CS112 - Causal Inference

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Question 1

Debugging--in the 3 cases below (a through c), identify the major coding error in each case and explain how to fix it, in 1-2 sentences. DO NOT actually copy/paste corrected code:

(a) https://gist.github.com/diamonaj/2e5d5ba5226b7b9760f5d1bf1e7bf765

The match argument is missing (`mout <- Match(Weight.matrix = genout`) and the code inputs the `GenMatch` object in the `match.out` parameter. Instead, we should first run `genout`, followed my `mout` feed the set of weights from `genout` in `Match()`

(b) https://gist.github.com/diamonaj/3b6bc83d040098486634184d99fc4c55
There are inconsistencies between the `GenMatch()` and `Match()` functions e.g different arguments for exact in `genout` and `mout`. To correct this, we should include the `exact = TRUE` argument in `Match()`.

(c) https://gist.github.com/diamonaj/a88cb40132ed8584e5182b585e1c84c8
In MatchBalance (), we have the real outcome variable re78 as the variable on the left-hand side. Instead, we should have treat~age+...+I(re74*re75).

Question 2

https://gist.github.com/kagenidennis/1446c289f7897c65b49dc88f05a6b1f2

Replicate figure 8 in https://gking.harvard.edu/files/counterf.pdf -- EXCEPT that this figure considers the implications of adding an interaction term (wardur * untype4) to the basic model. I want you to consider the implications of adding a different interaction term to the basic model -- the interaction term I want you to consider is (logdead*untype4).

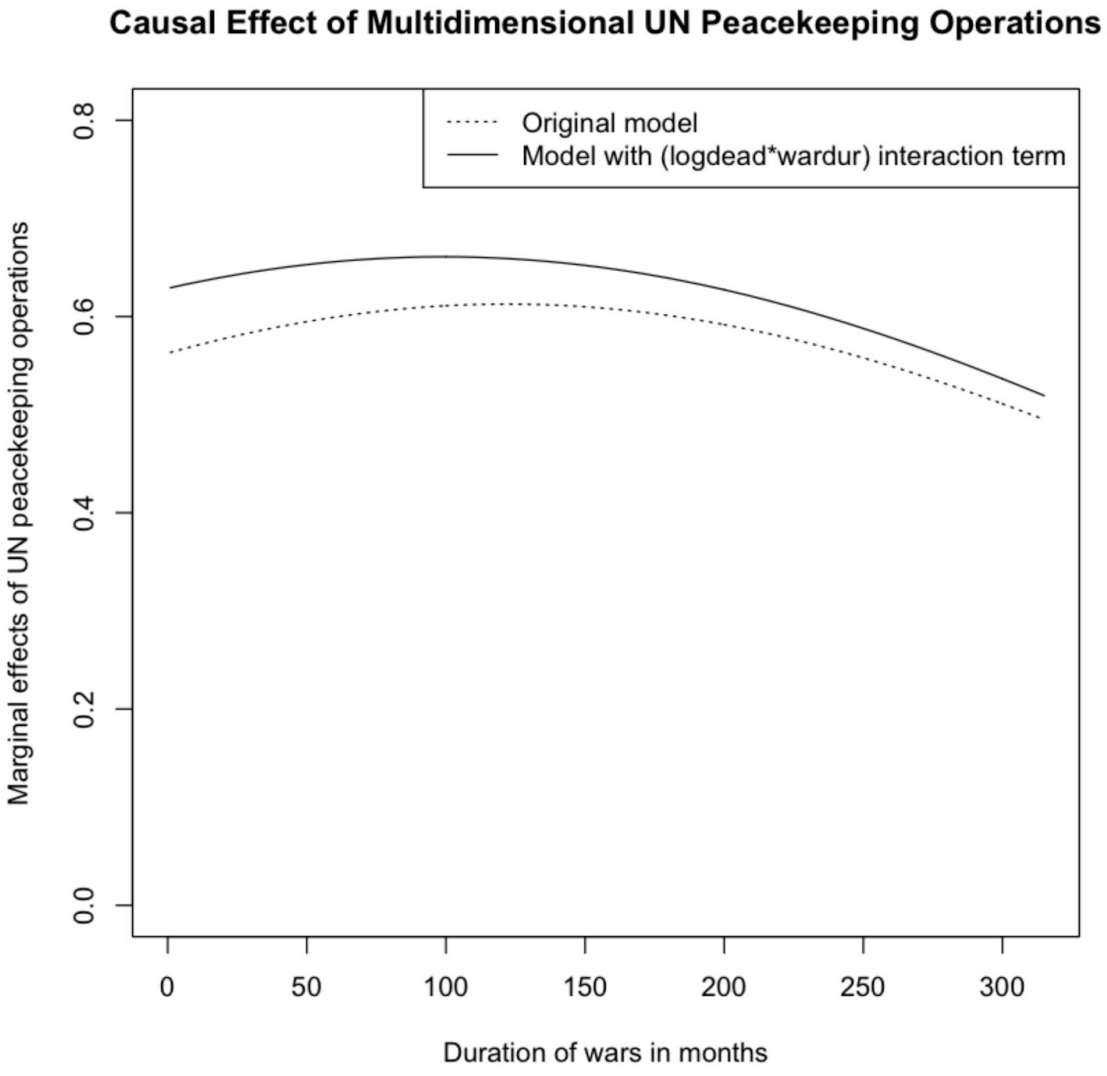

Figure 1. The causal effect of Multidimensional UN Peacekeeping operation considering interaction term (logdead * wardur)

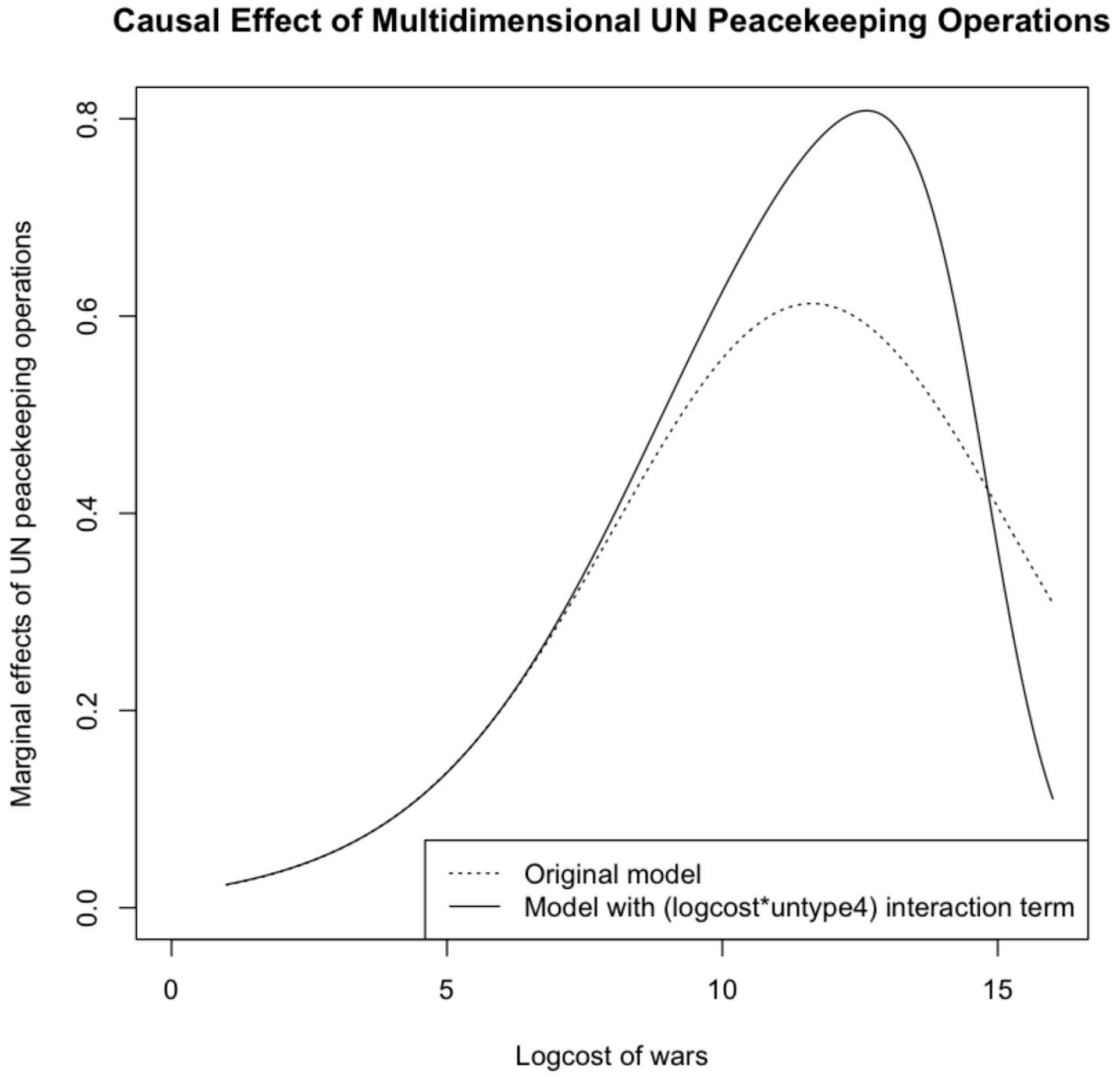

Figure 2. The causal effect of Multidimensional UN Peacekeeping operation considering interaction term (logcost * untype4)

(3) Define treatment as below:

```
Tr <- rep(0, length(foo$uncint))
Tr[which(foo$uncint != 0 & foo$uncint != 1)] <- 1
```

What does this mean? What is "treatment"?

Treatment is any type of UN peace operation. That's why we treatment = 1 is defined as any value of 'uncint' other than "None"

(4) Let's pretend you work for an NGO and your manager asks you to estimate the impact of the treatment identified above on lenient peacebuilding success 2 years and 5 years after the war. You will have to search for these two outcomes variables in the codebook.

(a) In no more than 1 sentence, articulate the causal question as best you can (being as clear as you can about treatment and control):

What is the effect of a UN peacekeeping operation on the probability of lenient peacebuilding - where successful lenient peacebuilding is defined as a state of no war, residual violence, and state authority can be exercised in the entire region - in a region, 2 years and 5 years after a war?

(b) In no more than 1 sentence, explain how/why SUTVA might be violated here. In no more than 1 additional sentence, explain how you could, in theory, use the "restrict" argument (in Match()/GenMatch()) to help address this potential problem.

SUTVA can be violated in the event of spillover effects of war beyond a country's/region's geographical borders. We can mitigate this by making sure that countries that are close to one another and have similar characteristics e.g Sudan and Somalia are not matched

(c) Use simple logistic regression, propensity score matching, and genetic matching to try to answer these questions.

https://gist.github.com/kagenidennis/1446c289f7897c65b49dc88f05a6b1f2

Method	**Tmt Effect (bias adj)**	**Tmt Effect (no bias adj)**	**P-value (measures balance) ****
Logistic Regression Len success 2 years	NA *	0.11392	NA
Logistic Regression Len success 5 years	NA *	0.14596	NA
P-score Matching Len success 5 years	0.2509	0.2500	0.0460
P-score Matching Len success 2 years	0.2196	0.2188	0.0320
GenMatch Len success 5 years	0.2116	0.2222	0.1800
GenMatch Len success 2 years	0.1386	0.1944	0.1800

Table 1. Treatment effects of lenient peacebuilding success 2 years and 5 years after war

* No need to provide bias-adjusted results for logistic regression--only for matching estimates.

** Leximin p-value provided for values greater than 0.10. Otherwise, "NA". **The functional form of the propensity score mode**l: *Tr ~ wartype + logcost + wardur + factnum + factum2 + trnsfcap + treaty + develop + exp + decade.* In **Genetic Matching**, we matched on the basic covariates (*wartype, logcost, wardur, factnum, factnum2, trnsfcap, develop, exp, decade, treaty)* and **measured balance** of the produced data sets on the same basic covariates. Refer to the codebook by Doyle & Sambanis (2000) for the precise definition of each of these variables.

MEMO

To: António Guterres

Subject: On the effects of the UN's peacekeeping operations on peacebuilding

Executive Summary:

As per your organization's request, we have completed our analyses on the impact of the UN's peacekeeping operations on lenient peacebuilding. Our causal models suggest that there is has been a systemic positive impact of past peacekeeping operations on the probability of lenient peacekeeping success 2 and 5 years after a war. Our models also suggest that the probability of peacekeeping is higher when peacebuilding happens over 5 years compared to peacebuilding efforts that happen over two years.

Conclusion:

Our recommendation is that the UN should continue to deploy peacekeeping operations to restore stability on in regions ravaged by war. The fact that multiple causal models give us similar values after controlling for potential confounders gives us confidence in the validity of this recommendation (Table 1). Please note that although our models suggest that peacekeeping operations generally have a positive impact on peacekeeping operations, this **does not mean that each** peacekeeping interventions would be successful. In addition to more sophisticated causal models, we would need to **run additional analyses using predictive models** to make an informed conclusion on the predicted probability of success for any future UN peacekeeping operation.

References

Doyle, M., & Sambanis, N. (2000). Data Sets Notes for International Peacebuilding: A Theoretical and Quantitative Analysis. The American Political Science Review, 94(4), 779-801. doi:10.2307/2586208/. Retrieved from http://www.nyu.edu/gsas/dept/politics/faculty/cohen/codebook.pdf