UNIVERSITY OF MANNHEIM
School of Social Sciences
Department of Political Science

Data Essay for Course
Quantitative Methods in Political Science

Evaluating UN Peacekeeping Operations

Bennur Kaya
bekaya@mail.uni-mannheim.de

Prof. Thomas Gschwend, Ph.D.

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1. Introduction

Peacekeeping by the United Nations is a unique and dynamic role held by the Department of Peace Operations to provide security and the political and peacebuilding support to countries. The interventions are aimed to reduce hostility between the conflicting parties and also create fruitful grounds for a sustainable peace process in the conflict area. In recent years, it has been observed that the demand for the UN to intervene in active conflicts has increased. Depending on the effectiveness of UN peacekeeping missions in reducing violence on the battlefield, this demand may be warranted. In this data article, an argument is tested claims that the effect of the UN troops size on reducing the battle-related fatalities is stronger once a ceasefire agreement is in place.

2. Data

2.1 Data Description

Peacekeeping Operations data is mainly constructed with the continuous and categorical variables based on 21518 observations and 21 variables. In total, 60665 of the observations are missing values in the dataset. The variables:

▪ *year_month:* The year and month

▪ *conflict_id:* ID of conflict

▪ *gov*: Government side in the conflict

▪ *rebel_ group:* Rebel group involved in the conflict

▪ *brf_grc:* Battle-related fatalities in the government, rebel groups and civilians as collateral damage in a month

▪ *brf_gr:* Battle-related fatalities in the government and rebel groups in a month

▪ *brf_grc_lag:* Battle-related fatalities in the government, rebel groups and civilians as collateral damage, lagged one month

▪ *brf_gr_lag:* Battle-related fatalities in the government and rebel groups, lagged one month

▪ *ceasefire:* Coded as 1 if a ceasefire agreement exists in a given month; 0 otherwise

▪ *troop_lag1000:* Number of UN military troops deployed, in thousands, lagged one month

▪ *police_lag1000:* Number of UN police units deployed, in thousands, lagged one month

▪ *rebel_strength:* Ordinal scale for 1 if rebels are much weaker than government to 5 if rebels are much stronger than government

▪ *n_rebel_goups:* Number of rebel groups involved in the conflict

▪ *pop:* population_size

▪ *pop_ln*: Population size, logged

▪ *biased_interventation:* Coded as 1 if one or more states intervened with UN troops in support of either the government or the rebels; 0 otherwise

▪ *active_year:* Coded as 1 if conflict was active in this year; 0 otherwise

▪ *peace_24_months:* Number of months passed since the conflict end, not available if number of months exceed 24

▪ *peace_36_months:* Number of months passed since the conflict end, not available if number of months exceed 36

▪ *peace_48_months:* Number of months passed since the conflict end, not available if number of months exceed 48

▪ *regional_pko:* Coded as 1 if PKO from regional intergovernmental organization intervened in the conflict state in a given month; 0 otherwise

2.2 Descriptive Statistics

The data set is between the years 1975 and 2011. There exist 84 different conflict groups. The maximum battle-related fatalities in the government and rebel groups including civilians as collateral damage in a month is 9793 and it belongs to the conflict between Congo and Cobras. Also, in 12452 of the observations, a ceasefire did not take place. On average, 1352

UN military troops and 123.9 UN police unites deployed, lagged one month. Furthermore, on average, the rebels look stronger than the government with a rebel strength value of 2. Comoros has the smallest population size with 507 and the average population size equals to 20647. Moreover, one or more states intervened with UN troops in support of either the government or the rebels 744 times. Lastly, in 4034 observations, the conflict was active and PKO from regional intergovernmental organization intervened in the conflict state in a given month for 2586 of the observations in data set.

3. Model

The argument starts with the assumption that UN peacekeepers not only can intervene in an ongoing conflict but also reduce violence by helping the conflicting parties to overcome commitment issues that arise through mutual agreements. That is, a given UN peacekeeping mission should further reduce the violence on the battlefield if the parties to the conflict involved are truly willing to stop fighting, and this is measured by the c*easefire* variable, which leads us to the hypothesis to be investigated.

3.1 Model Selection

Data preparation part is started with creating a new variable as *military_police_lag1000* for the sum of number of UN military troops and number of UN police unites deployed, in thousands, lagged one month. The reason is, the hypothesis is directly about the size of the UN troops, and being from the police units or the military troops is not the focus. Also, both have NA values for the same observations. This variable represents the UN troops size. Then, new data is created for the variables to be focused on building a model. *brf_grc* is selected as a dependent variable to represent the number of all battle-related fatalities in a month. As independent variables, *military_police_lag1000* is chosen as total troops size and *ceasefire* variable is chosen for indicating if the ceasefire agreement is in place.

Besides these variables mentioned in the main hypothesis, there are a few more variables to be controlled. First, if other states intervened with UN troops in support of either the government or the rebels, a new power can change the course of action in a both positive and negative way. This may cause an effect on the size of the battle-related fatalities. Finally, if the conflict is active in this year, it may cause a change in the size of fatalities. Because of these reasons, *biased_interventation* and *active_year* variables are included into model.

Negative binomial regression model for count data is built for the dataset since negative binomial regression is more flexible in overdispersion regard than Poisson regression and adjusts the variance independently from the mean.

3.2 Model Results

Regression Results

	Dependent variable:			
	Battle-related fatalities			
	(1)	(2)	(3)	(4)
Number of UN troops	-0.078***	-0.085***	-0.056***	-0.068***
	(0.014)	(0.014)	(0.011)	(0.016)
Ceasefire		-0.956***	-1.351***	-1.382***
		(0.119)	(0.087)	(0.091)
Biased Intervention			3.098***	3.111***
			(0.195)	(0.195)
Active Year			5.742***	5.758***
			(0.100)	(0.100)
Number of UN Troops : Ceasefire				0.024
				(0.022)
Constant	2.146***	2.476***	-1.623***	-1.617***
	(0.062)	(0.079)	(0.057)	(0.058)
Observations	19,826	19,826	19,826	19,826
Log Likelihood	-14,779.410	-14,748.980	-13,304.180	-13,303.640
theta	0.015*** (0.0004)	0.015*** (0.0004)	0.044*** (0.001)	0.044*** (0.001)
Akaike Inf. Crit.	29,562.830	29,503.970	26,618.370	26,619.270
Note:				*p<0.1; **p<0.05; ***p<0.01
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Table 1. Negative Binomial Regression Models

As you can see in Table I, four different negative binomial regression models are built to explain the hypothesis better. The first model is built directly to see the effect of the UN

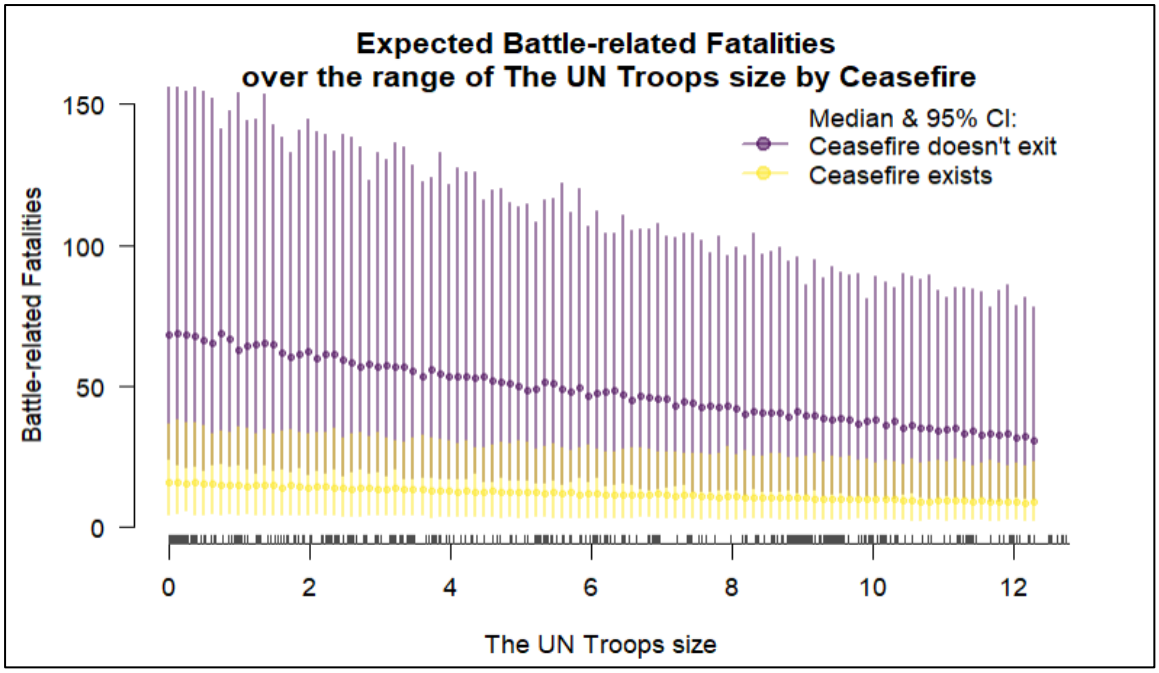
troops size on battle-related fatalities. In second model, *ceasefire* variable is added. Then, *biased_intervention* and *active_year* controlling variables are added into third model. Lastly, an interaction effect is added to the model to see the effect of the UN troops size on battle-related fatalities changes, depending on the Ceasefire variable.

The estimation negative binomial regression coefficients for the model can be interpreted separately however since the models are not linear models, interpreting the magnitude of the coefficients directly cannot be done. Firstly, the number of UN troops is significant at significance level of $\alpha = 0.05$ and has negative impact on battle-related fatalities in all models. Secondly, *ceasefire* is added to model 2 and it has negative coefficient value. This negative effect is even higher in fourth model. *Ceasefire* variable is significant for the models at alpha=0.05 significance level. In third model, *biased_intervention* and *active_year* variables are added and both have a positive effect on the battle-related fatalities. Both variables are significant for the model at significance level of $\alpha = 0.05$. Finally, our main model includes the interaction of the UN troops size and ceasefire with all other independent variables. The variable indicates if ceasefire exists, then the number of UN troop has positive effect on the battle-related fatalities. However, the interaction coefficient is not significant for the model at alpha=0.05 significance level.

Model 4 will be used in simulation to better test the hypothesis. Also, the interaction effect is important for the hypothesis, as the effect of the UN troops size on battle-related fatalities changes, depending on the ceasefire is searched.

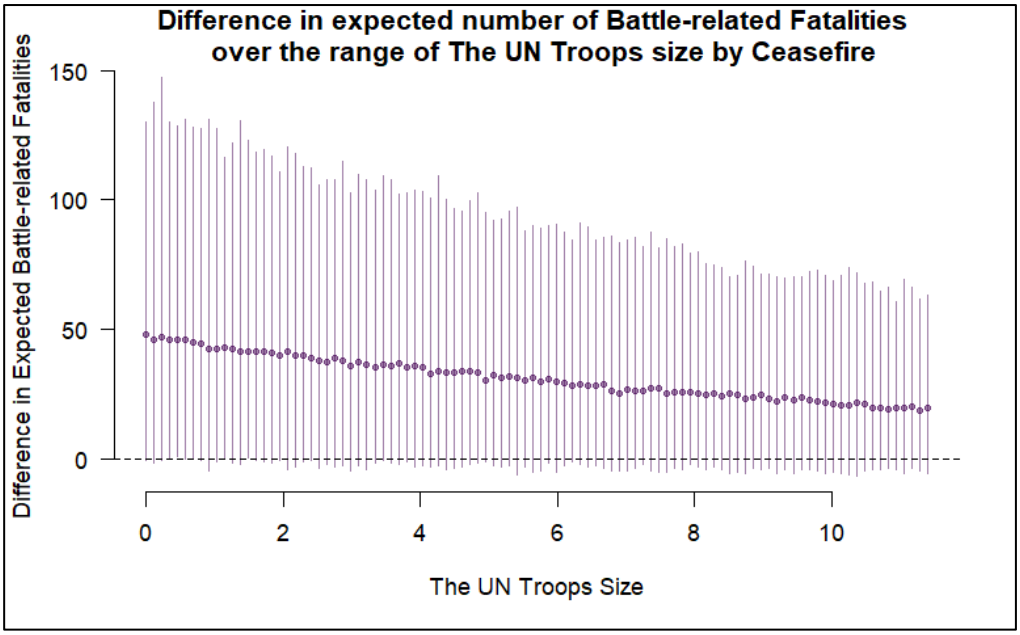
4. Simulation

Understanding the outputs of the models is important for gaining insight about the data, however, simulation is also applied to make more precise interpretations.



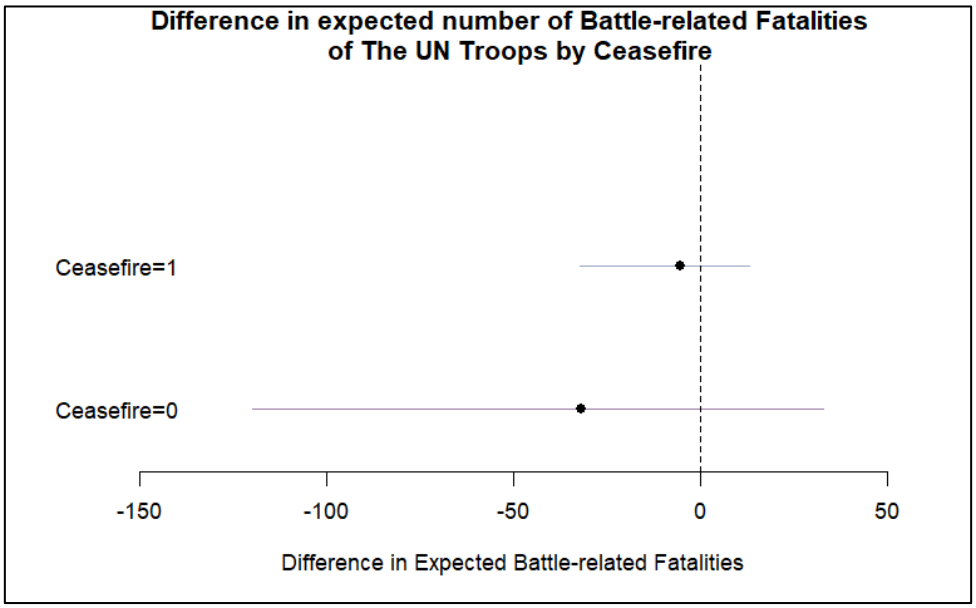
Plot I. Simulation Plot for Expected Battle-related Fatalities over the range of The UN Troops size by Ceasefire

The first scenario is created as ceasefire exists and the conflict is active. Active conflict causes a significant increment as seen in model 4. In the second scenario, the countries with ceasefire agreement are included while the conflict continues to be active. As it can be seen from the Plot I, in both scenarios, battle-related fatalities show a decreasing trend while the UN troops size is increasing. In the scenario when ceasefire doesn't exist, since the confidence intervals don't consist of zero, it can be said that the UN troops size always has positive affect on battle-related fatalities at a significance level of 0.05. However, precise inferences cannot be made in order to make a comparison between the scenarios.



Plot II. Simulation Plot for the difference in expected number of Battle-related Fatalities over the range of The UN Troops size by Ceasefire

By looking at the Plot II, since almost all of the intervals cover 0 when the troops size increases, the difference in expected number of battle-related fatalities is not significantly different in case of ceasefire exists at 5% significance level. If the primary goal is to show that the troops size has stronger effect on battle-related fatalities when ceasefire exists in order to quantify the difference, a different quantity of interest should be checked.



Plot III. Simulation Plot for Difference in expected number of Battle-related Fatalities of The UN Troops by Ceasefire existence

Segments depict 95% confidence intervals. As we can see from Plot III, when ceasefire doesn't exist, the differences in Expected Battle-related Fatalities has a wider interval

compared to scenario 2. Both intervals cover 0. Also, the median point is much closer to 0 when ceasefire exists. It means, even though battle-related fatalities show a decreasing trend while the UN troops size is increasing as in Plot I, it doesn't prove that the effect of the UN troops size on reducing the battle-related fatalities has significantly stronger effect once a ceasefire agreement exists.

5. Robustness Check

Robustness testing shows if the estimated effects of interest are sensitive to changes in model specifications. It can increase the validity of inferences. Outliers increase the variability in your data, which decreases statistical power. As a robustness test, outlier elimination is applied for the negative binomial regression model.

As you can see from Table II below, after the elimination, the variables that are significant in the old model remained to be significant as well. The interaction of the UN Troops Size and Ceasefire continued to be insignificant for the model but the sign of the coefficient changed. The model after outlier elimination indicates a negative effect of the Number of UN Troops on Battle-related Fatalities when ceasefire exists. Also, the coefficient effect of having an active conflict increased on Battle-related fatalities.

Regression Results

	Dependent variable:	
	Battle-related fatalities	
	(1)	(2)
Ceasefire	-1.382***	-1.120***
	(0.091)	(0.103)
Number of UN troops	-0.068***	-0.046***
	(0.016)	(0.015)
Active Year	5.758***	6.853***
	(0.100)	(0.087)
Biased Intervention	3.111***	3.524***
	(0.195)	(0.148)
Number of UN Troops : Ceasefire	0.024	-0.022
	(0.022)	(0.027)
Constant	-1.617***	-3.153***
	(0.058)	(0.063)
Observations	19,826	19,775
Log Likelihood	-13,303.640	-12,024.030
theta	0.044*** (0.001)	0.077*** (0.002)
Akaike Inf. Crit.	26,619.270	24,060.050

Note: *p<0.1; **p<0.05; ***p<0.01

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Table II. Model Results before and after Outlier Elimination

On the other hand, The Akaike information criterion (AIC) is a mathematical method for evaluating how well a model fits the data it was generated from. The lower it gets; it shows the model fits the data better. After robustness check, AIC value gets smaller. All in all, both models show the same variables as significant and there were relatively small changes in the coefficient values apart from the sign change in interaction variable after outlier elimination.

6. Conclusion

In this article, the argument is tested claims that the effect of the UN troops size on reducing the battle-related fatalities is stronger once a ceasefire agreement is in place. After data preparation and variable selection, negative binomial regression models are built. The model

which represents the hypothesis the most is chosen. Then, simulation for ceasefire and conflict existence in given month with two scenarios is created. It is conclueded that the difference in expected number of Battle-related fatalities mostly is not significantly different in case of ceasefire exists for the specified scenarios and even though battle-related fatalities show a decreasing trend while the UN troops size is increasing, it doesn't prove that the effect of the UN troops size on reducing the battle-related fatalities is stronger when ceasefire between the actors exists. All in all, there is not enough evidence to support the hypothesis.