) points out, "Most analysis of ethnic nationalist movements focus on the chronology and format of conflicting political interactions, the deterioration of interethnic perceptions, and the change in the relative economic positions
of ethnic groups within a society because of asymmetrical and disadvantageous distribution of power” (p. 57). All of these occurred in Sri Lanka to bring it to the brink of all out civil war, and subsequently propelled the nation into bitter internecine war. I first look briefly at the grievances cited for the discontentment of Tamils with the Sinhalese dominated governments of Sri Lanka, and then examine their decision to call for secession. This was a huge step, I maintain, and although the Tamil parties had the motive to want greater autonomy at first, the means for accomplishing this was not a separate state. Yet, key developments pushed them in this direction, and this progression of action is sometimes ignored in discussions about the civil war in Sri Lanka.

Tambiah (1992) gives a detailed account of the rise of Sinhalese nationalistic tendencies in the country and the alleged “inextricable” link between Sinhalism and Buddhism. Gunawardena (1985) is a good examination of Sinhala awareness, and Matthews (1988-1989) cursorily looks at Sinhalese nationalist groups, their histories, their actions and offshoots. The United National Party (UNP) controlled the government after independence in 1948, and the alleged “elitism” that the British-educated, English-speaking leaders of the UNP, triggered a Sinhala backlash. Its target gradually became the Tamils as well, who were also viewed as a foreign group. This Sinhala-Buddhist revival was first seen in a large scale at the 1956 general elections. As Tambiah (1986) points out, “It is not surprising that the post-independence boiling over of the pot of Sinhalese nationalism resulted in the entirely unexpected landslide defeat of the UNP by S.W.R.D. Bandaranaike, who led the opposition groups and championed their nationalist and revivalist demands and aspirations” (p. 71). He later adds, “The same boiling pot also
spilled over in the form of the first Sinhalese riots against the Tamils in 1956 and 1958” (p. 71).

This rise in Sinhalese nationalism led to Sinhalese being declared the official language, and the language of education and commerce, under the controversial Official Language Act of 1956. Sahadevan (1999) says that, “...Sinhalese as the official language in Sri Lanka in the 1950’s sowed the seeds of ethnic discontent and rivalry” (p. 4). This was very prejudicial against Tamils who held government positions since they were proficient in English and Tamil but not Sinhalese (Tambiah, 1986). As Shastri (1990) succinctly states, “The proportion of Tamils in public services and the rapidly expanding state sector fell sharply thereafter” (p. 59).

Nationalism affected not only the Sinhalese but the Tamils as well. Peebles (1990) cites Gunawardena (1985) as echoing the notion that, “Under the influence of nineteenth-century German theories, however, some Sinhalese elites began thinking of themselves as racially ‘Aryan.’ Sri Lanka Tamils for their part sometimes interpret the supremacy of the Vellala caste as evidence that their culture is ‘pure’ Dravidian- that is, antedating ‘Aryan’ Brahmin influence. Some Sri Lankan Tamils also have fallen prey to racist rhetoric, calling themselves a ‘Dravidian’ race” (Peebles, 1990, p. 31).1 He adds that these claims, and claims that the northern and eastern regions were “Tamil homelands,” amounted to “little support even among Sri Lanka Tamils for secession until the political crises of the 1970s and 1980s” (Ibid, p. 32).

1 Contrary to some scholars, Pamela Price (1996) claims that certain aspects of the Sri Lankan Tamil nationalist movement were borrowed from the Indian nationalist movement of the 1950s and 60s. See Price (1996) for more details.
Thus, at this point there weren’t concerted calls for secession, but merely calls for fairness and equal opportunity by the Tamils vis-à-vis the majority Sinhalese. The Federal Party (FP), formed in 1949, was the main party responsible for Tamil representation in Parliament at the time. According to Shastri (1990) “The FP continued to uphold the earliest and most significant of the agreements between the two communities, the Bandaranaike-Chelvanayagam Pact of 1957 (the BC Pact)” (p. 59). The BC Pact was named after the Prime Minister S.W.R.D. Bandaranaike and S.J.V Chelvanayagam, a former Tamil Congress party parliamentarian. It ceded regional autonomy to Northern Province (NP) and Eastern Province (EP), the minority provinces, and Tamils had powers over agriculture and related matters, “land settlement, regional development, law and order, local revenue allocations, use of the Tamil language, and propagation of Tamil culture” (Ibid. p.59). She also adds that, “Subject to the approval of Parliament, the two provinces or sections could cooperate with each other, divide themselves, or merge with each other. From the Tamil perspective the agreement offered the structure of power most compatible with the compulsive realities of a majoritarian democracy at the national level while protecting their distinct needs and identity at the regional level” (pp. 59-60). The BC Pact was an attempt by the Sri Lanka Freedom Party (SLFP) to abate the violence that gripped the country.

Yet the UNP, now in opposition, heavily protested against the BC Pact, and was led by J. R. Jayawardene. Sinhalese nationalists and Buddhist monks joined them as well. Under pressure, Bandaranaike abrogated the BC Pact. On September 25, 1959, a Buddhist monk killed Bandaranaike. This was Sri Lanka’s first political assassination, but it certainly
wasn’t its last. He was succeeded by his widow, Sirimavo Bandaranaike, who promptly “embraced Sinhalese chauvinism for electoral gains” (Swamy, 2002, p. 14), and cold-shouldered the FP. Swamy (2002) points out that, “Dejected and in the face of criticism that it had failed to provide a purposeful leadership, the Federal Party announced in Jaffna in January 1961 its decision to launch ‘direct action’ to assert what it called ‘the rights of the Tamil-speaking people’ ” (p. 14). This opposition was non-violent, and in the form of a Satyagraha2, which was a Gandhian act of civil disobedience. There were also growing calls for separatism.

The UNP was now sympathetic towards the FP, and expressed sympathy for the satyagrahis (those that commit satyagraha). Sirimavo Bandaranaike crushed the satyagrahis, and alienated the FP, who made common cause with the UNP led by Dudley Senanayake at the March 1965 elections. Although the SLFP lost the elections, the UNP failed to secure a majority in Parliament, and were thus forced to form a national government with the support of the FP, the Tamil Congress, and minor Sinhalese parties. Prior to the UNP victory, secret talks were held between Selvanayagam and Senanayake that resulted in an agreement later known as the Dudley-Chelvanayagam (DC) Pact. The opposition later ceased these concessions and tensions were aroused yet again. Facing mounting criticism of his policies towards the Tamils, Senanayake reneged on his commitments in July of 1968. As Swamy (2002) states, “it was another grievous mistake-

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2 Satyagraha means grasping, “graaha, the truth, “sataa.” Truth is love, and compassion. Mohandas Gandhi first espoused this in his writings and in his practice to win India her freedom from the British. It is not an instrument of achieving political goals but is a realization that is an end in itself. This realization manifests itself in non-violent resistance, which is in no means passive, as some contend. See any of Gandhi’s writings on non-violent resistance for an elaboration.
one that Tamil guerillas in later years would point out as an example of Sinhalese obduracy vis-à-vis the Tamils" (p. 17).

Yet, the Tamil community was very sharply divided along caste lines and this, according to Pfaffenberger (1990), also contributed for hastening the calls for separatism. Pfaffenberger (1990) says that "A point not often noted in studies of Sri Lanka’s ethnic conflict is that the call for regional autonomy in the Tamil north, and even for the partition of Sri Lanka, emerged first from conservative sections of the Vellalar caste, which deeply resented Colombo’s interference in what they considered the "private" matters of caste relations and temple worship" (p. 79). The crux of his paper, which deals with the 1968 Maviddapuram temple entry incident between the Vellalar caste and other lower castes, is that as a matter of defensive ethnic nationalism the Federal Party (FP) and later the Tamil United Liberation Front (TULF) tried to unite the Tamil community and divert attention from this Jaffna issue, which would have made the Tamil community "fall to pieces." Thus, given legitimate grievances by the Sinhalese dominated governments, defensive nationalism was another prime reason why the TULF called for separatist politics.

He also says that, "In 1957, in part to embarrass the Vellalar-dominated Tamil political leadership, the Sinhalese-dominated Parliament passed the Prevention of Social Disabilities Act, aimed at outlawing caste discrimination. Although the law proscribes discriminatory acts found sometimes within Sinhalese caste relations, its text specifies the actual forms of intercaste discrimination in Jaffna with an accuracy that would elicit
praise from a social anthropologist” (p. 86). There were missionary Buddhists who also exacerbated the problem and “With the enactment of the 1972 constitution, which guaranteed state support for the Buddhist religion, Tamil Hindus feared that such movements would become a massive, state-sponsored frontal attack on the very substance of the Hindu religion in Jaffna” (p. 87).

Before Maviddapuram, the FP began to unite the Tamil community in order to gain concessions from the government. Yet, “Faced with mounting youth unemployment, the Federal Party’s Youth League was showing signs of increasing radicalism in early 1968 in response to government delays in bringing the District Development Council (DDC) bill before the Parliament; indeed, a Youth League spokesman told a Colombo newspaper reporter that he had lost all confidence not only in the government but also in the Federal Party” (Pfaffengber, 1990, p. 91). He also adds, “Such sentiments ultimately drove the discredited moderate Tamil politicians from the Jaffna political scene; indeed, two of them were killed by disgruntled militants in the early 1980s, and most of the rest fled the country. So completely discredited are moderate Tamil politicians, in fact, that the TULF could not return to power even under the guarantee of 60,000 Indian peacekeeping troops, as the results of the 1989 Parliamentary election demonstrated dramatically: TULF candidates with ties to the old, moderate wing of the party failed to win a single seat” (p. 94). “For Jaffna youths, the DDC bill’s collapse may have been the proverbial straw that broke the camel’s back; violent guerilla youth groups such as the Liberation Tigers rose in 1970s, seeking to force Sri Lanka’s partition by acts of terrorism” (p. 91). Tambiah (1990) points out that the militant groups in Sri Lanka have recruited members
of all castes, and thus have moved away from these caste divisions that plagued the political leadership of the Tamils.

Shastri (1990) maintains that, "the demand for a separate state, however, emerged as a powerful motive force among Tamils in the mid-1970s" (p. 60). TULF passed the "Vaddukoddai Resolution," which called for a separate state of Tamil Eelam in 1976. The above-mentioned reasons were the catalysts for this radical shift in ideology. Shastri (1990) promulgates the idea that although there were legitimate grievances driving calls for separation of the NP and EP from the central government, the fact that separation became an economically viable option in the 1970s was also a very important and often overlooked reason for the change in Tamil policies. She elaborates, "Previously, the greatest weakness in the Tamil argument for a separate state had been its lack of a viable economic base. The north and east were "peripheral" or "backward" compared with the "forward" southwest of the island. This shortfall seems to have been overcome by the early 1970s. The rural areas of the north and particularly the east had emerged as important paddy-producing regions. The smallholders in the Jaffna region had emerged as important producers of chillies [sic] and onions. Indeed, the locus of development in agriculture had shifted to the Dry Zone, and by the beginning of the 1970s Trincomalee was recognized as holding the key to the next stage of industrialization, which would be export based" (p. 73). If a new government, the Eelam state, was created, it would be able to mobilize revenues, and would have the development of the local regions and its inhabitants as its primary consideration. As Shastri (1990) points out, the Eelam state will
also be “free to negotiate with and procure funding from foreign sources as an independent state” (p. 74).

Another reason for a more militant stance towards the central government and the call for separatism pertained to the late 1970’s colonization programs undertaken by the governments of Sri Lanka. Peebles (1990) says, “Both major parties competed for the votes of the Sinhalese, but the creation of agricultural settlements in the undeveloped interior of the island, or colonization, is associated primarily with the United National Party (UNP). He looks at the Accelerated Mahaweli Program and says that the propaganda surrounding it caused further strains in Sinhala-Tamil relations. This is his main preoccupation in the paper. During the UNP government of recently retired President Junius Richard Jayawardene (1977-1988), both the level of violence and the pace of colonization in the Dry Zone between the Sinhalese and Tamil majority areas increased” (p. 30). He adds that, “the Dry Zone has been transformed from a plural society to a homogenous Sinhalese Buddhist one (p. 40). He quotes Horowitz (1985: 141-56) as saying that the Sinhalese governments perceived the Sinhalese to be disadvantaged relative to a minority community. Thus colonization was an attempt to redress these inequalities, according to Peebles (1990). The Sri Lankan government followed a policy of ethnic colonization, according to Sahadevan (1999) which greatly affected the Sri Lankan Tamils. I quote, “The resettlement of a large number of rural Sinhalese in the Eastern Province was a direct threat to the ‘traditional homeland’ of the Sri Lankan Tamils” (p. 4).
From its inception, the Federal Party made colonization a political issue for Tamils. Commenting on the 1977 elections, Peebles (1990) states that, “The July 21, 1977, elections raised unfulfilled expectations that negotiations between the UNP and TULF, both of which won sweeping victories, would settle the ethnic crisis” (p. 40). He says that President Jayawardene thought that the 1978 constitution would resolve the ethnic crisis, but he adds, “The new constitution modified the wording of passages in the 1972 constitution to which Tamils had objected, and the government resisted Sinhalese extremist demands to further enhance the status of the Sinhala language and Buddhism. The TULF rejected the constitution, however, and Tamils extremists gained strength as negotiations faltered in 1979” (p. 45). There were backlash resettlement movements encouraged by Tamil separatists, and chief among them was the Gandhiyan movement, which resettled Tamil estate workers in the Vavuniya District in 1978-79. The Ministry of Defense dealt with these movements very harshly. As Mathews (1986) mentions, “In July 1979, Brigadier T. I. Weeratunga was sent to Jaffna with orders to “wipe out terrorism in six months” (p. 37).

There are two main legal bases for militarism\(^2\), according to Sahadevan (1999):

1) Prevention of Terrorism Act (1979) (amended in 1982) - Provisions: detention without trial for 18 months on the order of the Minister of Defense, absolute power for the army and police to search or arrest anyone on the ground of unlawful activity, detainee is held incommunicado without any legal remedy as arrest cannot be challenged in or by any court or tribunal.

\(^2\) These are given in the Appendix in Sahadevan (1999).
2) Emergency Regulations (promulgated under the Public Security Ordinance)
Provisions: The Secretary to the Ministry of Defense is empowered to order the arrest and detention of any person for an unlimited period. The detention cannot be questioned in any court of law. The security forces authorized by the President are empowered to arrest any person and detain him for 90 days. The court has no power to release the detainee without the written sanction of the Attorney General.

Peebles (1990) states that, “The turning point toward civil war can be traced to two elections in 1982, particularly a referendum in December that extended the life of Parliament rather than hold new elections and initiated the period of accelerated conflict” (p. 45). Parliament expelled the TULF on October 20, 1983. Negotiations failed as result although they were later resumed in 1984. Peebles (1990) contends that, “By the time an abortive all-party conference was dismissed in December 1984, military considerations outweighed negotiations. Jayewardene made no concessions regarding colonization until meeting with Rajiv Gandhi in October 1985, when he gave assurances that future colonization would be based on existing ethnic proportions to preserve current demographic balances” (p. 46). Yet, the Sinhalese nationalist groups were overwhelmingly against Indian intervention. Matthews (1988-1989) refers to these nationalist groups when he says that, “They all have in common an allegiance to some sense of ‘cultural nationalism,’ an intransigence towards India, and reluctance to accept a Provincial Council ‘federal’ solution in the Northern and Eastern Provinces” (p. 622). Sinhalese nationalist groups such as Jathika Peramuna protested the Thimpu, Bhutan

India-Sri Lanka Peace Accord was signed in July 1987, and followed by the devolution of power to provincial councils. The government adopted a quota system for land colonization and ownership, with a limited amount of devolution to the provinces. But, Peebles (1990) contends that these adjustments were in favor of the Sinhalese. Shastri (1990) maintains that India and the state of Tamil Nadu supported LTTE’s fight for an autonomous state within the island. She then adds that, “However, belonging to the international community and sensitive to fissiparous movements within its own borders, India has consistently stopped short of support for a separate state. Under the Indo-Sri Lanka accord in 1987, India attempted to implement just such a policy and posed a mortal threat to the most militant of the separatist groups (the LTTE) in the process” (p. 75).

Helmann-Rajansyagam (1988-1989) provides a very probing look at the Accord, and its implications for the conflict in Sri Lanka. The author’s main contention is that the reason the Peace Accord went awry was because of LTTE’s alienation and marginalization with regards to the process. India should have known better, the paper contends. LTTE was underestimated, both in terms of its value as a player in the conflict and therefore in the Peace Process, as well as in its capacity as a nationalist militant group. As Peebles (1990)

4 The Thimpu talks between the government of Sri Lanka and the armed Tamil groups like the LTTE, held under the auspices of the Indian government, elicited a variety of different responses. Jayaratne (2002) gives strong arguments from a moderate and objective point of view, while the majority Sinhalese view can be obtained from any nationalist source including the ones listed in this section. The same is true for the Tamil nationalist point of view.

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concluded, “The intervention of the Indian Peace Keeping Force (IPKF) in 1987 improved security in the Dry Zone, but massacres continued into 1989. In the Dry Zone, the alternative to resolving the ethnic conflict is maintaining Buddhist colonies in spite of massacres by Tamil separatist guerrillas—which at the time of this writing occur weekly” (p. 46).

Peebles (1990) asks, “Why could Sinhalese and Tamil leaders not arrive at a reasonable compromise on colonization, even after elected leaders began to lose control of the situation? The answer is that the negotiators debated colonization exclusively in terms of Sinhalese and Tamil nationalism, which do not touch on the complexities of the issue and which reinforce the irreconcilable ethnic myths” (p. 47). According to Sahadevan (1999), the Tamils’ sources of grievances were three fold: fear of marginalization (as a result of out-group domination), sense of relative deprivation (as a result of denial of equality), and sense of powerlessness (out of hegemonic majoritarianism). The latter also points out that an, “...abrogation of pacts, backtracking on promises and increased ethnic discrimination by successive governments, led to a complete loss of the Sri Lankan Tamils’ trust in the Sinhalese leadership” (p. 7). It was this loss of trust between the communities that led to one of the most enduring civil wars of the last century. According to Sahadevan (1999), the Tamils were wary of the majority Sinhalese perceived aspirations of hegemonic rule over the minorities, while the Sinhalese in turn were suspicious of minority demands that could potentially threaten majority survival.
Speaking of the large scale violence that gripped the nation, he says, "It struck Sri Lanka first in 1956, when the Sri Lankan Tamils resorted to a political agitation for linguistic parity and autonomy, and the last in July 1983, following the killing and mutilation of thirteen Sinhalese soldiers in an ambush by the Tamil militants in the Jaffna peninsula. In the interim period, as many as three riots with limited ferocity took place (in 1958, 1977 and 1981); since 1983 the nature of violence has changed into an internal ethnic war between the army and the militants" (p. 11). He mentions the cost of the riots and subsequent war briefly as follows: due to 1956 and 1983 the riots about 3,000 Tamils lost their lives, 8,077 cases of arson and 3,835 cases of looting. He finally contends that as a result of the war about 800,000 people are displaced internally, and all of them are Tamil. This is an incorrect observation on his part. As Peebles (1990) points out, "When the guerrillas gained the upper hand in the Eastern and Northern provinces, they raided isolated settlements, culminating in the May 14, 1985, attack on Anuradhapura that officially left 146 Sinhalese dead. These raids created a Sinhalese refugee population in the tens of thousands" (p. 46). Also, One hundred and forty Muslims were slaughtered whilst at prayer at Kattankudy mosque by the LTTE in the Eastern Province in 1990, and the LTTE gave the Muslims forty-eight hours to leave the North, causing 120,000 to flee. Government created an armed civil defense force, titled the Muslim Home Guard, who in turn were later accused of egregious acts against Tamil villagers in the region.

The cost of the war keeps rising. In one of his end notes Sahadevan (1999) says, "A ceremonial outfit until 1983, the Sri Lankan army has grown up by about 600 percent in 15 years, from a mere 16,000 men in 1983 to about 115,000 in 1997. Defense spending
constituted about 1.5 percent of the GDP in 1983 (4 percent of total government spending). It rose to over 5 percent of the GDP in 1987-88 (almost 18 percent of the total government spending). During 1985-95, the expenditure increased by 4.9 percent of the GDP. The actual amount of increase was from Rs. one billion in 1981 to 46 billion in 1996. Now, the running cost of the war is estimated at Rs. 2.4 million per day” (Note 76, p. 30). All of this has hampered economic growth. As Jalali and Lipset (1992-1993) state, the lackluster performance of the Sri Lankan economy is directly linked to the ethnic conflict.
Chapter 4 - Modeling the Relative Unit Effectiveness Parameter, \( \theta \)

I mentioned at the onset that although numerous papers in the defense economics literature mention \( \theta \), none of them explicitly examine this parameter, either in a theoretical or in an empirical sense. Therefore, this section, and the ones that follow, will be among the first of such attempts in the economics literature. In Chapter 2, I presented a cursory view of the existing literature on inter-state and civil war causation and prevalence in the political science literature. Although these allude to factors that might be important in the calculus of fighting battles, they do not engage the parameter explicitly nor do they entertain the parameter’s relationship to these war-affecting variables. Therefore, this section and the sections that follow bring together varied understandings and dimensions of \( \theta \) in both the economics and political science fields, and builds an encompassing model of this parameter.

To this end, I rely heavily on military studies and their Operations and Research (O & R) models and techniques. These studies give us a clearer understanding of the constituent components of \( \theta \), and possible ways of testing for it. Therefore, this section has two parts to it. Since I have already introduced the concept of unit effectiveness in Chapter 2, the first part of this chapter part looks at possible constituent components of \( \theta \), which are mainly deduced from military studies. The economics literature is admittedly vague on the matter, while I do cite the few references made to these components. In the second part I derive reduced form equations from structural ones for economic testing, which follows directly in the next chapter.
4.1 The Derivation of the Model

I now develop a model of \( \theta \), which I will later use to empirically test the importance of each of the three constituent components of \( \theta \). Since the literature on \( \theta \) does not include its constituent components explicitly, I first derive a functional model in this part, and in the next part further extend this to a model with its components lucidly expressed by using key assumptions, definitions and propositions. These assumptions, definitions, and propositions are presented in detail in Hirshleifer (2000), Skaperdas (1996), Neary (1997), Dixit (1987), and Grossman (1995). Definitions by other authors will be cited when they are presented. The model I develop is an extension of these papers, which as mentioned before, address different issues. Therefore, the model is simplified to a large extent. This is the model that will undergo econometric analysis.

Assumption 1: Consider two contenders (groups) engaged in fighting efforts. One is the incumbent ruling group ('r' subscripts) of a nation, with a military force that has Available Combat Potential of \( \Psi(F) \). The other is the insurgent group ('i' subscripts) with a military force that has Available Combat Potential of \( \Theta(F) \). In our model, the ruling group is the Sri Lankan Government and the insurgent group is the LTTE.\(^5\)

\(^5\) In many models of insurrection, for example Grossman (1995), the analysis is done in terms of an incumbent ruler, an insurgent leader, and other peasants. Here, the ruling group replaces the ruler, while the insurgent group replaces the insurgent leader, without loss of generality. The incumbent ruler engages in two kinds of economic activities, productive activities and fighting activities, in these models. The former is omitted since it is not directly relevant to our analysis.

\(^6\) Initially there were many rebel groups, and this would be controlled for in the regression model.
Definition 1: Available Combat Potential (ACP) is the latent capacity of a force to achieve useful results in combat with its existing organization, training, equipment, support, motivation, and leadership (Dubois, et al., 1998).

Definition 2a: The technology of insurrection is such that,

\[ p_i = \frac{\Theta(F_i)}{[\Theta(F_i) + \Psi(F_i)]}, \quad 0 \leq p_i \leq 1, \quad (1a) \]

where \( p_i \) is the probability of the insurrection succeeding.

Definition 2b: The technology of suppressing the insurrection by the ruling forces is given by

\[ p_s = \frac{\Psi(F_s)}{[\Theta(F_s) + \Psi(F_s)]}, \quad 0 \leq p_s \leq 1, \quad (1b) \]

where \( p_s \) is the success probability of suppressing the insurrection.

According to the economics literature, these CSFs have to abide by certain conditions, and chief among them is the 'legit' condition:

Condition 1: The 'legit' condition needs to hold true: that is,

\[ p_r + p_s = 1. \quad (2) \]

Now let us identify the components of \( \Psi(F_s) \) and \( \Theta(F_s) \). According to both military and economics literature, there has to be a variable that captures the magnitude of the forces (\( F \) subscripts), and another that captures the effectiveness of the forces. As mentioned

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I am assuming the ratio form of the CSF for simplicity. See my discussion in Part I of this section and cites mentioned there.
before, these $p$ subscripts denote the potential technologies, since we used the ACP as measure of fighting ability. These potential values will be different to the realized values (actual) in the battlefield. In the military literature this realized military power is called Combat Power, and is defined below.

**Definition 3:** Combat Power (CP) is the realized capability of a force at any instant of time to achieve results in combat in furtherance of a particular mission against a specific enemy force in a specific combat environment (DuBois, et al., 1998).

To adjust these potential force values to actual realized values, we need to scale them by certain parameters. In the economics literature these parameters are called the mass effect parameters (defined below). The actual results are realized through engagement in battle. Now let us derive equations for the actual realized probabilities.

**Definition 4:** Let $\psi(F) = (b,F)^o$ and define $\Theta(F) = (b,F)^o$. The $b$ subscripts denote the respective unit effectiveness parameters, while the $F$ subscripts are the respective fighting forces, and ‘$m$’ and ‘$n$’ are the decisiveness parameters$^2$.

Thus, equations (1a,b) become:

$$p_i = \frac{(b_i,F)^o}{[(b_i,F)^o + (b_i,F)^o]} \quad 0 \leq p_i \leq 1, \quad (3a)$$

$$p_r = \frac{(b_r,F)^o}{[(b_r,F)^o + (b_r,F)^o]} \quad 0 \leq p_r \leq 1, \quad (3b)$$

---

$^2$ Many papers contend that this form is an assumption, but in my analysis it is a definition. $^2$ As mentioned in Part I, this parameter scales the degree to which a side’s greater fighting effort translates into enhanced battle success. In our analysis, it incorporates chance, randomness etc. that is all too common in conflict. Although the literature contends that $m = n$, there is no reason to assume this in our analysis. This definition is from Hirshleifer (2000), with slight modifications.
Where now the $p$ subscripts denote the actual probabilities of success in insurrection (3a) and suppression (3b). Equation (2) still holds. Since these actual probabilities are realized, they cease to be probabilities, and are now transformed into certainties or results. Now think of the $p$ subscripts as the respective results of the successful application of insurrection (3a) and suppression (3b). Let us divide equations (3a) by (3b), and express the ratio of the results as,

$$\frac{p_1}{p_2} = \frac{(b_1F_1)^p}{(b_2F_2)^p}$$  \hspace{1cm} (4a)

Now by simple manipulation,

$$\frac{p_1}{p_2} = \frac{(b_1^p F_1^p)}{(b_2^p F_2^p)} = \frac{(b_1^p}{b_2^p}) \left(\frac{F_1^p}{F_2^p}\right)$$  \hspace{1cm} (4b)

Equation (4b) states that the realized or actual ratio of the results of insurrection to the suppression of that insurrection, equals the realized ratio of the unit effectiveness of the insurrectionary forces to suppressionary forces, times the ratio of CPs of the insurrectionary forces to the incumbent’s forces. Therefore, we can see that the ratio of the two results is equal to the realized relative unit effectiveness ($b_1^p / b_2^p$), multiplied by the realized relative CPs ($F_1^p / F_2^p$). By rearranging the terms of (4b) we obtain,

$$\frac{b_1^p}{b_2^p} = \frac{p_1}{p_2} \left(\frac{F_1^p}{F_2^p}\right)$$  \hspace{1cm} (5)
These structural equations of (1a,b), (3a,b), and (2) are essentially derived for aggregate conditions. That is, the defense economics literature assumes that the decision is between a rebellion and lack of one, and that this is a one-time phenomenon, and hence the full military force of both the insurgents and rulers are brought to bear on this one-time determination. This need not only be the case. Since our preoccupation is with modeling a civil/ethnic conflict, we can extend this one-time analysis to a collection of such analyses that comprises the set of civil war battles. Thus, for every battle the structural equations would hold, and we can deduce equation (5) from this system. This equation is our main equation of interest and the one that will be used directly in the modeling process. Ergo, there is a corresponding relative unit effectiveness value for every battle (a $\theta$ value), along with relative CP values for that battle. All these individual battles summed up would equal the ‘universal set’ of that particular conflict. This is analogous to the general description of the relationship of Combat Output to CP acting over time on the Combat Situation, clearly explained in DuBois et al. (1998, p. 12- 3). It will also be more apparent when I draw comparisons with the military defense research in the next part of this section. In fact, we can extend it to a battle-by-battle analysis by recognizing the relationships that exist across battles, while keeping these fundamental equations intact.

4.2 The Various Components of $\theta$

As mentioned above, there are only a few fleeting references to the underlying components of $\theta$ in the economics literature. The general equilibrium literature, such as Grossman (1995), contends that the components of the technology of conflict are not
necessary to model conflict in this setting. While this assertion is correct at an aggregate level, it deviates from reality since it assumes an a priori constant \( \theta \) which is determined exogenously. Yet, \( \theta \) changes with every battle fought, and therefore, considering an aggregate perspective will not give us an understanding of the dynamics of \( \theta \) as I mentioned in Chapter 2. Others in economics, such as Grossman (1991) and Hirshleifer (Nov. 1991, 2000), pointed out that \( \theta \) will be tied to qualitative human characteristics like morale, the quantity and quality of armaments, and other factors such as geography (see Part I of this section).

In the military studies literature there is a parameter of considerable importance known as the Combat Effectiveness Value\(^{10}\), and although I could not find any research in economics that links these two together, I was surprised to find a very strong relationship between the two. This relationship leads to a better understanding of the components of \( \theta \), as I show below. First it is best to dispense with some definitions.

**Definition 5:** The Combat Effectiveness Value (CEV) of a relative force in a certain engagement is defined as the ratio of the relative results of that battle for that force versus the other force at that given engagement, over the ratio of the relative CPs of that force versus the other force at that given engagement (Dupuy, 1985, 1986)\(^{11}\).

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\(^{10}\) A definition of this was hard to come by since most of the military literature that I found did not define it. I had to turn to military theorists and former practitioners for insight. DulBois et al. state CPs generally as a system of two conjugate equation sets, due to lack of knowledge of any definitive relationship. They also state that the process is inherently non-linear.

\(^{11}\) Dupuy provides the equations from which this verbal definition is inferred.
According to this definition, the relative CEV of the LTTE at a certain battle between the LTTE and the Sri Lankan government forces would be given as,

$$CEV = \left( \frac{R_i}{R_j} \right) / \left( \frac{P_i}{P_j} \right)$$  \hspace{1cm} (6a)$$

The relative CEV of the government forces at that same battle between these two groups is given by,

$$CEV = \left( \frac{R_i}{R_j} \right) / \left( \frac{P_i}{P_j} \right)$$  \hspace{1cm} (6b)$$

In equations (6a,b), the $R$ subscripts denote the relative results of a particular engagement between these two groups: i.e. if the LTTE won this engagement then $(R_i / R_j)$ in equation (6a) will be greater than 1. The $P$ subscripts denote the relative CPs of these two groups at that engagement. Hence, if $(P_i / P_j)$ was greater than 1 in equation (6a), then the CP of the LTTE was larger than the CP of the security forces.

It is clear when we compare equation (5) with equation (6a), that these two are very similar, since both relate to actual (realized through engaging in battle) values of the parameters in question. This in turn leads us to our next proposition:\footnote{I have not seen an explicit relationship between these two in the literature.}

**Proposition 1:** The relative CEV and the realized relative unit effectiveness parameter (6) in battle are equivalent.

We can ascertain proof of this from the discussion given below. At this point in our discussion we need to realize the reasons why that these two similar concepts are
equivalent. As mentioned in part 4.1 of this section, and later developed in part 4.2, $\theta$ is a variable that appears in the CSF in both civil war (insurrectionary) models as well as inter-state conflict models. Yet, although the structural equations take the form of equations (1a,b), there are important distinctions between modeling civil wars versus wars among states. The Literature Review (Chapter 2) noted several important differences in factors of war causation between these two types of conflict. It also showed that the literature clearly differentiates between interstate and intra-state wars in terms of factors that affect conflict duration and hence termination. Although for analytical purposes these two types of conflict are very different, from a battle-by-battle analysis perspective we can make the following assumption:

**Assumption 2:** The general equations that relate battle effectiveness to results will be the same for both interstate and intra-state wars. The variables in these equations will be different, but the structure would be the same.

From the military literature it is clear that the process of fighting a battle will be the same regardless of conflict type, although the variables of importance might change from one scenario to the next. Hence, as will be explained later on, the components of CEV, which is defined, at least in the literature that I encountered, in an interstate conflict sense, can be modified to include other variables that are important in the civil conflict sense, while abiding by Proposition I.
Although $\theta$ is not explored in detail, relative CEV is documented and is currently being explored in more detail. Therefore, by merging the components of CEV with the factors that influence battle analysis according to the civil war literature, we are able to come up with possible components of $\theta$. In Dupuy (1985, 1986), he presents the definition of CEV presented above, and explores that definition in detail. The primary focus of Dupuy’s two works is to derive what he calls the Quantitative Judgment Model (QJM)\(^\text{12}\), which is an attempt to model CEVs and their relationships to other variables of interest in battle, such as casualty-inflicting capabilities, with relation to German and Allied forces, especially the US. The first variable that he examines is CP. A simplified version of the formula (first used in Dupuy 1985) used to estimate CP is given in Dupuy (1986). He expresses CP (he uses the abbreviation P) as,

$$P = S \cdot V$$  \((7)\)

According to him, “In this formula S represents Force Strength, and V represents the variables affecting the employment of the force under the circumstances existing at the time of the battle or engagement” (Dupuy, 1986, p. 204, italics included). S was calculated in three basic steps: first, the group of experts he consulted quantified the lethality of each weapon used based on all characteristics of the weapon. The numbers derived were called the Operational Lethality Index (OLI). These weapons were divided into six categories: infantry, anti-armor, artillery, air defense, armor, and air support. The

\(^{12}\) Brown (1986) is a criticism of Dupuy (1985) in which he accuses Dupuy of “number and sample manipulation” to arrive at the outcome that for 78 selected battles between the US and German forces in 1943 and 1944, the German forces were better, unit for unit, than American forces.

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Second step was the application of variable factors that determine the effectiveness of weapons for each category. Most important among these factors are weather, terrain and season. Finally, the Force Strength was “the sum of the OLI*s for the weapons inventories, after having been modified by these weapons effects variables” (p. 204).

The symbol $P'$ in equation (7) corresponds to “those variable factors affecting the force as a whole, rather than just the weapons” (p. 204). Although more than twenty such factors were recognized in Dupuy (1985), the most vital of these, in terms of “effects on tactical operations” were posture, terrain, weather, mobility, and vulnerability. After he determined the $S$ and $V$ variables and their values, he formulated CP values for German forces ($P'_G$) versus Allied forces ($P'_A$) for each battle. Thus, if ($P'_G / P'_A$) was greater than 1.0 the Germans should have been theoretically ‘won’ the engagement due to CP* superiority.

The $A$ subscripts in equations (6a,b), which essentially denoted the ratio of the actual battle outcomes was measured using three criteria of effectiveness: mission effectiveness, spatial effectiveness, and casualty effectiveness. These will be explored in more detail in the subsequent section, when we address the methodology and operationalization of the primary model developed in this part. Suffice to say that if for a given battle the German forces had a higher result value ($R'_G$) than their Allied counterparts ($R'_A$), then ($R'_G / R'_A$) will be greater than 1.0.

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As I showed above from Propositions 1 and 2, since relative CEV and $\theta$ are equivalent, our task is thus reduced to modeling the components of CEV, with certain changes. Military theorists provide full explanations of these constituent components of CEV, although they do not provide any testing of these factors vis-à-vis civil wars, only interstate wars. Hawkins (1990) states that, by addressing the notion of “quantifying human behavior,” which is tantamount to figuring the fighting value of troops, we have and will comprehend the circumstances of combat appreciably more. He presents three facts about CEVs shown in studies by the Department of Defense (DOD): although exact relationships are not known at this time, it is apparent that CEVs are related to nationalities in such a way that CEVs of different nationals tend to vary, CEVs are shown to be amazingly consistent over time and space when compared to various conflicts, and that a unit’s CEV seems to be directly influenced by “senior leadership through personal presence in the front lines, discipline, courage, and aggressiveness” (p. 2). He also notes that, “since CEVs are derived for one side and the other based on an examination of each in comparison with the other, it would not be valid historical analysis to infer an advantage (or disadvantage) for a force against one for which no historical record (or insufficient data) exists” (p. 3).

After careful and extensive analysis of nearly 400 land combat (interstate combats) engagements, he says that the military community agrees on the following list of variables as those that are most influential in determining combat outcomes.
Table 4.1 - Constituent Components of Combat Effectiveness Value

<table>
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<tr>
<th>Operational</th>
<th>Environmental</th>
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<tr>
<td>Posture and Fortifications*</td>
<td>Terrain*</td>
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<td>Mobility*</td>
<td>Weather*</td>
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<td>Air Superiority*</td>
<td>Day/Night*</td>
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<td>Weapon Sophistication*</td>
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</table>

* Factor Values Established

According to him, the variables for which the factor values are not established comprise the CEV. These are, therefore, "a combination of behavioral and operational variables."

He also adds, "Thus, while the CEV factor is able to be quantified as an aggregate of those variables which comprise it, historical research and analysis to date has been unable to quantify the value of each component of the CEV. What the historical record does show, however, is whether or not one side was favored in a particular way."

Therefore, I infer that \( \theta \) includes all the behavioral and operational variables that the relative CEV has, since the latter is derived under objective military combat conditions.

Yet, \( \theta \) would also have variables that in our case reflect the civil war conditions it is used
under. To figure out what else should be included in our model of $\theta$ we need to look at Chapter 2 again. In a civil war setting, Elbadawi and Sambanis (2000) treat external intervention as an endogenous variable and finds that it is positively associated with war duration. Other studies (cited in Chapter 2) also confirm that third party (external) intervention is an important part of a civil war initiation and duration. The reason why third party intervention is not spoken of in the military works cited above is mostly since it is not always a crucial determinant in interstate conflict, and because of difficulty in quantifying the phenomenon. Yet, this is an incomplete way of modeling conflict according to other military theorists. DuBois et al. (1998) clearly mention this when they draw a distinction between the External and Internal Context of Combat:

**Definition 6a:** Internal Context of Combat (ICC) is defined as the military forces of the two adversarial parties in combat, together with their mental and physical states, and the combat environment (DuBois et al. 1998, Definitions, p. 14).

**Definition 6b:** External Context of Combat (ECC) is defined as everything outside the combat arena that has any influence whatsoever, no matter how indirectly, on what is done by either side during combat; this includes all manner of persons, material things, documents, communication sources, political activity, strategic directives, military forces, and the like (Ibid, p. 14).

They also add, "The internal context of combat includes the two opponents and the shared combat environment. But within this internal context, combat is continually
influenced by an external context, which is essentially unbounded in scope, since it stretches to the national entities supporting combat on both sides and extends to a broad geophysical space far beyond the battle arena. The external context establishes the boundary conditions for combat by both sides, not only at the start of action but in more or less degree continuously throughout combat. Within the internal context, each side will be influenced primarily by its own external conditions from the national or alliance level down to the campaign level, but there will also be an influence from trying to account for the opponents' external influences" (DuBois et al., Chapter 5, p.7). Ergo, we can arrive at another proposition:

**Proposition 2:** There should include another behavioral variable that captures third party intervention.

This variable will be elaborated on in the next section but for now it is important to note that this variable will affect other behavioral variables listed above in $\Theta$, and will have two levels of effects on $\Theta$, namely direct and indirect.

To recap our model, $\Theta$ has six behavioral variables, namely Leadership, Training, Experience, Morale, Manpower Quality and Third Party Intervention. It also has nine operational variables, namely Logistical Capability, Intelligence, Command and Control, Communications, Momentum, Initiative, Time and Space, Chance, and Friction. I will elaborate on these variables and their constituent components in the next section when I operationalize the model, with equation $(5)$ as our primary equation.
Chapter 5 - Operationalizing the Relative Unit Effectiveness Parameter

The reduced form equation that I am primarily interested in is equation (5), which I will reproduce here.

\[
\frac{(b_i^n / b_j^n)}{} = \frac{(p_i / p_j)}{} \cdot \frac{(F_i^n / F_j^n)}{}
\]  

(5)

The ratio \((b_i^n / b_j^n)\) is \(\theta\), or the actual relative unit effectiveness of insurgents vis-à-vis government soldiers at an engagement, \((p_i / p_j)\) is the relative result of the outcome of the said battle, and \((F_i^n / F_j^n)\) is the relative CP of the insurgents with respect to government soldiers. Since \(\theta\) is a function of the behavioral and operational variables mentioned in the preceding section, we can rewrite equation (5) as,

\[
\frac{(p_i / p_j)}{} \cdot \frac{(F_i^n / F_j^n)}{} = \theta = f(BEHAV_i, OPER_j),
\]  

(8a)

where \(BEHAV_i\) is the vector of behavioral variables, which are Leadership, Training, Experience, Morale, Manpower Quality and Third Party Intervention (TPI), and \(OPER_j\) is the vector of operational variables, namely Logistical Capability, Intelligence, Command and Control, Communications, Momentum, Initiative, Time and Space, Chance, and Friction of the Tamil rebels. Likewise for the government soldiers we can obtain,

\[
\frac{(p_i / p_j)}{} \cdot \frac{(F_i^n / F_j^n)}{} = f(BEHAV_i, OPER_j),
\]  

(8b)
I need specific military data from both the rebel and government side to measure these operational variables in (8a,b), but is impossible to obtain for two reasons: first, I am quite certain the Sri Lankan government does not invest in military research like the US military does, and hence these variables will not be studied at length. This will obviously be the case with the rebels. Second, even if the data exists, I will not be granted access to the data for national security reasons. Therefore, OPER, cannot be accurately measured, and I will drop it from my model.

Out of these six behavioral variables, Manpower Quality in combat could be considered as the latent ability or skill at fighting, which is different than acquired skills and is not related to other variables such as morale and leadership. As such, it will be extremely hard to quantify this phenomenon, although research is ongoing in doing precisely this in terms of specific nationalities from which the manpower is obtained. Since the studies are in their ascension stages, I will omit this variable from EEHAY. TPI could be classified as direct and indirect, with the classification strictly in terms of whether the intervention is directly for the combatants and their cause or not. As such, the literature identifies four different intervention methods, namely Military, Technological, Economic and Political. I will elaborate on this later on when I discuss operationalizing TPI. Military and Technological intervention methods directly enhance the fighting capabilities of the forces involved through training and armament, and therefore most of the change in Training over time would be captured by TPI. This was certainly the case in Sri Lanka, where the Sri Lankan soldiers obtained help from India, and even allegedly from Israel, under the auspices of the US, and thus the battle training changed with the level of these
foreign interventions. India, especially the state government of Tamil Nadu raised the LTTE as first, and the LTTE is also linked to the IRA and PLO. Thus we can ignore this variable in BEHAV, since its change with time is proxied by TPI.

Experience is for the most part an endogenously determined variable in combat scenarios, and since the information regarding the experience levels of various government units is classified information, I have no choice but to drop this variable from my analysis. In the case of the rebels, I even doubt that such records exist due to their hierarchy of priorities: what is important is not the experience one has, nor keeping track of it, at least in the lower ranks, but whether one achieves the military objectives. Therefore, it is highly unlikely that the LTTE keeps good records of battle experiences of all their members.¹⁴

After omitting these problematic variables we can rewrite equations (8a) and (8b) as,

\[
(p/p_0)/(F'_e/F''_e) = \theta = f[MORALE_e, LEAD_e, TPI_e, Other] \\
(p/p_0)/(F''_e/F''_e) = f[MORALE_e, LEAD_e, TPI_e, Other]
\]

Equations (9a, b) are the structural equations from which I derive several different econometric equations using six model specifications (explained below), and run regressions using Ordinary Least Squares (OLS) method. I now outline the general methodology for estimation of (9a, b), how these variables in (9a, b) are measured and their constituent components, and at the end provide a recap of the model specifications.

¹⁴ This is a big assumption on my part, but one I feel that is with a certain amount of merit due to the organizational structure of the LTTE.
that will be tested. The explanation is in terms of equation (9a) and the identical holds true for its counterpart.

5.1 General Methodology

Although data issues will be discussed in the next section, it is pertinent to bring some aspects of it in order to better comprehend the general estimation procedure. Result ratios and CP ratios are all expressed in terms of the Attacker with regards to a certain battle.\textsuperscript{15} That is, studies, such as TDI (2002), first identify which party to a battle was the Attacker, and which was the Defender. Then, they calculate result ratios and the CP ratios, which are relative terms by construction, only for the Attacker. Thus, they proceed to first differentiate between the Attacker and Defender in all the battles, and then divide the data set into two groups: one consisting of battles where one side was the Attacker, while the other consists of battles where the opposing side was the Attacker. This seems to be a very methodical way to proceed in the analysis for several reasons: the most obvious is that one can control for “posture” by using this method. Posture, in military terminology refers to whether you are the Attacker or Defender (generally speaking). Dupuy (1985, 1986) further develops it to include five categories of posture, namely Attack, Hasty Defense, Prepared Defense, Fortified Defense, and Delay.\textsuperscript{16} This underlies a basic reality that there are certain advantages to what type of posture one undertakes in a confrontation, and by dividing and considering separately the cases where each of the fighting groups were Attackers controls for, albeit partially, posture related biases.

\textsuperscript{15} See TDI (2002), Dupuy (1985) and others cited in the bibliography.

\textsuperscript{16} His “Score Effectiveness Value,” not elaborated upon in my paper, tries to control the result of each battle for these postures that each party undertook. I do not account for these postures in detail due to data problems.
Another advantage in separating the dataset in this manner is the fact that comparison is more convenient, since we can compare cases where both were Attackers with their subsequent outcomes. This facilitates battle effectiveness analysis, and I will therefore adopt this approach in my study as well. As a result, equation (9a) will only take into account the data points where the rebels were the Attackers, and (9b) will only deal with the points where the government soldiers were the clear Attackers. It is important to keep this in mind when reading the rest of the variable descriptions.

5.2 Result Ratios, \( \frac{p}{p_0} \)

As was mentioned in the preceding section, Dupuy (1985, 1986) attempts to measure the result of a battle in terms of three key measures of success: mission effectiveness, spatial effectiveness, and casualty effectiveness. Mission effectiveness is basically a measure of how successful the attacker was in terms of his objective, and as such captures the value of the outcome for the attacker. This can be done in three ways according to TDI (2002): by analyst judgment (one side wins or loses), by scoring (each side is scored as to their degree of success), or by outcome. Outcome is determined by observing into which category the battle result falls out of a set of possible results. For example, TDI (2002) mention seven possible outcomes in their study, namely Limited Action, Limited Attack, Failed Attack, Attack Advances, Defender Penetrated, Defender Enveloped, and Other.\(^1\)

There are a few key characteristics and problems of such outcome rankings.\(^2\) First, they always have to be from the Attacker's perspective: outcome is thus measured as the result for the Attacker. Second, the rankings have to be exhaustive: outcomes have to

\(^1\) Details are given on page 20 of TDI (2002).

\(^2\) These characteristics were not explicitly stated in TDI (2002), but make intuitive sense.
encompass all possible scenarios. Since I could not find research that in fact quantified and ranked all possible outcomes in a guerilla war, such as that in Sri Lanka, this will be a daunting task. Third, even if ranking was possible, there is no consensus on the relative values assigned to such outcomes. Third, there is bound to be ambiguity in certain categories of outcomes, and hence would pose problems in ranking and valuation. For example, although judging mission accomplishment by outcome is the most objective, TDI (2002) points out "it does not measure the results of "Limited Action," "Limited Attack," or "Other" (p. 23). These terms are ambiguous, and hence will cause distortions in our ranking system.

Therefore, TDI (2002) does judge mission accomplishment in terms of analyst judgment, while Hawkins (1990) does it in terms of scoring the performance of the two fighting groups. As the latter states, "A mission accomplishment score was determined for both sides in each engagement. This is a subjective evaluation based on a consideration of each side's: conceptual mission performance; spatial effectiveness; command and staff performance; and troop performance" (Hawkins, 1990, p. 4). Both of these are therefore inherently subjective, and TDI (2002) admits that it does not use this measure of combat success for precisely this reason. Due to data limitations I will be using the mission accomplishment score (MAS) as my primary method of determining who won an engagement. I only have a few observations for which I have casualty reports to judge casualty effectiveness (elaborated upon later). I plot the correlation between these two criteria in the next chapter when I deal with data issues, and also explore the relationship later on after explaining casualty effectiveness. It makes sense to have two mission
accomplishment values, namely 1 if the Attacker is “successful” in his attempt and 0 if the Attacker is “unsuccessful.”

The sole method I use to generate the results of a battle is MAS as mentioned above. I wanted to use casualty effectiveness ratios (CER) but could not due to lack of data. A simple definition of the concept is: “Casualty effectiveness is the ability of one side to cause casualties on another, relative to its own losses” (TDI, 2002). It is generally regarded as the best measure of combat effectiveness, although it too possesses some weaknesses. TDI (2002) notes several: the most obvious relates to reporting casualties. These are not always precise and, as they note, vary with different nationalities. This problem is compounded in Sri Lanka’s case by the fact that both sides have been notoriously deflating their casualties when informing the public. This would be problematic for any civil war study because of this reason. Also characteristic of the conflict is that the Tamil rebels take their dead and wounded comrades whenever possible, exacerbating this problem. Another problem that TDI (2002) cites are related to differences in the metrics used to determine this variable. It is accepted practice to report total casualties as the sum of: those killed-in-action (KIA), wounded-in-action (WIA), and missing-in-action (MIA). Some studies use all these values while others use a combination of these. Since the values for these three categories are inextricably linked to reporting of these values, there will always be an inherent bias, especially in our case. Considering that the rebels generally take their fallen comrades with them, the values for KIA, WIA, and MIA are understated for the LTTE, assuming that the reports to the media are accurate, which in itself is problematic since the government has been accused

19 See pp. 23-3 of TDI (2002) for setbacks of not using all three metrics for this variable.
of inflating rebel casualties, and lowering civilian casualties.\textsuperscript{20} The government’s casualty reports are questionable as well, since in most cases independent confirmation by the media is not available.\textsuperscript{21} Thus, there might also be understatements of actual soldier casualties, and thus the direction of the bias is not evident.

TDI (2002) uses the sum of KIA, WIA, and MIA, or total casualties reported, to calculate casualty effectiveness. Thus, casualty effectiveness is the number of total casualties suffered by the Attacker with relation to those suffered by the Defender in their study. I will use total casualties reported as my casualty values whenever they are available. As such, casualty effectiveness is a continuous variable.

The third commonly used indicator of battle success is spatial effectiveness, defined as "the measurement (usually in kilometers-per-day) of the ability to advance" (TDI, 2002, p.23). The shortcomings of this metric are briefly dealt with in TDI (2002). I will not examine this component of battle success explicitly because of its many shortcomings, as well as the lack of accurate data on advance rates from both sides.

5.3 Realized Combat Power Ratios, or ($F_{e}^{i}/F_{o}^{i}$)\textsuperscript{22}

In my model section I outlined the various components of CP calculations, as Dupuy (1985) suggested. CP was calculated by equation (7), but interestingly it only captured differences in armaments and not personnel, given the various circumstances under which

\textsuperscript{20} A charge often hurled by the rebels, and in some cases by NGOs operating in the region.

\textsuperscript{21} There is a heavy censorship of military reports under normal circumstances, which is frequently heightened during intense fighting.
they were deployed (see model discussion in Section IV). This was probably because he was dealing with units whose sizes were comparable, and thus were controlled for. Yet, what is clear in intrastate conflict is that in a majority of the cases the insurgent group resorts to guerilla warfare, and hence we need to adjust for differences in unit sizes in the various engagements. As such, I need to explicitly account for numbers of personnel involved in the battles when calculating CP values. A good way of correcting this problem and applying it to our study would be to express equation (7) in such a way that \( S \), or Force Strength, in turn was given by a weighted average of the sum of the OLIs for the weapons and the number of troops that utilized these weapons, after having been modifed by these weapons and troop effects variables discussed in Dupuy (1985).

This has not been done in a civil war setting, although as I mentioned in Assumption 2, it is possible to deduce that the general structures of troop deployment will be comparable between intrastate and interstate engagements. I do not possess the expertise to pursue this line of research, therefore will not try to create a battle tested equation for CP like that of Dupuy (1985). Instead, I can use a proxy for CP. This is precisely what TDI (2002) does in its study, although they do not explicitly state this. They call it Force Ratios (FR). Force Ratios are defined as “the personnel strength of the Attacker divided by the personnel strength of the Defender” (Ibid, p.19). They further add, “These strengths are the sum, at the start of an engagement, of all personnel in the force subject to enemy fire, including generally combat and combat support troops but also service support troops if subject to enemy fire” (Ibid, p. 19).
The biggest shortcoming of using this proxy for CP ratio is the fact that OLI's are not utilized to account for the weapons that are used by the troops in the engagement. This lack of accounting for the weapons used in war was purposeful, according to TDI (2002). They cite three reasons for this: the most obvious is the considerable effort involved in such a daunting task, which in turn is determined by the resources available to the researcher. The second is that to date there is no valid “universal” scoring system to account for differences in weapons. Colonel Dupuy’s OLI's are the only ones that were validated within a model. It will not directly translate to my model. The third reason they cite, but one that is definitely not true in our case, is that in an interstate battle opposing forces tend to be similar in armament and organization. They hypothesize that even if there were changes in armaments, in the long run these changes would average out. When modeling intrastate civil conflict it is vital to account for armaments since clearly the ruling government’s armament strength would be greatly more than the rebel groups, at least earlier on. There would be no averaging out, since it is very unlikely that the rebel group could ever surpass the government’s weapons capability. As a result, using FR to proxy for CP ratios would not yield accurate results. Yet, at the moment we have no choice, since research has not been undertaken (that I am aware of) in this regard for intrastate wars.

Another shortcoming of using FR as an instrument for CP ratios is that the former does not account for variable factors that affect the force as a whole, the $V_i$ in equation (7). Not controlling for posture, terrain, weather, mobility, and vulnerability (mentioned in Chapter 4) will bias our results, and the direction of the bias is unclear. Therefore, one
should interpret the results of FR, when used as proxies for CP ratios, rather judiciously. FR is a rather straightforward calculation for a given battle: assume that for a particular engagement, in which the SLA were the Attackers, there were 261 soldiers attacking an LTTE base with 352 cadres. Let us also assume that, as is often the case, there were no service support troops on either side at that battle. Then the FR of the SLA at that battle is 261/352, or 0.74. Now, if the LTTE were the Attackers at that same engagement, their FR would be 352/261, or 1.35. Since SLA had the lower FR, we can say that the LTTE had the greater FR, thereby the greater CP. Hence, CP ratio is a continuous, positive, and rational variable.

Although FR is the best proxy for CP, I could not find FR reports for a majority of the battles between LTTE and SLA and therefore I have to drop this variable from my model. I will incorporate this as more data becomes available in the future.

5.4 Relative Unit Effectiveness Parameter, or θ

Theta is given by the relationship shown in equation (9a), yet I cannot estimate this since CP values are not available in the dataset that I created. Therefore, I proxy θ by just the mission accomplishment score, since Dupuy (1985) points out that there is a strong correlation between the two. This measure does not control for CP, which is something that we need to keep in mind when we are interpreting our results later on. Since MAS is a binary variable, I had to use dependent variable models to run my regression as I explain later on.
5.5 The Morale Vector, or MORALE

One of Napoleon's famous maxims advocates that, "The moral is to the physical as three is to one." This highlights the pivotal role that military tacticians ascribe to morale among troops in a unit. Morale, or factors affecting it, should at the very onset be distinguished from Stress, or variables that capture Stress, during military operations. Measures of stress, often called Combat Fatigue in some military literature, or as Fatigue in studies such as Hawkins (1950). This variable is the subject of intense study since its effects on troop performance has been well documented. Studies such as Osipow and Spokane (1983) and Birkeland et al. (1998) use surveys (explained below) to measure this phenomenon. Although Stress is the result of hormonal response to environmental triggers (Birkeland et al., 1998), Morale is but a generic term encompassing all psychological factors, including Stress, in a given point in time. Therefore, any test for Morale must also account for Stress related factors.

Morale can be a product of Internally Directed Processes (IDP), or those that impact only own force elements, or Externally Directed Processes (EDP), or those affecting only enemy force elements (DaBois et al. 1998). An example of the former is Motivation, while an example of the latter is Demoralization. An example of EDP issues is the literature on Psychological Warfare, namely Cottrell (1960). Therefore, it is important to

22 There are studies that contend that morale of the civilian population is as important as the morale of the military in times of combat. Pope (1941) is an example.
23 Analyzing these surveys could be done in different ways, but the most popular are techniques called Sopometric techniques in the literature. See papers cited in my bibliography for further information.
24 See DaBois et al. (1998), Chapter 8, for more details.
keep in mind that whatever proxy or set of proxies that we use to gauge Morale must also capture these two processes of Morale. As such, Morale is not a constant state of mind, but one that is highly fluid and driven by battle related as well as pre and post battle related environmental and biological factors, both real and perceived.

As such, Morale is arguably the most problematic to quantify and measure of all the behavioral variables affecting relative unit effectiveness, which is the reason that I am yet to see a study that explicitly measures this variable in a combat setting. Some studies, such as TDI (2002), examine the evolution of $\theta$ from battle to battle as time passed by, and make claims such as that morale of one force must have suffered, relative to the other, if $\theta$ fell with time over subsequent engagements. This is insufficient for our purposes. Others, such as Swamy (2002), attempt to look at morale by using direct personnel statements, and anecdotal evidence. These accounts rarely pertain to a particular battle, and could be construed as aggregate observations for the most part. For example, rather than stating the morale condition of the LTTE at a time when it engaged in a confrontation with the SLA, he presents anecdotal evidence that due to heavy casualties the LTTE were demoralized after a certain string of battles. His study was merely a historical account and not a numerical exercise, and therefore we should be wary of using this evidence for measuring morale. Yet, it does highlight the subjective and interpersonal measuring of morale.

23 Neuropsychiatry is one field that looks at the problem from a biological perspective. See the papers cited in my bibliography for further details.
The most we can do with this anecdotal evidence is to use it as general timelines to buttress findings of a more objective measurement of Morale. The current line of research, military or otherwise, suggests that the best method of obtaining measures of troop morale, before and after battle, is by Contingent Valuation (CV) methods, or surveys. An example of this is Riley (2003). The Canadian Forces are given the Unit Morale Profile (UMP), a group-administered questionnaire, which is designed to capture the Morale component of unit effectiveness, and is a part of a wider attempt at modeling and measuring the human dimension of combat. Riley (2003) is a brief exposition on the UMP, which in its present format measures 14 dimensions of Morale, namely Role Stress, Work Motivation, Job Satisfaction, Psychological Distress, Quality of Life, Leadership Style, Confidence in Leadership, Cohesion, Communication, Climate, Preparedness for Deployment, Perceived Organizational Support and Organizational Commitment, Job Performance, and Retention/Attrition. Since these recognized, reliable and valid measures of Morale could only be ascertained by surveys, and to my knowledge there has been no such attempt made by the SLA or the LTTE, it is extremely difficult to objectively quantify the comprehensive vector of variables that measure Morale.

The military literature does point to possible proxies for assaying Morale, and two good examples are Surrender Rate (SR) and Defection Rate (DR). The first variable captures the change in those that surrender at some point in an engagement. The military literature

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26 See Riley and the works cited there for more information on these factors and the UMP in general.
27 I could not find studies that explicitly used this terminology and measurement methods for these two variables. As such, these are my own terminology and usage methods.
has a similar variable called Captured-in-Action (CIA), which is basically self-explanatory. This only considers the raw numbers of those that surrender to the opposition after a battle, and as such converting these numbers into rates provides us with a better instrument for gauging morale at a certain time as well as its changes with time. I introduced DR to capture the idiosyncrasies of civil conflict. What we saw in the Sri Lankan conflict was that more and more government soldiers defected and went underground. Although similar trends were not often reported on the LTTE side, there were instances when LTTE cadres just defected over to the government side in return for a pardon. They became informants in most cases. This aspect of civil conflict can also be used to gauge the morale changes of the respective combatants.

The relationship between SR and morale seem quite apparent, though I did not find studies substantiating it. As TDI (2000) points out, “one would expect to see more personnel surrendering in a force with lower morale, motivation, and cohesion (less combat effectiveness) than one with higher morale, motivation, and cohesion (more combat effectiveness)” (p. 38). The same should hold true for DR, although I could not find any study that examined this dimension of conflict separately from SR. By its nature, SR is a battle-dependent variable like CP, since technically CIA could be calculated along with KIA, MIA, and WIA after every battle. As TDI (2000) points out, there is a strong relationship between MIA and CIA, with usually MIA being equal to CIA.

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29 As TDI (2000) states, studies relating concepts similar to SR and DR with morale and in turn unit effectiveness are in their nascent stages.
30 The government harshly punished those that were caught, in an attempt to curb these defections. Also, there were general sentences given in certain periods for defectors, in return for their reinstatement in the service, especially in times of large operations.
although they do find cases where CIA is greater than MIA. DR, by construction, will not be a battle-dependent variable, since we would not expect defections to occur before or after every battle. Hence, the best way to operationalize DR is to look at the rate of defection of a force at predetermined intervals, such as over three or six month periods.

Both SR and DR meet the requirements for a good proxy for morale. Both are the results of EDP and IDP. It is also possible to measure these tendencies via CVs, as Riley (2003) implicitly indicates, with UMP measures such as Retention/Attrition and Cohesion. Yet, we encounter a problem when using SR and DR as measures of morale, due to SR changing from battle to battle, while DR remaining an aggregate measure. Since all our other variables of equation (9a) vary from battle to battle, we should construct a way to show how Morale changed from battle to battle as well.

Due to data restrictions, I cannot use either of these measures. Therefore, I will use my judgment to gauge morale of the combatants, whether it was high morale (a score of 1) or low morale (a score of 0). I explain where I got the information for this variable in the next Chapter when I discuss data issues in detail. Morale is a dummy variable in all my of regression models.

5.6 The Leadership Vector, LEAD

This important behavioral variable should also be analyzed in terms of ICC and ECC mentioned in the last section. War is an undertaking that requires leadership not only in the battlefront, but also demands overall societal leadership which in turn galvanizes that
society’s participation in the war. This societal group is often a nation, but it could also be an ethnic group as was the case in Sri Lanka. As such, the domestic political leadership in a country, in our case Sri Lanka, should also be considered along with the SLA leadership that physically commands the war effort. We should also consider both the rebel military leadership as well as Tamil political leadership, which as time went by disappeared, only to be superseded by one supreme military leader.

The military leadership is vital during conflict times and this holds true for both intrastate and interstate conflicts. As DuBois et al. (1998) lucidly state, “We say a commander activates his forces to create combat power from available combat potential” (Chapter 1, p. 5). To measure the effectiveness of military leadership, the military literature uses the CV method as is shown in Riley (2003), in his assessment of the Leadership perception of Morale. Some sociological literatures, especially those that use Sociometric techniques, use tests devised to tease out preferences in certain situations vis-à-vis leadership roles. An example of this is Hamblin (1958).

For our purposes, neither of these two methods yields a suitable proxy, although the former does suggest possible avenues of search. Effective leadership is a perceived quality, especially in a military setting. Therefore, if we gather primary and secondary reports of a troop’s perception of their leader, this would possibly be an instrument for Leadership. An alternative is to construct an index based on several leadership criteria which I could gauge from the data. This is what I do to capture this variable. I rank

31 There is always a hierarchy of leadership, and when I speak of the military leader I am referring to the overall lead of the military effort, be it the supreme leader of a rebel organization or the chief military officer of a state army.
leadership according to four criteria after having divided it into civilian and military leadership. This is explained in the next Chapter when I address data issues.

Since leadership is an ordinal variable, I use dummy variables for the leadership transitions from the base ranking of 0 to the other rankings. I only had leadership fluctuations from 0 to 3 since I did not have enough dependent variable observations to capture all the changes in leadership. Therefore I used three dummy variables for each of the transitions.

5.7 Third Party Intervention Vector, or TPI

Quite a number of studies have been done, both in economics and political science, with regards to TPI and existing conflict. I have mentioned some of these very briefly in the Literature Review, Chapter 2, and their main results. From an economic perspective, the literature has maintained that international intervention policies for conflict reduction should be aimed at increasing the cost of rebellion, and at reducing the revenues from it. A good example is Azam et al. 2001. They further contend that donations from diaspora communities should be curtailed by the foreign community, thereby increasing the cost of rebellion to the insurgent group, which receives most of their funding through these means. In the political science field, most of the research is based on case studies of actual intervention policies and their results rather than on a general framework on intervention. A few empirical papers do exist, such as those of Patrick Regan cited in my bibliography, but they do not say much about TPI in a setting such as ours. See especially Regan, 2003.
This variable has four dimensions as I explained in Section II, namely economic assistance (econAss), military assistance (milAss), political support (polSup) and technological assistance (techAss). Governments get these different types of aid for a host of reasons, so for our purposes we should only consider those that were directly used for battle related needs. This becomes a lot clearer is the case of the rebels, since nearly all of the assistance was channeled to the war effort. Economic assistance could be in many forms such as loans, donations etc. and for our purposes we do not need to differentiate various types of economic aid. But we do need to identify the source of the financial aide, be it by another nation or a non-state actor. This I will do when I compile the dataset to the best that data availability allows.

Political support is not as simple to capture. Hence, I consider any case where an international actor overtly and directly either expresses support or uses types of political leverages, such as resolutions, treaties, accords etc. as affording political support to that party in the conflict. As before, this too needs to be differentiated by the source of the support, done once again in the dataset, and the degree of support, presented in the model specification part. Technological aid is aimed at capturing direct transfers of foreign armaments, training methods, intelligence, and leadership guidance to the war effort. This too needs to be differentiated by the source of the support, done once again in the dataset, and the degree of support, presented in the model specification part. Military assistance could be either troop to fight for a group or training services, both of which will be elaborated in the next Chapter.
5.8 Model Specifications

For our purposes, we need proxies for all four of these measures of TPI. The most commonly examined measures are the raw numbers, especially for economic assistance and technological aid. This gives you a dollar value of the amount of intervention given to that country or to an insurgent group. This is not useful for our purposes, since we are not concerned with the dollar value of aid and its influence on $\theta$, but rather whether economic aid was given during certain battle engagements or not. Also, the amount of financial assistance extended to the rebels by diaspora communities will be very hard to gauge, and thus data problems will exist. The same applies to the other three forms of aid as well. Therefore selecting a method that recognizes whether any of these four methods of TPI were involved, such as designating a score of 1 for each of the four forms of TPI, and a 0 if not, would be a better choice, given our requirements.

Yet, it would be instructive to know which type of intervention was involved as well. Therefore, instead of using one weighted measure of all four, I propose model specifications in which I use the four TPI measures separately. Therefore, TPI would each have a score that corresponds to the total number of sources providing that form of aid instead of a mere 1 or 0. This will help us answer questions regarding the best type of intervention method used to achieve a desired unit effectiveness level. I will estimate the following regression equation:

$$(p/p_k)(E^n/F^n) = \theta = \beta_0 + \beta_1 \text{MORALE}_i + \beta_2 \text{LE}/D_i + \beta_3 \text{econAssist}_i + \beta_4 \text{milAssist}_i + \epsilon_i \quad (10)$$

$$\beta_1 \text{polSup}_i + \beta_2 \text{techAssist}_i + \epsilon_i \quad (10)$$
where the $\beta$ coefficients are the usual OLS coefficients, while $\varepsilon$ subscript denotes the disturbance term. This will be my primary equation. To test hypotheses (7a, b) to (11a, b) I use other specifications with which capture the interaction effects.
Chapter 6 - The Data Set and Related Issues

This section is divided into two parts: the first one is deals with general data issues facing civil conflict researchers. I briefly examine the type of data that is available and I explain in detail where I obtained my data and the issues pertaining to this acquisition. The second part deals with the actual variables themselves, the measures I utilized to code the data, and the relationships of these variables after the coding process was completed. This is presented as a backdrop to the results that will follow in the next section.

6.1 Data Issues in Civil Conflict Studies

Collier and Hoeffer (2001) is an excellent synopsis of most of the current literature regarding civil wars and different issues pertaining to them. These issues are namely: definitions of conflict (these vary somewhat from study to study); measuring the severity of civil wars using one of three criteria: by civil war duration, by the human costs involved in the conflict, or by its geographic spread; political events (which include regime transitions, TPI and reforms); and examining military spending of countries and groups engaged in civil wars. I do not wish to elaborate on studies in all of these areas, but would like to restrict the discussion to the ones that are most relevant to my study.

The first one deals with issues of defining civil conflicts. The most commonly used criteria were first promulgated by Singer and Small (1982, 1994 and 1997, among others). These definitions lead them to their seminal data collection effort (Correlates of
War Project, COW), which was later modified to include events up to 1997 (COW2). The COW definition of civil war is based on four main characteristics:

1. Whether military action was involved.
2. At least 1,000 battle deaths resulted during the civil war.
3. The national government at the time was actively involved.
4. Effective resistance (this is measured by the ratio of the fatalities of the weaker forces to the stronger forces) occurred on both sides.

The Sri Lankan conflict certainly qualifies as a civil war based on these criteria, but the rigidity of the requirements leads one to conclude that the conflict with the LTTE actually started with the biggest of the ethnic riots in 1983. This is mostly due to restriction number 2. Over 1,000 total conflict related deaths first appeared in 1983, and hence the popular conception that the civil war actually commenced in 1983. Yet, as Regan (2002) points out, we might need to relax this assumption to include other intractable conflicts as well. I agree with this assertion, and hence follow his (Regan, 2002) convention of denoting a conflict that results in 200 fatalities as being a civil war. According to this definition, Sri Lanka was in a state of civil war beginning in 1979, when the PTA was enacted and SLA moved into "clean-up" the north. Yet at this point, the LTTE and all the other rebel groups were merely targeting police and civilians. For our purposes, the first recorded battle between SLA and LTTE was in 1981. Therefore my data set, which spans from 1975 to July 2003, captures the beginning of SLA battles with LTTE as well as the beginning of the insurgency. This has implications for duration studies as well, which at
the moment (for example COW and COW2) list the Sri Lankan conflict as having started in 1983. It also has implications for studies on the human costs of war.

The second set of issues that pertain to my study deal with issues of geographic spread, which examine where the conflict originated and its progression to areas elsewhere. All the evidence supports "conflict clusters," or the thesis that civil wars spread to neighboring countries. This was evidenced in the Sri Lankan conflict as well, when in the aftermath of the 1983 anti-Tamil riots in Colombo, the Indian government started financing, training and equipping the rebel groups but later stopped overtly sympathizing with their cause when fears of internal strife started to emerge in India. This involvement of regional powers in civil wars of a neighboring state is a very interesting phenomenon, and my study tries to incorporate this explicitly.

The third set of issues that my study touches on have to do with TPI and its effects on civil wars. The Regan (2002) study and the accompanying database is one of the first such attempts at trying to capture this very important aspect of civil wars. He distinguishes between military, diplomatic and economic intervention, but I found that this database was lacking in several regards. The primary shortcoming was that it was not comprehensive enough. He does not provide enough observations in the Sri Lankan case and only mentions India’s involvement militarily in the conflict. My database provides more information and shows patterns in TPI as the conflict progressed. The second shortcoming was that he does not differentiate between technological (weaponry and intelligence assistance) and non-technological assistance. Regan's military assistance
variable includes all of these, but there are qualitative differences between these two forms of military intervention. My study differentiates between the two and provides a more comprehensive foundation in which to incorporate TPI in questions regarding civil wars in general, and the Sri Lankan war in particular.

In a nutshell, the existing sources of information were not suited to answer the questions that I raise in my study. As a result, I embarked on creating an exhaustive dataset of all conflict-related events between SLA and LTTE in the hopes of capturing the details that I was after. My primary source was the Facts on File World News Digest, a collection of news reports published weekly that span the vistas of current events. These reports were compiled from other primary news sources, and are generally accurate and impartial. The only shortcoming was that, as expected, it only reported but a handful of the events that took place in Sri Lanka. This meant that, although it reported the key events that transpired in Sri Lanka in any given week, it omitted many LTTE and SLA battle details. It was not specific about some of the battle details that they did report either, frequently aggregating battle statistics and cursorily referring to battles that took place without providing any key details. Yet it was a good start, and I used it to build my database and code and track the variables pertaining to my model.

The other primary source was Swamy (2002). This is the most comprehensive research effort regarding the evolution of the LTTE, but it had a few shortcomings as well. The primary one stemmed from the fact that it was written not as a data study, but as a historical account that followed the transformation of the LTTE from just one of a few
rebel groups since its inception in 1976, to the most powerful one in Sri Lanka, and arguably one of the most well organized, extensively funded and lethal anywhere in recent times. After using Swamy (2002), my battle related observations increased from 45 to 71, and made a significant difference to my study. The observations for my other variables increased significantly as well, especially for the TPI and morale variables. Another shortcoming in Swamy’s research was that it did not address important aspects of TPI, such as the extensive network of diaspora financial and political support that the LTTE enjoys. Therefore, I could not capture this part of TPI in my study. It was also limited in information about military and technological assistance received from abroad, which also severely limited my ability to analyze these variables as the conflict progressed.

I could not find a comparable study for SLA which limited my observations for SLA severely. This is reflected in the number of battles that I used for the SLA vis-à-vis the respective mission accomplishment scores. While I had 45 battles for which I could determine mission accomplishment scores for the LTTE, I just had 26 for SLA, which proved to be a problem especially in the logit specifications that I ran (explained in the next section). It also proved to be problematic when I tried to model SLA morale and leadership, since the observations that were available were limited in their variation. This affected the former variable more than the latter for obvious reason. I am hoping to find better sources and remedy this imbalance as I expand my dataset in the future. The current database is available upon request.
6.2 The Variables Involved

This discussion is structured in the following way: I first introduce the variables that I use to capture equations (9a, b) and then describe the methods I used to code the variables, the problems I encountered and remedies I came up with, and their distributions in the data. I do this for all the variables in succession and for both groups, with the observations for the SLA described after the ones for the LTTE. I will make comparisons between the two and also elaborate on questions that I confronted while designing the database and coding the variables. Descriptions for the variables would be the same for both groups, unless otherwise noted.

6.2.1 Unit Effectiveness Variable

As I mentioned in the last section, since I could not find enough CP values associated with the battle observations to use \( \theta \) in the conventional sense I proxy this with the result ratios of all the battles for SLA and LTTE. As I mentioned before, the ratio is captured primarily by the mission accomplishment score that I assigned to both groups, which in turn depended on who attacked whom. Table-6.1 below shows the battle statistics of the LTTE compared to the SLA. The second column is the total number of battle observations for that group in my dataset, column three is the number of victories out of those attacks for the respective groups, with the battle success percentage (average MAS) within parenthesis, column four lists the number of observations for which I have CERs for, column five calculates the average CER for that group, and the final column shows the correlation between the MAS and CER.
The average MAS for LTTE is 89 percent and is slightly higher than for the SLA (81 percent). The average CER is also higher for the LTTE (0.83) compared to the SLA (0.71). This means that on average the LTTE were more successful in the battle field, but we should be cautious since this does not take into account CP ratios for the groups. Hence, we cannot definitively say that the unit effectiveness of the LTTE was higher than the SLA.

Table 6.1 - Comparison of Battle Statistics of LTTE and SLA

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Number of Observations</th>
<th>Number of Victories</th>
<th>Number of Casualty Days</th>
<th>Average CER</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTTE</td>
<td>45</td>
<td>40 (89%)</td>
<td>15</td>
<td>0.83</td>
<td>-0.52</td>
</tr>
<tr>
<td>SLA</td>
<td>26</td>
<td>21 (81%)</td>
<td>3</td>
<td>0.71</td>
<td>-0.59</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>71</strong></td>
<td></td>
<td><strong>18</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The correlation coefficient between CER and MAS for the LTTE was -0.52, which is rather high, while it was -0.99 for the SLA. The latter is due to the fact that all the three CER calculations for the SLA coincided with a MAS of 1, indicating that they won the three battles under consideration. The relationship is negative as we hoped, indicating that both groups were cost-efficient in terms of casualties. It also indicates for both groups the MAS is fairly consistent with the results that we might obtain by using CER as our measure of battle success.

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How the MAS for the rebels changed with time is plotted in Figure-6.1 above. All dates do not appear on the graph due to space restrictions. It shows that the LTTE suffered 2 loses in 1985 (January and February of 1985), one in December 1986, one in July 1991, and the last one in November 1993. After that the LTTE did not lose any battles that they initiated according to my observations. Before we draw any conclusions, we need to note the scattering of battle observations in Figure-6.1. I have eight LTTE observations for 1985 (Figure-6.1 only shows four due to lack of space), while just one for 1981, three for 1983 and two for 1984. Also, there is a gap from July 1987 to June 1990, which coincided with the time the LTTE was battling the Indian Peace Keeping Force (IPKF) and not the SLA. The scattering of the battles after 1997 show similar disproportionate representation, with five battles available for 2000 but just one each for 1998 and 1999 (see Table-B1 of Appendix-B for more details).
The distribution of SLA battle victories is equally interesting. Figure-6.2 above plots the MAS for SLA with time. It shows that SLA lost one battle in January 1986, one in July 1995, and three after May 1997 (one each in 1997, 1998 and 2001) out of all the battles that they initiated. Once again we should note the scattering of the observations (see Table-B2 of Appendix-B for more details). As mentioned before, there is a gap between May 1987 and June 1990 due to IPKF involvement in Sri Lanka. According to Table-B2 of Appendix-B, between February 1985 and December 1985 SLA launched six attacks which were all successful. Between January 1987 and May 1987 SLA also launched six attacks which were successful. The latter was when SLA was successfully implementing "Operation Liberation" to wrest control of Jaffna from the LTTE. Interestingly, all the attacks that they launched after 1997 were unsuccessful.
For both groups I had to omit a host of observations since they did not qualify as battles. I defined a battle as an open confrontation between LTTE and SLA where there has to be a gunfight involved in some form or the other. This is quite restrictive, but I had to do so for the sake of comparison. LTTE perfected using landmines which dealt crushing blows to SLA, especially when they took the lives of very senior battle generals (this will be elaborated in the SLA military leadership section in this chapter). Yet these landmine explosions were clearly not comparable to gun battles, therefore to make the selection fair for the SLA I dropped these observations. Some landmine attacks were followed by gunfights and these were included in the dataset. The same was true for suicide bombings, another tactic frequently employed by the LTTE to lethal precision. Likewise, since unit effectiveness as is currently being used in the literature is defined only for land engagements I had to drop naval engagements between the two and aerial assaults by the SLA. Further studies should examine how we could incorporate these incidents as well.

There was a great deal of fighting going on between LTTE and other rebel groups such as TELO, PLOTE, EROS etc, while they were individually and in a few occasions collectively fighting the SLA. I omitted all rebel group attacks on civilian targets and attacks on the police and other non-SLA personnel. I also omitted SLA attacks on non-LTTE rebel groups from the dataset. Hence all the battles included in the dataset are only between LTTE and SLA. I did not make a distinction between a regular battle and an operation (which in essence is usually comprised of multiple battles). This was due to the fact that I could not tease out how many battles were actually included in a given operation secondary to inadequate sources. I made sure not to double count whenever
there were reports of both an operation and battles within an operation. This level of
disaggregation is usually done in the military literature, since battles are fundamentally
different to operations. I am hoping to make this distinction as I improve this work in the
future.

6.2.2 The Morale Variable

As I mentioned in the last section, since morale could not be determined by either the
surrender rate (SR) or the defection rate (DR) I had to rely on secondary sources for this
information, which in turn based their observations either on interviews of the
combatants or their general perceptions of battle dynamics. Facts on File did mention
morale changes for both groups on occasion, but did not directly specify their sources. In
some cases they reported the event and alluded to such changes. I used my discretion to
code this variable whenever reports did not directly specify but merely imply. The
majority of the observations for morale were taken from Swamy (2002), who interviewed
LTTE and government sources in compiling his book.

There were several key assumptions that I had to make to code for morale. I assumed that
morale does not change with the outcomes of battles unless it was either explicitly stated
by Swamy (2002) or Facts on File. An example was the disarray the LTTE faced when
SLA unleashed “Operation Liberation.” The LTTE was clearly demoralized, and I
captured this demoralization. Both of my sources mentioned the loss of LTTE morale. I
made this assumption to avoid any collinearity problems in the data. The second
assumption that I made was that morale remained stable across time unless it was
disrupted by events. In other words, if there were no observations between a certain time period and prior to that one group had high morale, I assumed that the said group continued to have high morale until the next morale changing event. I had to make this assumption since I did not have observations on a daily basis.

I tracked morale changes across 108 events for both groups from 1975 to July 2003. The dataset is too large to reproduce here but is available upon request. I did plot morale changes for the two groups with time so that we could observe relationships, which should exist due to the nature of morale. I first present the way the LTTE's morale changed with time in Figure-6.3 below. The y-axis is the morale score which is designated by a 0 if it is low morale and 1 if it is high. Due to lack of space all of the corresponding dates are not shown in the x-axis, but it is easy to get a sense of morale changing with time for the LTTE.
According to Figure-6.3 LTTE morale changed constantly, contrary to popular belief in their unwavering resolve. This was especially the case early in its insurgency, when the power struggle between current supremo Prabhakaran and Uma Maheswaran (elaborated upon in the next leadership section) crippled the LTTE along with the operations launched by SLA between 1979 and 1980. In fact, these two leaders along with other leaders of most of the rebel groups fled to Tamil Nadu, India to escape the SLA onslaught. The morale was low but when Prabhakaran came back to Sri Lanka in the latter part of 1982 he revived the LTTE and consolidated it, and we can see an immediate rise in LTTE morale between 1983 and 1984 in the above graph.

During the height of "Operation Liberation" (May 26, 1987) we can see that the morale of LTTE was low for the most part, especially due to the SLA capturing key bases in the north, including Velvedittur, which was the home base of the LTTE, and the strategically vital Vadamalari Peninsula in Jaffna. At this time LTTE suffered serious setbacks when several of their leaders were hurt as well (elaborated on later).

LTTE morale became low for the most part when India imposed the Indo-Lanka Peace Accord on it along with the Accord’s ceasefire and disarmament requirements. This was between 1987 and 1989. Yet soon after it jumped back up when the LTTE took on a surprised IPKF. From then on it has been high for the majority of the time with the exception of the mid to latter parts of 1995 and early 1996. In the early part of 1995 the LTTE launched “Eelam War III,” with an attack on the Trincomalee harbor in the in the
north east. This was moments after it broke off talks with the government of President Chandrika Bandaranaike-Kumaratunga which were aimed at resolving the conflict. After intense pressure to retaliate in the wake of these attacks, SLA launched its most successful operation to date, “Operation Leap Forward” in June of 1995. They were able to capture the rebel main town of Jaffna in a matter of hours, and the LTTE moved its capital to east of Jaffna.

This SLA celebration was short-lived though, as is clearly evidenced from Figure-6.3. LTTE launched “Operation Unceasing Waves” to capture the SLA base in Mullaitivu in the north and they succeeded after intense fighting in July of 1996. Then they attacked Elephant Pass and Paranthan army bases in January of 1997, and the SLA was unable to push back the LTTE assaults. Since then the LTTE has had high morale with just a few exceptions.

We get a similar interesting story when we plot the changes in SLA morale with time, presented in Figure-6.4 below.
SLA morale was very stable and high between 1975 and 1987 when it was “clear” that the rebel insurgency (spearheaded by the LTTE and other rebel groups) would be put down. After 1990 morale fluctuated greatly until 1995 when it launched “Operation Leap Forward” mentioned above. It went down in the wake of “Operation Unceasing Waves” explained above. After LTTE launched “Operation Unceasing Waves 3” the SLA lost Jaffna and was forced to pullback to Vavuniya. After more than a year and a half of fighting the SLA was finally demoralized at being unable to make progress. Swamy (2002) mentions that in the wake of the latter LTTE offensive, some of the SLA soldiers who were heavily demoralized, dropped their weapons and walked back to the nearest base camps without offering resistance. It is clear that the SLA morale was low after 2000.
6.2.3 The Leadership Variable

This variable shows very interesting dynamics especially due to the coding criteria that I used to capture it. I had 178 LTTE leadership variation observations and 282 Sri Lankan civilian and military leadership variation observations. I will not list them all due to obvious space restrictions, but as before I will present the respective leadership changes with time later on in this discussion. I initially divided leadership into civilian leadership and military leadership, because technically the changes in these two should affect the performance of combatants very differently. Yet, the LTTE did not have a civilian leadership so to speak, merely a political spokesman/group abroad led by Anton Balasingham. This group took orders from Prabhakaran, and therefore there was no effective civilian leadership. In the case of the SLA, the Sri Lankan government and its Ministry of Defense had authority over the SLA. Yet these two should be judged by different criteria, and so I decided to split the Sri Lankan leadership into military and civilian.

6.2.3.1 Military Leadership

I will first look at the military leadership since this is common to both groups, starting off with the LTTE leadership. I decided what data to use based on four criteria: the first was whether there was consensus in the military leadership regarding the war effort. If there was consensus in leadership for the respective groups I assigned them a score of 1 and 0
otherwise. I took note of reports that spoke of dissent in the military leadership in both
groups and notes in Swamy (2002) about the relevant situations. I am not plotting the
LTTE consensus fluctuations with time. It is interesting to note that with the exception of
the period between 1979 and 1982, there was unanimous consensus in the LTTE
leadership structure as to their purpose and actions. This coincided with split in the LTTE
due to the power struggle between Uma Maheswaran and Prabhakaran. The former was
recruited into the LTTE by Prabhakaran but later proclaimed to be its sole leader, much
to the chagrin of the latter.

The consensus of the SLA leadership showed even less variation and therefore I do not
plot this either. There was dissent at only two points in time according to my data: the
first was in 1993 when Gen. Hamilton Wanasinghe was elected Defenc Minister
following the resignation of the former head, Air Chief Marshal Walter Fernando due to
war tactics apparently. The second was in 1995 when the LTTE broke off peace talks
(mentioned before) and continued their war effort. The military was pressuring President
Bandaranaike-Kumaratunga to fight back which she resisted at first, even when the LTTE
downed two government Air Force planes, killing all 97 people aboard. The planes
crashed near Palaly Air Base, Jaffna and these were the first attacks in which the LTTE
used antiaircraft missiles previously purchased from Ukraine. The tensions within the
military rankings lasted for a very short time, and then SLA unleashed bombings on
Jaffna and other rebel strongholds. Other than at these two points, there seemed to be
consensus throughout the leadership ranks of the SLA.
The second leadership criterion was whether there were statement or actions undertaken that clearly reflected the groups' attitudes towards the war effort. If there were such actions, statements or any other form of a manifestation of that group's desire to continue war, I gave them a 1 and 0 otherwise. I will not plot these changes with time for the LTTE since it does not have too much explanatory power. They had a zero only during times when the LTTE called for either peace talks or a ceasefire (which were June 18, 1985; July 8 1985; September 2, 1994; December 19, 2001) or when the LTTE agreed to the terms of the Indo-Lanka Peace Accord. The ceasefire that the LTTE called in December of 2001 has resulted in a time of unprecedented peace in Sri Lanka since violence first erupted. Other than these times, they had a 1 throughout. The only exception to this was when leaders of the LTTE along with leaders of the other rebel groups fled to Tamil Nadu and stayed there between 1979 and early part of 1981, and for these years they had zero.

The SLA had its share of zeros for this criterion but they too predominantly got 1s for their protracted war with the LTTE. I once again abstain from plotting this change with time due to the lack of sufficient variation in the observations. They had 0s early on when the LTTE and other rebel groups were merely targeting police and civilians, but this changed when the SLA was deployed to the north in 1979. The other times when they had 0s were either when the government was negotiating with the rebels with the understanding that they would not launch any military operations against the LTTE (June 28, 1989; September 2, 1994; January 3, 1995; December 21, 2001) or when it partially
suspended its actions against the LTTE as a result of the Indo-Lanka Peace Accord of July 1987.

The third criterion was whether the general perception of the military leadership of the LTTE and SLA was favorable or not. If the general perception at the time was that the military leadership was waging the war in the "right manner," then that group got a 1 and a 0 otherwise. I obtained my data for this from Swanmy (2002) and Facts on File. I will not plot these changes for either group but will explain the sources of the variation that I observed in my data.

The general perception of the LTTE leadership between 1979 and December of 1982 was fairly unfavorable, although "the boys" as all the rebel groups were called by the Tamil political parties at the time (mainly the TULF), were highly regarded for the potential that they had. This was due to the SLA onslaught that drove away all the rebel leaders to India, and which also took the lives of some in the process. Therefore, they had 0s during this time period. The general perception of the LTTE was also quite unfavorable, both within the Tamil community in Sri Lanka as well as those abroad, when the LTTE waged war first on TEO, then PLOTE and finally EPRLF (between April 1986 and April 1987) in their attempts at consolidating rebel leadership. During these times I gave the LTTE leadership a score of 0.

Other than these two times, there were three other groups of incidents that cast doubts on the infallibility of the LTTE leadership. The first when SLA seized many parts of the north during 1987 when they launched "Operation Liberation." This pattern was also

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repeated as SLA launched “Operation Leap Forward” in June of 1995, when for the first
time SLA took control of Jaffna, the rebel main city. During these two major SLA
offenses the general population was under the impression that the LTTE leadership had
fallen somewhat from its previously unchallenged position at the top. The second group
of events was due to LTTE being forced to agree to the Indo-Lanka Peace Accord signed
in July 1987. The humiliation of having basically been forced to sign a peace accord that
they were not at all thrilled about created a sense of disillusionment about the LTTE
leadership among the population in Jaffna. The third and final group of events was
related to countries that once supported or accommodated the LTTE such as India, United
States, Malaysia, United Kingdom, Australia and Canada. This will be elaborated in my
discussion of TPI later, but this banning created the impression that the LTTE leadership
had isolated itself due to its actions. This perceived isolation was thought of by the
general population as an indication that the leadership was perhaps not living up to its
main objective, of establishing a separate state which is also recognized as such by the
world community. For these events I assigned the LTTE a score of 0. The rest of the
observations had a score of 1.

There was very little variation for the perceived military leadership of the SLA and for
the overwhelming majority of the time they had a score of 1. The first change of this
perception occurred when President Premadasa was killed along with a number of other
civilian leaders on May 1, 1993. The debilitating effect of the loss of the Commander-in-
Chief left the SLA in perceived disarray, although its military leadership was intact. The
second such event happened when the LTTE launched “Operation Unceasing Waves”
(mentioned above) and provided a heavy blow to the SLA and its appearance of having control of the situation in the north. This also happened during further successful operations by the LTTE, including the time they were poised to retake Jaffna from the SLA (in May of 2000). The other event that caused a sense of the SLA not being in control of the situation was when the LTTE attacked the only international airport in Sri Lanka, the Katunayake Airport, and the adjoining military base inflicting millions of dollars in damage for both the official carrier of the nation as well as the army. All of these events got a score of 0 and the SLA had a 1 for the rest of the observations.

The final criterion was whether the military leadership of that group was weakened in some way (killed or hurt in an attack or natural causes etc.). I will tie the discussion of this criterion with that of the overall leadership scores for both groups since the effects of the penalties that I assigned to this criterion can be readily seen when we look at the overall picture. The penalties that were imposed ranged from 0, if no one in the respective leaderships was killed or hurt, to -4 in the rare case when the highest leader of that group is killed or debilitated (fourth-tier). The latter did not happen of course for either of the two military leaderships. I imposed a penalty of -1 if any of the lower level leaders (intelligence officers, battle leaders etc.) were killed or injured (first-tier), a penalty of -2 if an area leader or a rather superior level leader who was not in the inner circle of the leadership was hurt or killed (second-tier). A penalty of -3 was imposed if any of the leaders in the inner circle of that group's leadership was killed (third-tier). Table-6.2 below shows these statistics for both groups.
The columns correspond to the penalties imposed and the number of events that received those penalties. For example, the LTTE had 8 second-tier leaders hurt or killed as opposed to just 1 of the SLA. Overall, the LTTE had a lot more leaders killed than the SLA. This is clear when we look at the leadership fluctuations of the LTTE with time given in Figure-6.5 below. The low score between 1979 and 1981 was because of the reasons explained earlier in this discussion. In July 15 and 23, LTTE top second-tier leaders Seelan and Chellakitti were killed in operations against SLA, and we can see the effects of this in the dips at this time shown in Figure-6.5.

<table>
<thead>
<tr>
<th>Name of Group</th>
<th>Penalty of -1</th>
<th>Penalty of -2</th>
<th>Penalty of -3</th>
<th>Penalty of -4</th>
<th>Total killed</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTTE</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>SLA</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>
On January 9, 1985, SLA killed LTTE second-tier leader Pandithar, who was a close associate of Prabhakaran, and this was a big blow as well. We can see this in the graph above as well. On October 16, 1986, SLA killed LTTE Mannar area commander Victor, another second-tier leader. According to the above graph 1987 was a disastrous year for the LTTE. They had two second-tier leaders, Arpathan and Radha killed, and Kitti, the LTTE second in charge, was hurt in a grenade attack. In October they lost two very high level leaders, Kumarappa and Pulendran. All of these losses are reflected in their leadership scores, and the last one is reflected in the first negative dip (down to -1 in 1987). The second negative dip happened in 1991 when the LTTE lost their second in charge, a third-tier leader, Kita, who was allegedly betrayed by another LTTE leader, Mahattaya. Other than these loses the LTTE leadership fluctuated between 3 (the highest possible score) and 2, with a majority of the observations being in the former.

Figure-6.6 below shows the leadership variations of the SLA with time.
The first major leadership loss for the SLA was that of the third-tier leader, Colonel Ariyaperuma, chief of SLA’s northern command, who was killed in Telipally in Jaffna by a landmine on November 19, 1984. He was the highest ranking SLA officer to die until that point, which was a huge blow to the SLA leadership. This is illustrated by the first dip to 0 in the graph above. The next dip down to 0 was the result of SLA losing its Northern Commander Brg. Gen. Vijaya Wimalarane and Commander of Military Operations against LTTE Maj. Gen. Denzil Kobbedaduwa on Kayts Island. This was the biggest setback the SLA faced in terms of leadership losses. These are shown in Figure 6.6. These were the only leadership losses that the SLA had and the rest of the dips could be explained by the criteria mentioned above. Generally, SLA leadership fluctuated between 3 (the highest score) and 2, mostly remaining in the former level.
6.2.3.2 Sri Lankan Civilian Leadership

I used similar criteria to gauge the Sri Lankan civilian leadership and its changes with time. The first issue was whether there was consensus in government action regarding the war effort. If the government had consensus on its war efforts (it wasn’t split by internal dissension) then it was awarded a 1 and 0 otherwise. The 0 score observations were for most part scattered and small in number. I will not present this in a time-plot but instead elaborate on some of the key findings. The first key dissention that occurred in the civilian leadership was in the wake of the Indo-Lanka Peace Accord, when the Prime Minister of President J.R. Jayewardene’s cabinet, Ranasinghe Premadasa and a few others openly voiced their opposition to the Accord. They were joined in by the opposition at the time, SLFP and a few nationalist groups like the Janatha Vimukthi Peramuna (JVP). The next big change in consensus was during President Chandrika Bandaranaike-Kumaratunga’s first term in office and later during her second term due to her inability to control the situation with the LTTE. Out of 281 total observations for civilian leadership, there were 40 incidents of internal dissent within the leadership from 1975 to July 2003, most were directly related to the war effort, while others were somewhat related.

The second criterion was whether there were any statements, motions or actions taken that unequivocally support the civilian leadership’s stance regarding the war effort. If there were such actions I assigned them a score of 1 and 0 otherwise. I am not plotting this with time since there were hardly any changes from a score of 1. The moments when the government was involved in peace talks or ceasefires (listed above in my discussion
of LTTE leadership) were the only times when the civilian leadership was not actively advocating all out war.

The third criterion was whether the general perception about the civilian leadership was favorable (a score of 1) or not (a score of 0). The score was 1 for the most part, but there were very important exceptions. The first happened in January 1987 when the LTTE started issuing motor licenses in an attempt to legitimize their authority. People were uncertain about the central government’s control of the situation in the north and hence I assigned them a score of 0 for that observation. The second instance of this happened when India, ignoring the Sri Lankan government’s opposition to bringing supplies to the north to ease the problems caused by an economic embargo, airlifted food items in an effort called “Operation Eagle.” The general perception was that the government was impotent to do anything in the face of this apparent intrusion into its domestic affairs. The next key instance was when the government signed the peace accord with India (mentioned before) that was a betrayal of national sovereignty for many Sinhalese in the country. This feeling was reinforced with the increasing presence of the IPKF in the north of the country. The deaths of Northern Commander Brg. Gen. Vijaya Wimalaratne and Commander Military Operations against LTTE Maj. Gen. Denzil Kobbekaduwa (mentioned above) also made people unsure of the civilian leadership’s ability to conduct the war effort at least temporarily. These sentiments were also aired during President Kumaratunga’s first and second terms (mentioned before) which was also in the backdrop of crippling defeats suffered by the SLA at the hands of the LTTE (also explained in the previous parts of this Chapter).
I plot the distribution of Sri Lankan civilian leadership with time in Figure-6.7 below. I also had a fourth criterion, which was the penalty criterion listed above for the military leadership, except for civilian leadership. Likewise, if a lower ranking (first-tier) government official (a mayor etc.) was killed the government was given a penalty of -1, if a minister who was not in a leadership position (such as a minister of reconstruction, education etc.) was killed, the government was given a score of -2, if a minister who was directly involved in the war effort (such as the Defense minister etc. designated as a third-tier leader) was killed then they were given a score of -3, and -4 was assigned to a fourth-tier leader, which in this case was exclusively reserved for the death of the President of Sri Lanka. I present the distribution of the penalty points in Table-6.3 below.

<table>
<thead>
<tr>
<th>Penalty of -1</th>
<th>Penalty of -2</th>
<th>Penalty of -3</th>
<th>Penalty of -4</th>
<th>Total killed</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>18</td>
</tr>
</tbody>
</table>

As Table-6.3 illustrates, the civilian administration lost 18 leaders including a President (President Premadasa). The crippling effect of this is clear in Figure-6.7. For the most part, the scores stayed between 3 (the highest possible score) and 2, but there were a few interesting observations. The first dips (down to 0) were during the Indo-Lanka Peace Accord, when there was hostility to the Accord and the handling of the situation by the government. The next big dip occurs on March 2, 1991, when Deputy Defense Minister Ranjan Wijeratne was assassinated by the LTTE. The crippling effect of his loss is apparent from Figure-6.7.
The biggest dip (down to -3) happened when President Premadasa was killed on May 1, 1993. The latter two dips down to a score of zero correspond to President Kumaratunga being injured in a bomb blast December 18, 1999, and when Minister C.V. Gunaratne, the Industrial Development Minister, but at a time when the country’s perception of the civilian leadership was unfavorable. As of 2001, the leadership has been strong and stable, as is clear from a consistent score of 3.

For both military and civilian leadership I added up the scores from all the criteria and used this raw score as the respective civilian and military score for that group for that observation.
6.2.4 Third Party Intervention Variable

This variable posed fewer problems than the leadership variable, and I relied on *Facts on File* reports and Swamy (2002) for the data. I describe the four types of TPI (economic, military, political and technological) individually for both groups in the discussion below. For every type of TPI, once a type of aid is mentioned I assumed that the aid was continuously provided until the services were terminated from that source. I had to make this simplifying assumption since the data sources were not explicit in their news reports.

6.2.4.1 International Economic Assistance

I used the number of sources (state and non-state) of international economic aid as the criterion for measuring the international assistance extended to both the SLA and LTTE. I could not find numbers for the official sources of financial assistance given to the government, hence the SLA, so I dropped this variable for the SLA. I was only interested in sources of aid that were explicitly for the war effort on the respective side, and the distribution of the number of sources of economic assistance with time for the LTTE is given below in Figure-6.8. The y-axis represents the number of foreign donors of financial assistance to the LTTE.
According to the reports, India started financially assisting the LTTE, even though they publicly denied any direct involvement in the conflict. My data indicates that this started as early as July 1983, in the aftermath of the anti-Tamil riots that gripped the country.

In June of 1984, reports started coming in that the Tamil groups in the United Kingdom were providing the LTTE with financial assistance, and as a result the number of sources jumped to 2 at this point in time. In July of 1987, Indian Prime Minister stopped LTTE’s funding from India in the wake of the Peace Accord with the Sri Lankan government. The aid from India finally stopped in 1991 when the LTTE was implicated in the assassination of former Indian Prime Minister Rajiv Gandhi on May 21, 1991. With the
United Kingdom banning them in 2001, their international financial assistance dropped to 0 according to my dataset since I was only able to get information on two sources.

I do not have any information on the largest source of LTTE financial assistance from abroad, diaspora aid, as well as other less known sources of foreign aid. The main reason for this was the fact that it wasn't reported in either of my main sources. This is an area of increasing research at the moment, and as more information is brought to light I will incorporate these to my database and improve my model.

6.2.4.2 International Military Assistance

I tried to capture direct military intervention with this variable which is therefore composed of two parts: the first is aid in terms of soldiers to fight for either one of the groups. This would encompass both official foreign forces or foreign militia or mercenaries. The second component was training from abroad. The total number of aid for both types of intervention was the score allotted to a group for a given observation. I first explain this variable for the LTTE and then proceed to the SLA.

LTTE international military intervention is plotted in Figure-6.9 with time. Once again the number of military sources is on the y-axis.
As Figure-6.9 shows, the LTTE started off with training from one source (The Palestinian Liberation Organization (PLO), which trained not only the LTTE but also TELO and other groups in their training camps in Lebanon) in 1979. Then retired Indian military officers started training Prabhakaran and others in New Delhi and elsewhere, when they fled due to the operations carried out by SLA in 1979 to 1981. This was done with the full knowledge of the Indian government. Indian influence intensified when Tamil youth from India started to arrive in boats and fight alongside other rebel groups. This was after 1984, and the spike from 2 to 3 represents this progression of events. The decline in military assistance in 1985 coincides with India’s attempts at trying to control the overwhelming support the LTTE and the cause of Eelara was enjoying from Tamil Nadu. Then in anticipation of the Peace Accord, Prime Minister Gandhi asked the Indian external intelligence agency Research Analysis Wing (RAW) to cut back on the training
it was providing the LTTE in 1987. Thus the LTTE had only one training source, according to my data, the PLO.

Figure-6.10 below shows the number of international military assistance sources (y-axis) with time for the SLA.

![Figure 6.10 - SLA International Military Assistance with Time](image)

According to the data, the SLA started receiving foreign aid of military nature around 1987 (*Facts on File* did not mention the exact dates so I assumed it was during this time), when it was reported that British mercenaries were training the SLA. There was a clause in the Indo-Lanka accord that attempted to control this foreign military intervention in Sri Lanka, much to the chagrin and opposition of many Sri Lankan government officials. With the breakdown of the Peace Accord, India cracked down on the LTTE and started
providing training to the SLA as well. Since they were fighting the LTTE on behalf of the SLA, I counted this as an intervention for the SLA, and thus the number of sources jumped to 3 after the latter part of 1987.

This was short-lived however, when the IPKF reached a ceasefire agreement with the LTTE and later withdrew from the country. Yet India continued to train the SLA, while also training the LTTE until the latter was proscribed in India in 1991. India agreed to provide military support in terms of naval vessels to the SLA when they requested assistance in June of 1995. Later India withdrew its forces and merely provided training to the SLA when they requested it.

This dataset is very small as one can see but as I explained in the discussion concerning economic aid, it was all the information that I could tease out from the two sources that I examined. It will certainly be worthwhile to expand the dataset, not only for our modeling purposes but also to see the different sources of military aid that is available for governments as well as insurgent groups.

6.2.4.3 International Political Support

In order to qualify as international political support, the source had to meet one of two criteria: it either had to pass resolutions or make statements agreeing with one of the two parties to the conflict, or it had to take actions that favored one of the two groups. I

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follow the same format as before for international political support as well, first showing my results for the LTTE followed by those for the SLA.

Figure 6.11 below shows the foreign political support for the LTTE with time. The y-axis is the number of sources of political support.

Figure 6.11 shows more variation than the other figures, and the first source of aid was India in 1981 when they sympathized with the Tamils in Jaffna and gave the rebel leaders a safe haven during this time. Under Prime Minister Indira Gandhi, India was more vocally supportive of the rebels’ quest for a separate state, and hence their support rose in India. This vocal support changed in March of 1985 while P.M. Rajiv Gandhi (Indira Gandhi’s son) was premier, when he openly said that India did not support the rebel
cause. Yet, India trained and equipped the rebels and thus acted on behalf of them nonetheless. From then on India had a love-hate relationship with the LTTE, embracing it especially in the face of SLA successes and all the while trying to remain in control of them. This was clear in 1987 when in the aftermath of "Operation Liberation," India insisted that it would not let the rebel stronghold fall, and started arming and supporting the LTTE. With the advent of the Peace Accord and IPKF involvement, India stopped politically supporting the rebels.

Figure-6.12 shows the SLA political support with time. The x-axis is the number of sources of international political support for the SLA. Any support for the Sri Lankan government in its war against the LTTE was of course support for the SLA. India was one of the first countries to call for a political solution to the conflict and denounce separatism. They were later joined by the United States under President Reagan in 1984, Italy in 1985, and then the seven members of the South Asian Association for Regional Cooperation (SAARC) in December 1985. Malaysia banned them in 1996, thus directly expressing its support of the SLA while the United States followed it in 1997, and then Canada, Australia and UK in 2001. Since they supported in resolutions as well as actions, this greatly helped increase the number of sources that supported the SLA, as the Figure shows.
In reality, the political support for the LTTE stems not merely from governments who are sympathetic to their cause but by non-state actors who often lobby governments. I could not find information on these, but I am hoping to incorporate this type of support into my study in the future.

6.2.4.4 International Technological Assistance

International Technological Support for both groups was defined again by one of two criteria: one was whether a source gave weapons and armaments to one of the groups. The other criterion was whether a particular source gave intelligence to one of the combatants. The number of sources of that particular form of technological aid represented that group’s technological TPI. The sources given below are but a few of the
sources from which both these groups obtained weapons and intelligence, but I could not find reliable, objective sources from which to get more information.

Figure 6.13 graphs LTTE's technological aid sources with time. The number of technological sources is on the y-axis.

India was the first source that I could find who clearly gave weapons and intelligence to the LTTE in 1983. Later in 1985, LTTE purchased arms from Singapore. Then in 1987, RAW was asked to stop helping the LTTE prior to the Peace Accord between India and Sri Lanka. After IPKF started clashing with LTTE, India stopped supporting them in any fashion. Then in 1994, the LTTE bought anti-aircraft missiles from the Ukraine and
although there were rumors of many other sources, I could not find solid information to incorporate these into the dataset.

Figure 6.14 below plots the SLA's number of sources of international technological assistance (y-axis) with time.

According to Figure 6.14, the SLA did not receive any technological assistance till 1985, when they bought weapons from Jordan in 1985. This was increased in February of 1985 when the British government let Sri Lanka buy armaments from a British company using British government credit. Then in 1985 SLA got naval equipment from Israel, which caused quite a controversy within the political administration, since the government had broken off ties with Israel in 1972. The same year they got more arms from China and
Pakistan. In 1987, when RAW was helping the LTTE, it started secretly providing SLA with intelligence about LTTE weaknesses. In 1987 Sri Lanka obtained intelligence from Israel and Pakistan. In 1995, SLA purchased arms from Russia.
Chapter 7 - Regression Results and Discussion

This section is divided into two sections: the first deals with equation (9a) and its specifications for the rebels. The second section deals with equation (9b) and its different specifications for the SLA. For both groups I first tried simple OLS methods of regression, and it soon became apparent that the Linear Probability Model (LPM) was not suitable for my needs. I tried logit specifications which were clearly more suitable for the types of variables that were involved. The estimation for the SLA is the exception, since logit was unable to run most of the models due to the fact that there was a small sample size (26 observations) and most of the variables did not show enough variation for logit to capture. I present LPM (estimated using Excel and Stata) as the first step since I used it to gauge the relationships. Therefore, I am only interested in the general magnitudes and directions of the coefficients and not on predictions derived from these LPM models. For all the tables I present the variable coefficients followed by their t-statistics (for LPM models, Tables 7.1 and 7.3), and z-statistics (for logit models estimated using Stata, Tables 7.2 and 7.4). The values in italics in Tables 7.2 and 7.4 are the marginal effects associated with the respective variables, and their significance values are in parentheses.

7.1 LTTE Battle Success

The results of equation (9a) are given in Table 7.1 below using LPM and logit. Although we could use LPM for the limited dependent variable model that I am estimating, it is frequently the case that heteroskedasticity will be a problem. Wooldridge (2000, p. 236) mentions this, and to check for this I carried out Breusch-Pagan tests for
heteroskedasticity on the primary LPM models (Table-7.1, Models 1 and 2). There was serious heteroskedasticity, but since the main models are the logit models (Table-7.2, Models 1 and 2) I decided against correcting for them. I follow this procedure for all LPM specifications.

Table 7.1 - LTTE – Dependent Variable-Mission Accomplishment Score (LPM)

<table>
<thead>
<tr>
<th>Number of observations</th>
<th>Linear Probability Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
</tr>
<tr>
<td><strong>Intercept</strong></td>
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</tr>
<tr>
<td></td>
<td>(4.81)</td>
</tr>
<tr>
<td>moreLTTE</td>
<td>0.29**</td>
</tr>
<tr>
<td></td>
<td>(2.58)</td>
</tr>
<tr>
<td>leadLTTE1</td>
<td>-0.12</td>
</tr>
<tr>
<td></td>
<td>(-0.67)</td>
</tr>
<tr>
<td>leadLTTE2</td>
<td>-</td>
</tr>
<tr>
<td>leadLTTE3</td>
<td>-0.22</td>
</tr>
<tr>
<td></td>
<td>(-1.50)</td>
</tr>
<tr>
<td>LTEEconAss</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td>LTEmilAss</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td>LTTEpolSup</td>
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<tr>
<td></td>
<td>(-1.72)</td>
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<tr>
<td>LTTEtechAss</td>
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<td></td>
<td>(0.56)</td>
</tr>
<tr>
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<td>-</td>
</tr>
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<td>-</td>
</tr>
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<td></td>
<td>-</td>
</tr>
<tr>
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<td>-</td>
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<tr>
<td>R-squared</td>
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125
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<th>Number of Observations</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
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<th>Model 7</th>
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</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.15 (1.26)</td>
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<td>3.06 (1.69)</td>
<td>1.71 (1.03)</td>
<td>3.63 (2.06)</td>
<td>4.20 (2.57)</td>
<td>1.22 (1.65)</td>
</tr>
<tr>
<td>lntotalLTTE</td>
<td>2.50** (2.14)</td>
<td>2.36** (2.07)</td>
<td>2.30** (2.10)</td>
<td>2.08*** (1.99)</td>
<td>-</td>
<td>-</td>
<td>2.21** (2.14)</td>
</tr>
<tr>
<td>leadLTTE1</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>leadLTTE2</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>leadLTTE3</td>
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<td>-0.75 (-0.60)</td>
<td>-0.03 (-0.60)</td>
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<td>-0.06 (-1.41)</td>
<td>-0.03 (-1.41)</td>
</tr>
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<td>LTEeconAss</td>
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<td>0.002 (0.03)</td>
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<td>-0.03 (-0.38)</td>
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<tr>
<td>LTEenlAss</td>
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<td>-</td>
<td>-0.06 (-1.33)</td>
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<td>-</td>
<td>-0.86 (-1.42)</td>
<td>-1.47 (-1.47)</td>
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<td>LTEepollSup</td>
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<td>-1.17 (-1.21)</td>
<td>-0.09 (-1.13)</td>
<td>-0.52 (-0.73)</td>
<td>-1.55* (-1.75)</td>
<td>-0.12 (-1.88)</td>
<td>-</td>
</tr>
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<td>LTEtechAss</td>
<td>0.85 (1.06)</td>
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<td>-</td>
<td>-</td>
<td>0.59 (0.85)</td>
<td>0.05 (0.80)</td>
<td>-</td>
</tr>
<tr>
<td>Prevent Correctly Predicted</td>
<td>0.94</td>
<td>0.94</td>
<td>0.93</td>
<td>0.93</td>
<td>0.92</td>
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<tr>
<td>Pseudo R-squared</td>
<td>0.28</td>
<td>0.24</td>
<td>0.22</td>
<td>0.19</td>
<td>0.12</td>
<td>0.07</td>
<td>0.16</td>
</tr>
</tbody>
</table>
7.1.1 Morale of LTTE

Table 7.1 shows that morale of LTTE has a positive, very significant affect (at the 0.05 significance level) on battle success in the LPM models. My main models (Models 1 and 2, Table-7.2) have all the variables (interaction terms not included). The percent correctly predicted for the latter models were very high (0.94 each) compared to the pseudo $R^2$-squared value of 0.28 and 0.24 respectively. One should not put too much emphasis on this latter measure, but it was convenient when it came to selecting which models had predictive power. The log-likelihoods of Models 1 and 2 were the lowest (-11.29 and -11.89) again indicating that from all the models these was the most preferable.

From Model-1 of Table-7.2 it is clear morale is very significant (at the 0.05 significance level) and positive. When morale changes from low morale (a value of 0) to high morale (a value of 1) ceteris paribus, the marginal effect is 0.28. That is, the probability of winning a battle in which the LTTE attacked goes up by 28 percent when other things are held constant. This is a very significant increase in probability. Model specifications 2, 3, 4, and 7 in Table-7.2 show that the probability of winning goes up by 27 percent, 27 percent, 29 percent, and 28 percent respectively when morale goes from low to high ceteris paribus, at a significance level of 0.05. For Model-4 this is true at the 0.01 percent significance level. These findings also agree with the Rotte and Schmidt (2003) study for determinants of war in a cross-section of interstate conflicts. They find that morale is very significant as a predictor of battle success. Many military studies (DuBois et al., 1998 for example) maintain this assertion for interstate conflict, though there is a dearth
of empirical papers on the subject. We can assume that the same result should hold true for civil conflicts, although this has yet to be empirically validated elsewhere.

The correlation coefficient between mission accomplishment score and morale_LTTE is 0.35, which is moderately high. We get Figure-7.1 when we plot LTTE mission accomplishment score (MAS) with their changes in morale. The y-axis is the MAS, and this varies from 0 (if the LTTE lost a battle in which they attacked) to 1 (if they won such a battle). The x-axis is the morale dummy, with 0 designating a low morale and 1 a high morale. There are fourteen transition points in morale_LTTE, seven of them corresponding to morale falling from a high level to a low level.

According to Figure-6.3 presented in the last section, LTTE morale fluctuated constantly between 1975 and 2003. Even though my limited dependent variable observations were
scattered as they were, I was still able to see the impact of morale on combat success very clearly. We had a clear indication of a positive relationship between morale and battle success in Table-7.1, when all of the LPM models indicated that morale was positively significant, and this was later confirmed by the primary testing method, the logit specification. This is the relationship that we would expect, and it is very robust in the face of all linear and logit specifications.

7.1.2 Leadership of LTTE

LeadLTTE1 and LeadLTTE2 were insignificant in all the logit specifications and therefore I omitted them from Table-7.2. LeadLTTE3 was negative in Models 1 and 2 of both tables and remained so in all the other specifications as well. In Models 1, 2, 5, 6 and 7 of Table-7.1, LeadLTTE1 and LeadLTTE3 were insignificant, and yet have the opposite sign of what we would expect. It says that when the LTTE changes its leadership from 0, which is the base level, to either 1 (LeadLTTE1) or 3 (LeadLTTE3), which is the highest possible level, it will decrease their probability of battle success. Model-1 of Table-7.2 says the same thing for the latter. This result is very puzzling since the military literature clearly maintains that leadership has a positive and significant effect on battle success. Although this is stated in interstate conflict cases, one can infer that the same ought to hold in a civil conflict. This should definitely be the case for the LTTE that does not have a strong civilian body to exert any influence over the military leadership led by its supremo Prabhakaran.

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The only explanation that I could think of is related to my database, specifically the relationship between the 45 dependent variable observations for the LTTE and the leadership dummies. The relationship between leadership changing from 0 to 1 and the change in mission accomplishment scores are given in Figure-7.2. The y-axis is the MAS that varies between 0 (if LTTE loses a battle that they initiated) and 1 (if they win the battle), and the x-axis is leadership change from a base value of 0 to a ranking of 1, designated as leadLTTE1 (a binary variable).

As is clear from Figure-7.2, there is a lack of sufficient mission accomplishment score changes that accompany leadership changes. The leadership changes from 0 to 1 only thrice in the data, and on four occasions the mission accomplishment score fell from 1 to 0. The leadership structure going up (from 0 to 1) corresponds to only one change in battle success, which is in fact a loss (from a mission accomplishment score of 0 to 1). There are weak corresponding changes in mission accomplishment score for the other six
changes in leadership. That is the reason for a weak negative correlation between a leadership change from 0 to 1 and the MAS in the LPM models. It also explains the insignificant effect of this variable on battle success in the logit models. The correlation coefficient is -0.04, which is extremely weak.

LeadLTTE3 was insignificant and negative in all models in Table-7.2, and the same is true for the LPM specifications. This is a very counter-intuitive result, more so than the change from 0 to 1 being insignificantly negative, since we would definitely expect such a drastic leadership change to be accompanied by significant increases in battle success. My findings cannot be defended by any existing military literature or otherwise.

The only explanation that I can come up with pertains to the variation in LeadLTTE3 in my final data, much like the explanation for LeadLTTE1 given above. This type of inadequacy in observations is seen when we plot the leadership change of LTTE from 0 to 3 against the accompanying MAS. Figure-7.3 below represents this graph.
The mission accomplishment score is as before, and the leadership change is the change in leadership structure from the base ranking, which is 0, to the highest possible ranking, which is a 3. LeadLTTE3 is a dummy variable that shows a change in leadership from 0 to 3 by a corresponding change from 0 to 1. There are a total of five leadership changes from a score of 0 to a 3 (a corresponding change in LeadLTTE3 from 0 to 1), and in three of these changes the LTTE were in a winning streak. The two observations that do capture a change in mission accomplishment score (second and third such observations from left to right in LeadLTTE3) show that the mission accomplishment score fell from 1 to 0 at these times. In the two observations when LTTE leadership changed from 3 to 0 (a corresponding change from 1 to 0 in leadLTTE3), one of them corresponded to a change in the mission accomplishment score from 0 to 1. I.e., the LTTE recorded battle successes when their leadership was falling from the highest possible ranking to the lowest. That is why we observe an insignificant negative correlation between LeadLTTE3 and battle success (correlation coefficient is -0.07). It is also why we see
LeadLTTE3 having a negative sign throughout all the models in Table-7.1 and, more importantly, why LeadLTTE3 is insignificantly negative in all the logit specifications.

I might have been able to capture the rich dynamics shown in Figure-6.5 in the last section (how LTTE leadership fluctuated) if my battle observations were not as scattered as is evidenced by Figure-6.1 (also in the last section). It would be interesting to see if this negative relationship holds in the presence of superior data.

I first suspected that the emergence of a negative relationship between LeadLTTE1, LeadLTTE2, and LeadLTTE3, and the MAS was due to the coding criteria I used to capture both LTTE and SLA leadership. I designated the loss of LTTE leadership members (as was explained in the data discussion Chapter), due to operations or otherwise, from a scale of -1, where just a lower level leader such as an intelligence commander is killed, to a value of -4, where the top leader, in this case Prabhakaran, was killed (he is alive and well). This criterion was one of the four that I used, along with whether there was consensus in LTTE action (1 if yes and 0 otherwise), whether there were any statements made, resolutions passed, or actions taken (in this case fighting the SLA) that were unequivocal in their intent to wage war (1 if yes and 0 otherwise), and whether the general perception of the LTTE leadership was strong or not (1 if yes and 0 otherwise). All of these were discussed in the previous Chapter.

The inclusion of this penalty might cause unintended consequences, and to check this I ran several other models (not presented in the tables above). In these models, I labeled
the leadership score from just the last three criteria mentioned above LeadnewLTTE, while LeadweakLTTE was the dummy that captured the effects of the debilitating of leadership (the penalty criterion). Out of all the fluctuations in leadership seen in Figure-E, only penalties corresponding to -2, or where LTTE area commanders who are not in the LTTE inner committee are killed, were applicable to our data set due to the limitation of dependent variable observations. I assigned each such observation a 1 if such a leader died and 0 otherwise when I coded LeadweakLTTE. In every case the effects of this separation, and the relationship between the two, were insignificant. This is what led me to conclude that it was indeed the data and not necessarily the coding criteria which is misleading, indeed if the relationship between leadership and battle success of an Attacker is positive.

7.1.3 LTTE International Economic Assistance

The variable that captures third party intervention in the form of financial aid, LTTEeconAss, is very insignificant in every specification in both LPM and logit specifications as is evidenced by all the models presented in Tables 7.1 and 7.2. Their signs are a bit curious though. We would expect the relationship to be positive, since the more sources of economic aid a rebel group obtains the more it can spend on its war machinery. The thing to remember is that my data for TPI were very limited, especially in the form of economic assistance to LTTE. The bulk of LTTE economic assistance is coming in the form of diaspora contributions especially in countries like Canada and Australia (before the LTTE were banned in them). I could not find a data source that provided me with estimate sources of these diaspora contributions with initial and end
dates, so I could not incorporate these to my model as I explained in the last Chapter. Therefore the main financial contribution data that I had were the ones reported in the news and in Swamy (2002), which were mainly through open sources like states (in the case of India) and a handful non-government organizations. These were given in Figure-6.8 (last Chapter).

Figure-7.4 plots LTTE international economic assistance with battle success. The y-axis is the battle success score as before and the x-axis is the number of international sources contributing to the LTTE financially. My battle observations attempt to capture all of the six changes in the number of sources of international economic assistance (according to my data) to the LTTE between 1975 to July 2003.
The correlation coefficient between LTTEconAss and the mission accomplishment score is -0.15. Out of these six changes, only one (a change in the number of sources from 2 to 1) corresponds to a change in mission accomplishment values, in this case from 1 to 0, which probably explains the small negative correlation coefficient. It also explains the same effect in all of my model specifications.

Byman et al. (2001) state that “The scale of contributions derived from the diaspora community is intrinsically related to LTTE effectiveness in the battlefield. Following setbacks and defeats, donations typically fall and may have to be coerced from the migrant community. In the wake of major military victories, however, there is likely to be a surge of voluntary, even enthusiastic, financial support, including the proffering of mass spontaneous contributions far in excess of the expected minimum war tax” (p.51). This is apparent in Figure 6.8 when we see large spikes between 1981 and 1985, which was the beginning of major scale insurgency and overwhelming Indian support. We also see that towards the end of 1987 when LTTE launched “Eelam War II” and within weeks had stranglehold on Kilinochchi, Vavuniya, Mullaitivu and Mannar districts.

Byman et al. (2001) also mention that more economic aid from abroad does not necessarily have to translate into more battle success, although they do not present an empirical case for this assertion. However they are clear when they say that, “... the LTTE enjoys strong political support among Tamils in Sri Lanka and commands considerable resources. Thus, it requires less outside support and, even if this were cut off, probably would still remain a potent, if diminished, political and military force” (p.
43). This might be an explanation why LTTE battle performance is not significantly positively related to international financial assistance. It also has many implications if this insignificant relationship persists in the face of better data, which I elaborate in my conclusion.

7.1.4 LTTE International Military Assistance

According to Models 3 and 5 of Table-7.2, LTTEmilAss is insignificant but negative, and in every specification that I tried it remained insignificant, the sign was robust as well. In the LPM models I discovered similar insignificance. Although LTTEmilAss is insignificant in Model-7 of Table-7.1, and in nearly all the LPM models that included this variable for that matter, the overwhelming trend is to be negative in direction. One would expect third party military intervention in the forms of either directly providing fighting troops or training the rebels to have a strong, positive effect on battle performance. Yet, the military literature mentions that the effect of this aid is ambiguous. We would expect that international military assistance in the form of training would make a big change in the battle effectiveness of a group that is just starting its insurgency. Indeed, I feel that if I had battle information during the time LTTE was getting training from PLO and RAW during its infancy, I might have been able to catch some of these effects. It is also feasible that since battle dynamics are so complicated, the boost in performance of a foreign military intervention on the battle performance of an already battle-hardened insurgent group might be insignificant. The same would go for retreating military support from such a group.
There is some evidence to support this latter assertion in the limited battle related data that I have. According to Figure-6.9, military assistance to LTTE rose during 1979-1983 from 1 source to 2 sources, and then from 2 sources to 3 sources during 1984-1985. The overwhelming majority of this aid came from India, which was clandestinely training, harboring, and providing Tamil fighters for LTTE while overtly denying the accusations voiced by the Sri Lankan government. When LTTE started battling IPKF in the fall of 1987, India cut back aid but by then LTTE would have had all the training that they required, and hence it might not have made such a big difference. This is clear from Figure-7.5 below, which shows that there weren’t significant losing streaks after ties were severed from India.

Another possible reason for the insignificant relationship between LTTEmilAss and battle success was provided by the Byman et al. (2001) paper that I cited before. It suggests that even though international military assistance is cut back, the LTTE is able to function due to its extensive support structure that transcends merely state-sponsored aid. The implications of this are staggering as I will elaborate in the next section. Since I don’t have data for other sources of military assistance, it distorts my analysis and therefore this result should be interpreted cautiously.

Another reason why I am not observing any significant effects, if there are any, is due to the way the data is clustered around battle observations. I plot LTTE international military assistance versus their MAS in Figure-7.5 below. The correlation coefficient
between these two variables is -0.20, showing a weak negative correlation. The x-axis is the number of sources of military assistance, and in my data they ranged from 0 to 3.

Since I don’t examine the battles between the LTTE and IPKF, there is a gap between the battle observations of SLA and LTTE from 1987 to 1990, which is when the IPKF withdrew officially. Therefore, it is hard to gauge the real effect of all those years of Indian military assistance (from 1983 to July 1987, as far as I could find) on LTTE battle success, immediately post-assistance. As mentioned above, I also don’t have enough information on numerous other military aid sources available to the extensive LTTE structure. Therefore, this result warrants further analysis with superior data.
7.1.5 LTTE International Political Support

As was the case for all but one of the TPI variables for the LTTE, LTTEpolSup is negative but at times significant at the 0.10 percent significance level. In Table-7.2, all models show this as being negatively related to battle success, while it is also the case for all models in Table-7.1. In Model-1 of Table-7.2, when political support for the LTTE goes up by one more source, their probability of winning a battle in which they were the Attacker falls by 9 percent at the 0.10 percent significance level. According to Model-5 (Table-7.2), this probability falls by 12 percent at the same significance level. This pattern is also clear from Table-7.1, in which Models 1 and 5 show that the LTTE battle success is negatively (significantly at the 0.10 percent significance level) related to LTTEpolSup.

Although there have been no empirical studies done on this link in civil wars to my knowledge, I am unsure as to the direction and significance of this aspect of TPI. One can argue that the more broad based political support an insurgency has, the better its chances of success, which in turn translates into better battlefield performance. Yet for a group like LTTE which is involved in illegal activities such as drug smuggling, human trafficking, and extortion (all of these accusations are highlighted in Byman et al., 2001), the lack of overt political support might not be as detrimental as one might think.

Given the paucity of my observations for this variable I cannot rule out data inadequacy as being the cause of such inconclusive results. I got a sense of this when I plotted international political support for LTTE vis-à-vis their mission accomplishment scores in
Figure 6 below. Once again the number of political sources that openly supported the LTTE is on the x-axis. Out of fifteen changes in international political leadership shown in figure 6.11, only eight are covered in figure 7.6 below. If the data were not clustered in the way they were for my battle success variable, I might have noticed some significant relationship between international political support and the MAS of the LTTE. The correlation coefficient between LTTEpolSup and battle success is just -0.20.

Another main reason why I might not correctly capture the international political consequences in the battle field performance of LTTE might have to do with my coding of this variable. As I mentioned in the preceding section, when I was coding for political support I asked the following question, “Does this action support the particular group or not?” If an action (I only counted the reports of state actions and not political support of non-state actors) was for a group, I counted it, but if it was opposing the group I counted
it as only as a plus for the other group instead of also penalizing the first group. In my data, examples of such observations were Italy cracking down on LTTE sympathizers selling heroine to fund the war effort, India banning LTTE in 1999, Malaysia banning LTTE in 1996, United States banning it in 1997, and the United Kingdom, Australia, and Canada banning it in 2001. This might have introduced a certain bias, since political action taken against an insurgent group such as the LTTE will probably be disproportionate to that taken against the government of a nation-state. I wasn’t sure how to control for this, and therefore I opted to simply exclude a penalty criterion.

From an observational standpoint, losing the support of countries like Canada, which, according to Byman et al. (who cite Rohan Gunaratne who is an expert on the LTTE organizational structure abroad) contributed as much as $6.5 million between October 1998 and October 1999, was a crippling blow to the LTTE. London was the international headquarters of the LTTE and the British proscription undoubtedly hurt the LTTE. This could very well be why the LTTE declared its intentions to seek a peaceful solution to the conflict after Australia, UK and Canada banned them in 2001. It was also in the aftermath of September 11, when the US was threatening war against “international terrorism” everywhere. This link between international political support and battle performance of the LTTE should be examined carefully, as I explain in my conclusion.

7.1.6 LTTE International Technological Support

The final component of TPI was technological assistance, strictly in terms of both arms and ammunition to the LTTE or military intelligence. In Models 1 and 5 of Table-7.1,
this is positive but very insignificant, while in Models 1 and 5 of the logit specifications LTTEtechAss is insignificant and positive as well. The sign is always positive in direction, which is what we expected. It is clear in the literature (military) that there should be a rise in battle performance corresponding to an increase in technological assistance. This result holds true mostly in interstate war cases, and one could assume it would be as significant in a civil conflict as well since in both instances enhancement of weapons and intelligence capabilities would be invaluable for battle success.

The statistical insignificance in LTTEtechAss is mainly due to my data distribution. For example, there were reports that LTTE were obtaining arms from a host of sources, but since the reports lacked adequate elaboration they were not conducive for our purposes and I had to omit them. The lack of a significant positive relationship between these two variables could thus be attributed to the lack of data on both the regressor and the regressand. This is also clear when we plot the relationship between LTTEtechAss and battle success, which is given in Figure-7.7.
The x-axis is the number of sources of technological assistance and ranged from 0 to 3 in the data that I was able to obtain. The correlation coefficient between mission accomplishment score and LTTEtechAss was once again extremely small, but strangely negative (-0.01). As we look at Figure 7.7 we see that the lack of battle observations in and around the turning points of LTTEtechAss is the reason why there is a poor relationship between these two variables. Only one battle observation coincided, and that was the last change in which LTTEtechAss rose from 0 sources to 1 source while LTTE battle success rose immediately before it.

7.1.7 Further Comments

In all model specifications, both logit and LPM, the interactions terms are insignificant and therefore dropped from this discussion. Morale seems to be significantly positive at the 0.05 percent significance level for all specifications while the leadership dummies
were very insignificant at the 0.05 percent significance level, yet negatively. The TPI variables showed considerable multicollinearity. LTTEmilAss was significantly correlated with the other TPI variables, and LTTEconAss was correlated with LTTEtechAss. The correlation coefficients between LTTEmilAss and LTTEconAss, LTTEpolSup and LTTEtechAss were 0.60, 0.73, and 0.59, which were all rather significant correlations. Therefore, I did not use LTTEmilAss with any of the other TPI variables in the same model. In fact, LTTEmilAss is insignificant (though negative, as can be seen in Table-7.1, Model-7 and Table-7.2, Models 3 and 6), as was mentioned before and explains little of the variation in the battle observations. The correlation coefficient between LTTEconAss and LTTEtechAss was 6.60, again rather high, and therefore I made sure that I did not use these two regressors together in the same equation.32

As an end note to Table-7.1, the goodness-of-fit measure (R-squared) being consistently low shows that not enough variation in the dependent variable is captured by our regressors in all specifications. The R-squared for my main LPM models (Models 1 and 2, Table-7.1) are 0.22 each, which is rather low, but is to be expected in a binary analysis using a LPM. The rest of the specifications had even lower predictive power. The logit models followed the same general pattern, with very low pseudo R-squares again indicating that very little variation is captured by my models. Models 1 and 2 of Table-7.2, which were my models of interest, had the lowest log-likelihoods (-11.29 and -11.89

32 If I had not made this correction, LTTEmilAss does not change the sign of any of the other TPI variables but it does make LTTEpolSup, which is significant at the 0.10 percent level in some models, insignificant.
respectively) and highest pseudo R-squared values (0.28 and 0.24). This was another indication that these two were the best of all the models that I estimated.

### 7.2 Sri Lankan Army (SLA) Battle Success

<table>
<thead>
<tr>
<th>Table 7.3: SLA – Dependent Variable-Mission Accomplishment Score (LPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of observations</strong></td>
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<tr>
<td><strong>Models</strong></td>
</tr>
<tr>
<td><strong>Intercept</strong></td>
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<tr>
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<tr>
<td>Lead3-Civ</td>
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<tr>
<td>Lead3-Mil</td>
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<td>SLApolislup</td>
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<td>R-squared</td>
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### Table 7.4 - SLA – Dependent Variable-Mission Accomplishment Score (Logit)

<table>
<thead>
<tr>
<th>Number of Observations</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
<th>Model 7</th>
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<td>-1.39</td>
<td>-0.69</td>
<td>-0.27</td>
<td>1.39</td>
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<tr>
<td>(0.78)</td>
<td>(0.35)</td>
<td>(-0.76)</td>
<td>(-0.57)</td>
<td>(-0.26)</td>
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<tr>
<td>moraleSLA</td>
<td>3.81</td>
<td>2.73*</td>
<td>1.77*</td>
<td>2.59*</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>(1.48)</td>
<td>(1.69)</td>
<td>(1.93)</td>
<td>(1.89)</td>
<td>(1.91)</td>
<td>-</td>
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<tr>
<td>leadSLA-Civ</td>
<td>0.71</td>
<td>0.59</td>
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<tr>
<td>(1.79)</td>
<td>(1.48)</td>
<td>(2.06)</td>
<td>(1.91)</td>
<td>(1.91)</td>
<td>-</td>
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<td></td>
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<tr>
<td>SLA militar</td>
<td>-</td>
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<tr>
<td>(0.51)</td>
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<td>SLA tech</td>
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<td>(-1.70)</td>
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<td>SLA morale*lead3-Mil</td>
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<td>-</td>
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<tr>
<td>-0.14</td>
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<td>SLA morale*militarian</td>
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<tr>
<td>-0.06</td>
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<td>SLA morale*militarian</td>
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<td>-0.06</td>
<td>(0.83)</td>
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<td>SLA morale*militarian</td>
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<tr>
<td>-0.06</td>
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<tr>
<td>Percent Correctly Predicted</td>
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<td>0.88</td>
<td>0.84</td>
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<tr>
<td>Log-Likelihood Value</td>
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<td>-8.53</td>
<td>-10.69</td>
<td>-10.82</td>
<td>-11.06</td>
<td>-9.34</td>
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</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.34</td>
<td>0.33</td>
<td>0.16</td>
<td>0.12</td>
<td>0.13</td>
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<td>(0.0001)</td>
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As before, I include both the results of LPM models and logit models in succession and describe their implications below. Table 7.3 has the LPM specifications and Table 7.4...
has the logit models. Yet the sample size of SLA battle successes is 26, a small sample size. This fact, coupled with a lack of variability in some of the variables that I was interested in became a problem when I ran various logit specifications using Stata. That is why a majority of the models in Table-7.3 do not have a counterpart in Table-7.4. The results of Table-7.3 are not biased, although they are inconsistent due to heteroskedasticity in LPM. I did run LPM models to check for the logit specifications that I could run, and they were rather similar in magnitude and direction. Therefore, I am not presenting this table of LPM results. My main model is Model-1 of Table-7.3.

7.2.1 Morale of SLA

In Model-1 of Table-7.3 moraleSLA is positive and very significant at the 0.05 significant level. The t-statistic was 2.44. In fact, in all of the linear specifications moraleSLA turns out to be positive and very significant. It alternates between being significant at the 0.05 percent significance level (Models 1, 2, 6 and 7, Table-7.3), and the 0.01 percent significance level (Model-4 in Table-7.3). In the logit models (Models 2, 3 and 4 of Table-7.4), when morale of SLA goes from low to high, we would on average see a 50 percent, 57 percent, and 54 percent increase in battle success in battles that were initiated by the SLA, ceteris paribus. The LPM Models in Table-7.3 allude to these significant effects. Although these appear to be very large increases, we should keep in mind that there were just 26 observations in the sample.

In Model-1 of Table-7.4, moraleSLA is positive but insignificant at the 0.10 significance level. This was the only specification that did not show a significant positive relationship
with the MAS. Yet, LPM models were not affected by small sample bias as the logit models were, and therefore we can safely conclude that moraleSLA is positive and significant at the 0.10 percent significance level and this was indeed robust.

We would have undoubtedly seen a more obvious positive effect in the logit models on battle success if there was enough variation in the data and we had a larger sample. I plot SLA’s morale distribution with their mission accomplishment scores (over 26 observations) in Figure-7.8 below. As before, the y-axis is the mission accomplishment score and the x-axis denotes morale changes from low (designated by 0) to high (a value of 1).

![Figure 7.8 - SLA Morale Changing from 0 to 1 vs. Battle Success.](image)
The reason why significance in the relationship becomes indeterminate in logit specifications is very clear when we look at Figure-7.8. The SLA "lost" just five battles in my sample, and the moraleLTTE changed very slightly towards the end of those 0 battle-success scores. The correlation coefficient between mission accomplishment and moraleSLA was 0.43, which is moderately high. If we compare the morale fluctuations in Figure-7.8 with those of Figure-6.4 in the last section, it is clear the very frequent changes in SLA morale could not be captured due to the fact that I don't have enough dependent variable observations. Even with these limitations the LPM models captured significant effects of moraleSLA on the MAS. If superior data was available we would undoubtedly have seen this same result at the 0.05 significance level in the logit models.

As I commented in the last section, it is very interesting to note the differences in morale fluctuations between LTTE and SLA given by Figures 6.3 and 6.4, respectively. Intuitively, for an insurgent group to be effective morale would have to play a pivotal role, especially since there is no remuneration for insurgency in many cases, including that of the LTTE. From an observational standpoint, SLA started losing more after the latter part of 1997, and it is clear from Figure-5.4 that this was exactly the time when their morale was at its lowest. It would interesting to see further studies that document this difference in insurgent and governmental morale changes with time and their effects on battle performance.

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7.2.2 Leadership of SLA

Since leadership for the Sri Lankan government was divided into SLA leadership and Sri Lankan civilian leadership, I was able to see the different effects of the two structures on SLA battle performance. I first discuss the latter and then the former. According to Model-1 of Table 7.3, civilian leadership (designated as Lead3-Civ, in Table-7.3 and LeadSLA-Civ in Table-4) turns out to be positively related to battle success, albeit insignificantly. This result seems to be very robust for every linear and logit specification. We would expect a positive result, although I have not found any empirical papers that explicitly attempted to model the effect of civilian political leadership on a war effort. The reason for an insignificant positive result is that my data does not capture the variations displayed in Figure-6.10, where I plotted the civilian leadership changes with time. We can see this when we plot battle success of SLA versus the civilian leadership score of the government, which I have done in Figure-7.9 below. I do not plot the civilian leadership changes from the base value (which is 0), to either 1, or 2 simply because there were just five observations total that corresponded to both of these categories in my sample.

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The y-axis is battle success and the x-axis is the dummy that captures the effect of civilian leadership changing from the base value 0, to the highest possible value which is 3. The two changes in Lead3-Civ are not adequate to capture any effect on battle success. The correlation coefficient between Lead3-Civ and battle success is very weak (0.01) as expected. As was outlined in the LTTE leadership section above, since I used a penalty method in my four criteria for civilian leadership, I separated the leadership penalty and the other three effects and ran separate regressions. As in the LTTE case, this separation made no difference to the result. I omit them from Tables 7.3 and 7.4 due their insignificance. It would be of interest to see if further studies validate this insignificant positive relationship of civilian leadership to mission accomplishment.
The SLA component of leadership was modeled by Lead3-Mil in Table-7.3. Logit would not run this model due to its lack of variability, and therefore it is not presented in Table-7.4. The inadequacy of this variable to capture battle success of SLA is clear when we plot these two, which I have done in Figure-7.10 below.

The x-axis is the dummy that captures the change in leadership from 0 to 3. There is only one such point in my sample, which is why Stata would not use this variable in the logit models. I adjusted for the penalty criterion as before but to no avail. A larger dataset would have enabled me to see the dynamics displayed in Figure-6.6 in the last section. The correlation coefficient between the two was -0.1.
The LPM specifications presented in Table 7.3 (Models 1, 3, 4 and 5) showed that Lead3-Mil has a positive insignificant effect on battle success. This positive sign was in fact robust. This is in fact what we would have expected. I feel that if I had a richer dataset this positive relationship would have been significant.

7.2.3 SLA International Economic Assistance

I could not find any direct information on specific war related financial aid given to SLA, and therefore I could not model this variable in my regressions. As I expand my dataset I am hoping to incorporate this crucial component of TPI.

7.2.4 SLA International Military Assistance

The rest of the TPI variables turn out to be very interesting as Table-7.3 shows. International military assistance turns out to an insignificant negative effect on battle success. According to Models 1, 2, 3 and 6 of Table-7.3, this negative result is insignificant. It is very interesting to note that Model specifications 2 and 6 of Table-7.4 show that SLAmilAss is negative and significant at the 0.10 percent significance level. According to Model-2 of Table-7.4, when the number of sources of international military assistance to the SLA goes up by 1, it decreases the probability of SLA winning a battle that they initiated by 14 percent. In Model-6 of the same Table, when the number of sources goes up by 1, it decreases the probability of SLA winning a battle in which they were the Attacker by 19 percent. Therefore, I am unsure as to the significance of this variable but it is robustly negative. If we assume that it is not due to any small sample
biases, this would be an unexpected result, much like the negative sign on LTTEmilAss.
The existing literature, be it military, economic or otherwise, does not provide an
eplanation for this to my knowledge.

One would think that increased military spending would mean more success on the battle
field. The argument that productivity would necessarily increase among battle
combatants just because they have more training and foreign soldiers fighting with them
has several key assumptions. First we assume that if we have foreign soldiers fighting for
a group that is involved in a conflict, that these soldiers would at least be comparable to
member of the said group. Sri Lanka was an example where the IPKF fought with LTTE
due to the Indo-Lanka Peace Accord. Although they did not fight side by side with SLA,
they were there on SLA’s behalf and gave them training, and so is a valid example (in
fact I used this in my dataset). Yet these IPKF soldiers incurred huge casualties and only
survived due to their sheer numbers. Therefore the effects of the training that they
imparted might be questionable since they themselves were totally unprepared for the
LTTE. Another example was the case during World War II when Germany used
conscripts from occupied territories to fight the Allies. Yet according to TDI (2000,
2002) these conscripts were much less productive than the average German soldier.

Another reason why productivity might not rise necessarily due to increased military
spending would be why the training and assistance was requested in the first place. If it
was because the group that needed the assistance was already performing poorly, this
type of aid might not be as useful to the group as they would have thought. It is clear that
this was also the case in Sri Lanka. To illustrate this I plot SLAmilAss with mission accomplishment scores in Figure-7.11 below. The y-axis is battle success while the x-axis is the number of sources of international military aid.

![Figure 7.11 - SLA International Military Assistance vs. Battle Success.](image)

According to Figure-7.11, SLAmilAss rose to 2 towards the end of the battle observations and fell at the end. The former was due to India providing help to blockade the LTTE stronghold of Jaffna in the face of increased attacks against SLA. At this point SLA was losing anyway, and the assistance that was provided (India explicitly said that it would not be directly involved) was of little relief. This could also explain the negative relationship between the SLAmilAss and battle success. The correlation coefficient between the two is -0.46, which is moderately large.
It would be very interesting to see if this negative relationship would hold for SLA when more battle observations are used along with more SLAmilAss data. If it does, it would have dramatic consequences to governments that wage war on insurgency groups. Some of these implications are discussed in the next Chapter.

7.2.5 SLA International Political Support

According to Table-7.3, SLApolSup is significantly related to SLA battle success, but the sign is once again negative. In Model-1 of Table-7.3, this is significantly negative at the 0.10 percent significance level. The same is true for Models 2, 3 and 6 in the same Table. According to these models, when the number of sources of international political assistance to the SLA goes up by 1, it decreases their probability of winning battles that they initiated. Logit specifications would not include this variable in any of the regressions due to lack of variation in SLApolSup. This can be seen by plotting SLApolSup with SLA battle performance, as I have done in Figure-7.12 below.
The x-axis is the number of sources of international political support for SLA. Figure-7.12 shows that SLApolSup has risen dramatically from 2 to 16 international actors either making statements or passing resolutions in favor of the Sri Lankan stance against LTTE, or directly intervening on the Sri Lankan government’s behalf in their native countries. Yet, it has had no positive effect. This result might be premature as logit points out, since there is little variation in SLApolSup as Figure-7.12 shows. That is why we should be cautious about this result, even though the coefficient of correlation is -0.50.

One explanation of these results is tied to the timing of the political support from abroad. As I mentioned in my discussion of SLAmilAss, if a battle group is already losing in the battle filed, external support in the form of either military aid, or in this case political support, might not be very useful. This might be the case for Sri Lanka, where the dramatic rise in SLApolSup came towards the end of the battles shown in Figure-7.12,
which was also when SLA was facing its biggest defeats. Maybe we should take note of the timing of political support and not just the magnitude, as I will explain in the conclusion.

If this result is as robust as Table-7.3 indicates, then it has very interesting implications for nation-states dealing with insurgent groups. It could very well be that political support for a country that is fighting a group as organized and well funded as the LTTE would in fact have no consequence for the recipient country. It might, in a certain sense, make nation-states obsolete as actors trying to combat international insurrections, as I will explain later.

7.2.6 SLA International Technological Assistance

In Models 4 and 5 of Table-7.3, SLAtechAss is negative but significant at the 0.10 percent significance level (Model-5) and the 0.05 percent significance level (Model-4). In the logit specifications given in Table-7.4 this is also negative and significant at the 0.10 percent significance level (Model-1). It says that when the number of sources of international technological assistance to the SLA the probability of the SLA winning a battle in which they were the Attacker goes down by 6 percent, ceteris paribus.

This negative result is fairly robust. We would expect a positive correlation between technological assistance and battlefield performance in reality. As I mentioned in the LTTE discussion, since providing armaments, be it weaponry or intelligence, directly affects battle performance, the literature shows that the relationship between the two

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variables would be positive. Although I have not seen studies for civil conflicts that validate this, we could reasonably assume this to be true.

This could simply be due to the sample size employed. As Figure 7.15 below shows, the small battle observations, mixed with fact that there is very little variation in SLAtechAss, might distort our results. In the graph below the mission accomplishment score is given on the y-axis and the number of sources of international technological assistance is given on the x-axis. The correlation coefficient between the two is -0.36.

7.2.7 Further Comments

Once again the interaction terms become very insignificant and therefore I omit these from my discussion. My model of interest, Model-1 of Table 7.3, has the highest
exploratory power out of all the models that I looked at. Its R-squared was 0.50. The best logit model, given the sample size, was Model-1, which had the lowest log-likelihood value (-8.36) coupled with the highest pseudo R-squared value (0.34).

Overall for the SLA, morale is positive and this result is robust. SLAtchAss and SLAPolSup are negative and significant in the LPM models. This result is somewhat robust, although this has to be validated in other studies. It is unclear if SLAmilAss is significant, since it shows significance (negative) at the 0.10 percent significance level in Model 2 and 6 of Table-7.4 and does not show any significance in Table-7.3.

On a related note, I found that the three TPI variables that I used were highly collinear. SLAtchAss was highly correlated with the other two: the correlation coefficient between SLAtchAss and SLAPolSup was 0.86, which was very high, and the correlation coefficient between SLAtchAss and SLAmilAss was 0.72, which was also very high. Due to this multicollinearity, I dropped SLAtchAss from my models when the other two were present.  

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33 If I had not made this correction, both SLAmilAss and SLAPolSup would have been highly significant (negative) at the 0.05 percent significant level, while SLAtchAss would have been significant at the 0.10 percent significance level, though the latter result was not robust. More importantly, moraleSLA loses its significance, though it remains positive.
Chapter 8 – Conclusions

This final section is divided into three parts. The first section deals with the conclusions that are derived from the tests, and their implications for the hypotheses articulated in the introduction. The second section deals with the major shortcomings of this study and suggests areas of potential improvement. The final section addresses ramifications of this study and also points out further lines of inquiry.

8.1 Hypothesis testing

The first set of hypotheses that I presented in the introduction were regarding TPI. The following are the conclusions regarding the hypotheses.

**Hypothesis 1a:** I reject this hypothesis at the 0.05 % significance level. There is no clear evidence whether economic assistance to an insurgent group, in this case the LTTE, significantly enhances their unit effectiveness in battle.

**Hypothesis 1b:** I cannot draw an inference for TPI in the form of economic aid for the ruling government since data was unavailable to test it.

**Hypothesis 2a:** I reject this hypothesis at the 0.05 % significance level. There is no clear evidence whether TPI in the form of military assistance to an insurgent group (LTTE) significantly increases their unit effectiveness.
Hypothesis 2b: I reject this hypothesis at the 0.05 % significance level. There does not seem to be a robust, significant, negative relationship between TPI in the form of military intervention for a ruling government (SL) and that government's military machinery (SLA).

Hypothesis 3a: I reject this hypothesis at the 0.05 % significance level. There does not seem to be a significant increase in unit effectiveness of a rebel group (LTTE) accompanied by increased TPI in the form of political support.

Hypothesis 3b: I reject this hypothesis at the 0.05 % significance level. There seems to be a significant negative effect (at then 0.10 percent level) of TPI in the form of political support on the unit effectiveness of an incumbent group (SLA).

Hypothesis 4a: I reject this hypothesis at the 0.05 % significance level. There does not seem to be a significant positive relationship between TPI in the form of technological assistance to a rebel group (LTTE) and their unit effectiveness in the battlefield.

Hypothesis 4b: I reject this hypothesis at the 0.05 % significance level. There seems to be evidence that TPI in the form of technological assistance to the incumbent (SLA) is possibly related (negatively) to their unit effectiveness but its significance is questionable.

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The second set of hypotheses that I generated were regarding the effect of morale on unit effectiveness on combatants.

**Hypothesis 5a**: I fail to reject this hypothesis at the 0.05 % significance level. There seems to be strong evidence that morale of an insurgent group (LTTE) has a strong positive effect on its unit effectiveness.

**Hypothesis 5b**: I fail to reject this hypothesis at the 0.05 % significance level. There seems to be a robust, significantly positive relationship between morale of an incumbent (SLA) and its unit effectiveness.

The third set of hypotheses that I generated were regarding leadership.

**Hypothesis 6a**: I reject this hypothesis at the 0.05 % significance level. There does not seem to be a significant positive relationship between the leadership of a rebel group (LTTE) and its unit effectiveness.

**Hypothesis 6b**: I reject this hypothesis at the 0.05 % significance level. There does not seem to be a strong, positive relationship between the civilian leadership of a country (SL government) and the unit effectiveness of its military (SLA).
Hypothesis 6c: I reject this hypothesis at the 0.05 % significance level. There does not seem to be a strong, positive relationship between the leadership of an incumbent force (SLA) and its unit effectiveness.

The final set of hypotheses was regarding the interaction terms.

Hypothesis 7a: I reject this hypothesis at the 0.05 % significance level. The morale of a rebel group (LTTE) interacted with their leadership does not have a significant, positive effect on unit effectiveness.

Hypothesis 7b: I reject this hypothesis at the 0.05 % significance level. The morale of an incumbent group (SLA) interacted with their leadership does not have a significant, positive effect on unit effectiveness of that group.

Hypotheses 8a, 9a, 10a, and 11a: I reject these hypotheses at the 0.05 % significance level. Morale when interacting with the four forms of TPI (economic, military, technological assistance and political support) does not have a significant, positive relationship on the unit effectiveness of a rebel group (LTTE).

Hypotheses 8b, 9b, 10b, and 11b: I reject these hypotheses at the 0.05 % significance level. Morale when interacting with the four forms of TPI (economic, military, technological assistance and political support) does not have a significant, positive relationship to the unit effectiveness of an incumbent group (SLA).
8.2 Shortcomings

The most blatant shortcoming of my study is the size of my dependent variable observations. This small sample size would have distorted my results especially for the SLA. This paper is part of an ongoing study in which I am hoping to comprehend the dynamics of the Sri Lankan civil war in all its dimensions. It is also the first step at attempting to tease out deeper relationships that cut across civil conflicts worldwide. Therefore, my results should be only viewed as a preliminary attempt in this larger endeavor.

My coding of the qualitative variables was undoubtedly subjective. As I described in the data section, one can design “objective” measures of variables such as morale, leadership and third party intervention. Yet, observations on the measures that I wanted to use were unavailable due to data restrictions. Hence I had to construct measures from the data itself which might not be very conducive for further study. The values that I assigned in the coding process were arbitrary but reasonable given the data. I tried to control for some of the unintended effects of such an arbitrary coding procedure by econometric techniques. The leadership variable was an ordinal variable. Thus, I had to use special controls for this as well. I will refine this coding process as the study progresses.

The propositions that I used in linking the defense economics literature and the military literature need to be empirically tested. Although it seems that equations relating battle characteristics should remain fairly stable across different types of conflict, I have yet to
see empirical results that confirm this. TDI is currently conducting research to determine battle success in urban terrains, and it would be educational to extend this analysis to incorporate the different terrains that civil war usually are fought in.

I started out trying to get observations for unit effectiveness but due to data constraints had to resort to proxies for this measure. This is a shortcoming as well, but one that will also be remedied when more data becomes available. I could not separate battle observations from operations and this was a shortcoming as well. Once finer details become available, I can undertake this kind of disaggregation.

Finally, the econometric techniques need to be refined if and when now, more suitable data is incorporated. This will also be an area that I will be focusing on as the study develops.

8.3 Implications and new avenues of research

What is interesting about this study is that it raises more questions than it answers. Since there are no empirical studies explicitly measuring the variables that I looked at in a civil war setting, my study would give researchers new ways of incorporating behavioral variables in attempting to capture battle dynamics. It would be interesting to see if the relationships of these variables to battle success remain stable over conflicts that span different continents. This would not only be invaluable for understanding civil conflicts in general from a battle perspective, but also would be beneficial for predicting outcomes given certain conditions. This possible predictive power is what compelled me to
undertake this study in the first place. It is my contention that the reason that the majority of TPI has failed miserably is that intervention is usually undertaken without judicious examination of endogenous battle dynamics. This micro-level analysis is the key, I maintain, for implementing successful and durable resolutions to conflicts.

This study also addresses another very pressing issue in global politics which is global terrorism. LTTE is branded as a terrorist group by a host of nations including the US and UK, and yet, as my preliminary study indicates, their battle effectiveness and their resolve to continue in their activities have not diminished. In a time when nations like the US are actively waging war on organizations of this kind, studies such as this would be invaluable to see which specific type of TPI should be targeted to achieve specific policy goals. Indeed extensively structured organizations such as the LTTE render nation states impotent, as was shown by my coefficients on TPI remaining negative as they did for the LTTE. This directly addresses the existing debate in political science circles of the continuing importance of nation states in an age of transnational actors such as insurgent groups.

When I was compiling my database I came across information pertaining to refugee displacement both internally and externally. Although addressing such topics was not in the purview of this paper, such a dataset would be invaluable for researchers in their quest to understand refugee issues in detail. I compiled a separate dataset of peaceful gestures or attempts at reconciliation by either the Sri Lankan government or the LTTE. This set provides a different dimension of the conflict and would be useful for a more
complete understanding of this conflict. It would also be possible to understand when the resolution could be successfully initiated once a conflict has started.

On an aside, studying the Sri Lankan conflict in the level that I did gave me a new appreciation as to the difficulties facing those involved in conflict resolution. It is readily apparent to me that the conflict could have very easily been averted in its infancy not by military might, but by fairly addressing mutual fears faced by the Sinhalese and Tamils. The intractability of the conflict to a political resolution highlights the intricacies of war, which when unleashed cannot easily be contained. I hope that this paper provides researchers with a new way of examining conflicts thereby comprehending the subtleties involved in their resolution and prevention.
Appendix A – Sri Lanka: A Timeline of a Country at War

1931: The Soulbury Constitution gave universal suffrage to Sri Lanka (then known as Ceylon) and the National Assembly was created.

1931-47: British leadership approves Ceylon’s first post-independence constitution. Tamil political leaders are accused of communalism due to their demand for disproportionate parliamentary quotas. Unitary state created upon independence.

1948: Ceylon gains independence. Donoughmore majoritarian constitution is enforced, and Upcountry Tamils are denied citizenship through the Ceylon Citizenship Act. Some Tamil leaders like Chelvanayagam vehemently oppose this Act, while the majority of Tamil politicians consent.

1949: Federal Party is formed.

1951: SLFP is formed.

1952-55: Intense debates over official language dominate politics. SLFP pledges to make Sinhala the sole language of the state.


1957: BC Pact, which addressed issues of colonization, Tamil language, and devolution of state power. An anti-pact protest march to Kandy spurs mob attacks on Tamils throughout the southern provinces.

1958: Tamil Language (Special Provisions) Act is passed, and allows the use of Tamil in education, public service entrance exams and administration in the NP and EP. The government abrogates the BC Pact.

1960: A Buddhist monk assassinates Prime Minister S.W.R.D. Bandaranaike. His widow, Sirimavo rouse in the general elections. To win electoral backing of FP, the SLFP agrees to revive the BC Pact but reneges on this agreement upon winning a majority.

1961: The 1956 “Sinhala Only” Act is implemented while the 1958 Tamil Language (Special Provisions) Act is not. The Federal Party re-launcher its civil disobedience campaign, paralyzing government administration in the north and east. The government declares a state of emergency and deploys troops to regain control of Jaffna. FP members of Parliament are detained for six months.
1965: UNP comes back to power in general elections under Dudley Senanayake. DC Pact is signed and covers the establishment of District Councils, colonization and Tamil language.

1968: Due to opposition pressure, the government abandons the District Councils Bill, which was part of the DC Pact. The 1966 Tamil Language (Special Provisions) Regulation is not implemented as well.

1969: The FP quits the government.

1970: SLFP win general elections. Mrs. Bandaranaike returns as Prime Minister and establishes a Constituent Assembly to frame a new, republican constitution. The Tamil Students League (TSL) is formed to protest against government plans to introduce communal quotas for higher education. First unsuccessful assassination attempts by Tamil militants against government representatives in Jaffna District.

1971: Educational standardization policies implemented, and lead to higher university entrance requirements for Tamil speakers. Many Tamil members withdraw from the Constituent Assembly after parity of status for the Tamil and Sinhala languages is rejected. The JVP initiates an unsuccessful armed revolt in the South of the island. The government adopts emergency powers and crushes the rebellion, killing thousands.

1972: Republican constitution adopted and Buddhism is made the state religion. Sinhala is the sole language of the courts and state administration. The 'district quota' system for university entrance improves prospects for rural and provincial populations at the expense of students in Colombo, Jaffna and other traditional educational centers. The Federal Party and other groups representing Sri Lankan and Up-Country Tamils coalesce to form the Tamil United Front (TUF). TNT, TELO and LTTE formed, and are splinter groups from TSL.

1973: The Tamil Youth League (TYL) is formed. It is strongly influenced by militant ideas. The government arrests several Tamil activists, including TYL leaders.

1974: Police attack the fourth conference of the International Association of Tamil Research in Jaffna, resulting in nine deaths.

1975: Tamil militants assassinate Alfred Duraiyappa, Tamil mayor of Jaffna. Four youths, including Vellupillai Pirabakaran, claim responsibility for this act, the first successful assassination by the militants. Tamil youths organize in London, and also establish links with, and receive training from, the Palestinian liberation movements.


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1977: UNP wins general elections with a landslide majority. TULF becomes opposition, running on a secessionist platform. TULF calls for a separate Eelam state for the first time on May 14. Anti-Tamil violence breaks out in the south, and hundreds are killed and thousands displaced.

1978: LTTE is proscribed along with other “terrorist” groups. A second republicar constitution is passed, creating a powerful executive presidency and granting partial concessions to the Tamils.

1979: With TULF participation, the government appoints a presidential commission to report on de-centralizing the state administration through District Development Councils (DDCs). As militant action continues around Jaffna, the Prevention of Terrorism Act (PTA) is passed, temporarily suspending important safeguards against human rights violations. Mass arrests of Tamil youth ensue, along with a spate of extra-judicial killings and ‘disappearances’.

1980: SLMC is established. The TULF gives full support to the passage of the District Development Councils Act. Tamil militants become active at TULF dominance in Tamil politics. Other militant Tamil groups like TELO, PLOTE, EPRP, and EROS consolidate their structures. They have rival sponsors in Tamil Nadu and Delhi. Intemecine feuds heighten.

1981: District Development Council elections won by TULF in Jaffna but the elections generate violence in the North as Tamil militants kill a UNP candidate and two police officers. The police go allegedly “on the rampage,” killing several people and destroying many buildings including the Jaffna public library, a key depository of Tamil history and culture.

1982: J.R. Jayawardene becomes the first Executive President of Sri Lanka. The life of Parliament is extended by 6 years by a one-question referendum. The life of the PTA is extended indefinitely.

1983: Anti-Tamil riots shock the country after 13 soldiers are killed in an LTTE ambush. Tamils escape as refugees to India and Europe. Recruitment to the Tamil militant movement soars. India begins an intense diplomatic offensive that lasts until 1989 to secure rights for Tamils within the unitary state. The sixth amendment to the constitution outlaws secessionism. TULF MPs are forced to leave Parliament. The violence leaves hundreds of Tamils massacred and 200,000 displaced.

1984: President Jayawardene convenes an All Party Conference to address Tamil grievances in Colombo.

1985: The LTTE massacre 150 Sinhalese civilians at Anuradhapura. The First face-to-face negotiations take place between the Government of Sri Lanka and militant Tamil organizations with the TULF, at Thimpu, Bhutan, with India taking the lead. The negotiations fail. The “Thimpu Principles” articulated by the Tamil organizations

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continue to be quoted by the LTTE throughout the 1990s. Muslim villagers are killed, accused of collusion with Sri Lankan security forces. The cease-fire agreed prior to the Thimpu talks breaks down. PLOTE is severely weakened by infiltrating and LTTE attacks.

1986: Intermecine killing between the various Tamil groups weakens the Tamil resistance to the army. The LTTE attack TELO and kill 150-300 cadres, including its leader, Sri Sabaratnam. Government imposes economic blockade on Jaffna. The Indian government seizes communications equipment in Tamil Nadu, and Pirabatharan is temporarily held under house arrest in Madras.

1987: The SLA launches a massive campaign in the north and extends its blockade to include food, fertilizers and medicine. After a shipload of supplies sent to Jaffna is turned back, the Indian government parachutes food and medicines into the city. After intense diplomatic activity, Indo-Lanka Accord is signed resulting in the immediate deployment of the Indian Peacekeeping Force (IPKF) in the Northeast of Sri Lanka. LTTE signed the accord and surrendered large portions of arms and ammunition. All militant groups, except LTTE, align with the IPKF, and Tigers launch devastating attacks on PLOTE and EPRLF. The JVP revolts in the south of Sri Lanka.

1988: The JVP insurrection is met with bloody counter-insurgency measures by the Sri Lankan security forces. The thirteenth amendment to the constitution creates the Northeast Provincial Council. It is controlled by the EPRLF, with its leader Vadarajah Perumal being sworn in as chief minister of the North East Provincial Council (NEPC), after the provincial elections provoke a spectacularly high turnout. Ranasinghe Premadasa of the UNP is elected president of Sri Lanka. The LTTE break their coerced agreement with the Indian government, and fierce fighting breaks out with the IPKF. IPKF is accused of targeting civilians. This results in many civilian casualties in the Northeast.

1989: With IPKF support, the NEPC recruit a new Tamil National Army (TNA). A cease-fire is agreed and negotiations commence between the Government of Sri Lanka and the LTTE. The government gives arms and money to the LTTE, who are still fighting the IPKF. Relations between Sri Lankan and Indian governments sour as the IPKF is ordered out of Sri Lanka by the Sri Lankan President. The LTTE is held accountable for the killing of Jaffna University lecturer Rajini Thirunagaram, TULF leaders A. Amirthalingam and V. Yogeswaran and EPRLF MP Sam Thambimuttu.

1990: The IPKF finally leave Sri Lanka in March, followed by many of the EPRLFs who, frustrated by the lack of implementation of powers to the Northeast Provincial Council, unilaterally declare Eelam before leaving the island for India. President Premadasa sets up an All Party Conference to which the LTTE send observers from their newly created political wing PLFT. The cease-fire between the Sri Lankan government and LTTE breaks down in June. Government declares “Eelam War II.” One hundred and forty Muslims are slaughtered whilst at prayer at Kattankudy mosque by the LTTE in the Eastern Province, and the LTTE give the Muslims forty-eight hours to leave the North.
causing $20,000 to flee. Government creates an armed civil defense force, the Muslim Home Guard. In Madras, LTTE kill 14 members of the EPRLF leadership.

1991: Government seeks a solution to the war, and convenes Parliamentary Select Committee (PSC). The LTTE assassinate Defence Minister Ranjan Wijeratne. A suicide bomber assassinated Ex-Prime Minister of India, Rajiv Gandhi, on 21 May. India retaliated by banning all LTTE activities in India.

1992: PSC continues debate while war rages. Government forces kill 23 Hindu worshippers and LTTE massacre about 180, mostly Muslim, villagers near Polonnaruwa. LTTE assassinate the popular Brigadier Denzil Kodikaduwara. Nineteen soldiers implicated in the 1991 Kokkadisholai massacre are acquitted, for lack of evidence.

1993: All Tamil Groups withdraw from PSC. Prominent LTTE leader Kittu dies after his ship blows up under attack from the Indian navy. Former Minister Lalith Adulathumudali is assassinated by the LTTE. President Premadasa is also assassinated and succeeded by President Wijetunge of the UNP.

1994: The PA wins the general election, and their leader Chandrika Bandaranaike-Kumaraswamy wins the Presidential election. The new government relaxes the embargo on the north, releases several Tamil prisoners and opens preliminary discussions with the LTTE. The opposition President candidate, Gaminis Diasayake, and over fifty others, are assassinated by the LTTE at an election rally. A cease-fire is declared by the LTTE and talks between the LTTE and the government commence.

1995: Although a formal cessation of hostilities is agreed the talks break down in July, and the LTTE begin to launch attacks, including the first use of anti-aircraft missiles. The government responds with a sustained military offensive, “Eelam War III,” and the announcement of a substantial proposal for devolution of power. After five months, the army enters Jaffna and gains control of the town of Jaffna, in December, and much of the peninsula, after a 50 day offensive. The population was evacuated by the LTTE, and this leads to increased displaced populations in the north.

1996: Amended constitutional devolution proposals are placed before a Parliamentary Select Committee by the government. The war continues with the army continuing to hold Jaffna. A large majority of displaced residents return to the peninsula, removing itself from direct authority of the LTTE for the first time since 1990. The LTTE stages a massive and successful attack at Mullaitivu killing over 1,200 soldiers. They also place a bomb, which destroys Colombo’s Central Bank, kills over 150 civilians and wounds over 1,500.

1997: The Parliamentary Select Committee fails to reach consensus on constitutional reform. The impasse persists, however, while the LTTE hardens its position against negotiations. Local elections in the south are marred by violence, including the killing by a UNP MP of Nalanda Ellawala, a rising star in the PA administration. The United States bans the LTTE, and lists it as a terrorist organization, and pressure grows for the UK to
close the Tigers' international headquarters in London. The military offensives escalate as the army tries to secure the main supply route to the north. Estimated military casualties on both sides reach an all-time high.

1998: At a convention organized in Colombo by the National Peace Council (NPC), 1,700 participants from all districts and ethnicities renounce the war and call for a 'just and honorable peace'. The convention receives goodwill messages from President Kumaratunga, UNP leader Ranil Wickremesinghe and Pirabhakaran. A blast outside Maradana train station in Colombo kills over 30 people. Local elections are held in Jaffna for the first time in 15 years. Turnout is surprisingly high, but police and home guards massacre villagers near Trincomalee the very same week. The LTTE assassinate Brigadier Larry Wijeratne in Jaffna and the newly elected TULF Mayor Sanujini Yogeswaran. The LTTE explodes bombs in Colombo. LTTE plants a bomb at the Buddhist Temple of the Tooth in Kandy. This latter explosion casts a shadow over celebration of the 50th anniversary of independence. The LTTE are formally banned in Sri Lanka and ends public advocacy for negotiations. A ferocious attack by the LTTE on the Sri Lankan army at Killinochchi results in approximately 1,000 casualties.

1999: There are local and provincial council elections and a presidential election (due in November 2000), is called in December. The Sri Lankan military changes tactics and abandon the frontal assault on the A9 highway but the intensity of military engagement continues. In a major battle the LTTE regain large amounts of ground painfully taken by the Sri Lankan military over the last two years.

2000: Twenty-four people including Muslim Parliamentary candidate Mohammed Baithullah, are killed in an LTTE suicide bombing in October. LTTE capture the massive Elephant Pass garrison. The PA, led by Chandrika Bandaranaike wins re-election in parliamentary elections in October.

2001: A crack commando LTTE unit overruns the Katunayake airbase and the Bandaranaike International Airport on 24 July. LTTE is banned in Australia, Canada and the UK. LTTE declare a unilateral ceasefire in December.

2002: At the beginning of the year, the LTTE controlled a large portion of land, including Mallaviya, Kilinochi districts, and parts of Vavuniya and Mannar. Cease fire holds and the Sri Lankan government lifts its ban in the LTTE.

2003: Talks are still continuing to find a political solution to the conflict.
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## Appendix B - Table B2 - Distribution of SLA Battles with Time and Results

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The date is when the battle took place, the mission accomplishments column shows the results of the battle for the SLA. Example: 1.00 indicates a victory for the SLA. The battle number indicates the overall number of that particular battle in the data set.
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