

Causal Inference

Prof Diamond

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CS112 - Fall 2018

**CODE**

<https://gist.github.com/bellabuchanan/bd045b2fd280c26449343f2a58cf9e05>

**QUESTION 1**Question 1A

The problem is that in the *MatchBalance()* function, *genout* is the argument given for *match.out*. This is a problem because the *GenMatch()* function produces a weight matrix however, *match.out* requires “an object from a previous call to *Match()*,” this can be fixed by changing the argument to *mout*.

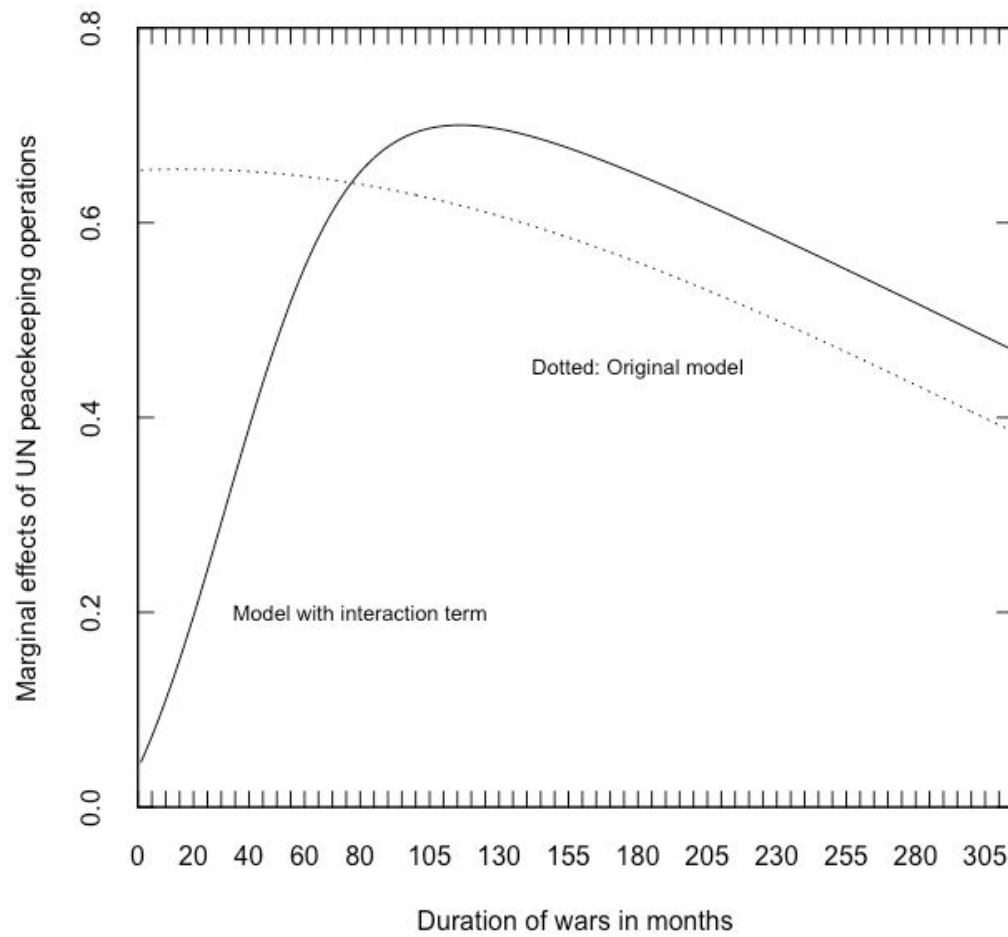
Question 1B

The problem here is that the estimands are not the same—in the *GenMatch()* function, it is specified that the estimand is “*ATE*,” whereas in the *Match()* function, no specification for *estimand* is given and therefore the default estimand of “*ATT*” is used. To fix this, the estimands should be identical, either both “*ATE*,” or both “*ATT*” depending on which estimand is desirable.

Question 1C

The problem is that the argument *M*, used to specify the number of matches to be found, is inconsistent between the *GenMatch()* and *Match()* functions (*M* = 1, vs *M* = 2). This is problematic because the ideal weight matrix was calculated using the ideal weights for

one-to-one matching, but then one-to-two matching was done, meaning that the weights were not ideal for this process—this problem can be fixed by making the values for  $M$  consistent.

**QUESTION 2**

REPLICATED FIG. 8. Causal Effect of Multidimensional UN Peacekeeping Operations (King & Zeng, 2007).

**QUESTION 3**

Treatment is defined as having any type of UN peacekeeping intervention. This is done by making a list of 122 zeros, and changing the values which are not *None* to ones. In this way, the interventions of *Observer*, *MultiPKO*, *TradPKO*, and *Enforcement* + are all defined as the treatment because they are a form of UN intervention.

**QUESTION 4**Question 4.1A

What is the impact of UN peacekeeping intervention, versus no intervention, on lenient success 2 and 5 years after the war?

Question 4.1B

SUTVA is violated since the outcome observation of peace status of one country is affected by the assignment of another country to treatment and control since wars affect nearby countries as well as countries with strong ties. The restrict argument could be used to not allow countries which border each other, or countries which peace status are dependent on the others to be matched.

Question 4.1C

TABLE 1. Results of the impact of UN peacekeeping interventions using logistic regression, propensity score matching, and genetic matching.

	Treatment effect (bias adjusted)	Treatment effect (no bias adjusted)	P-value
Logistic regression			
Lenient success after 2 years	NA*	0.06818	0.00011
Lenient success after 5 years	NA*	0.09848	
P-score matching			
Lenient success after 2 years	0.36359	NA**	0.012
Lenient success after 5 years	0.39389	NA**	
Genetic Matching			
Lenient success after 2 years	0.14844	0.18182	0.30093
Lenient success after 5 years	0.17875	0.21212	

\*No matching was done in logistic regression so there is no bias adjustment

\*\*Leximin p-value is below 0.1

Question 4.2

**TO:** S Stewart, UN Peacekeeping Operations Manager

**Executive Summary**

This memo serves to evaluate the impact of UN Peacekeeping interventions on lenient success after war—this is highly relevant in establishing whether efforts are being directed in the correct way. The treatment effects of UN peacekeeping interventions are calculated using logistic regression, propensity score matching, and genetic matching. The genetic algorithm analysis produces a well balanced data set which can be used to calculate a positive treatment effect, suggesting that UN peacekeeping interventions improve lenient success 2 and 5 years after the end of the war. The positive treatment effect with a balanced dataset is indicative of an improvement of lenient success, and hence it is recommended that peacekeeping interventions be continued, and that genetic matching be used in any similar further analysis.

**Conclusion**

Different methods of analysis have concluded that UN peacekeeping interventions yield positive treatment effects on lenient success 2 and 5 years after the war, and efforts should be continued. It is advised that treatment effects be calculated using genetic matching since the high  $p$  – value suggest a greater amount of balance between the treatment and control group increases our confidence that the treatment effect is in fact due to the treatment and not some other confounding variable. Lastly, it is advised that further analysis be done on the treatment effects of *specific* UN interventions so as to be able to best decide where to concentrate efforts.

## References

King, G., & Zeng, L. (2007). When Can History Be Our Guide? The Pitfalls of Counterfactual Inference. Retrieved November 26, 2018, from <https://gking.harvard.edu/files/counterf.pdf>

## Appendix

### Appendix A

*Code for Question 2 and 4*

<https://gist.github.com/bellabuchanan/bd045b2fd280c26449343f2a58cf9e05>