CS112 – Causal Inference Assignment

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Code: https://gist.github.com/hamparmin/4da33d0b6765d260ac4f85c07dcc6cbb

1.
   a. $GenMatch()$ only outputs a weight matrix. In order to actually match, we would need to run $Match()$ specifying the $Weight.matrix$ argument to be $genout$.
   b. The estimand in $GenMatch()$ is defined as ATE, which is not the default setting for the $Match()$. The default is ATT, so this constitutes a crucial error. We always need to make sure that the arguments are of the two functions are the same.
   c. The $GenMatch()$ does not specify M, however $Match()$ does, such that $M = 2$. We always need to make sure that the arguments are of the two functions are the same. This discrepancy constitutes a crucial error.

2.

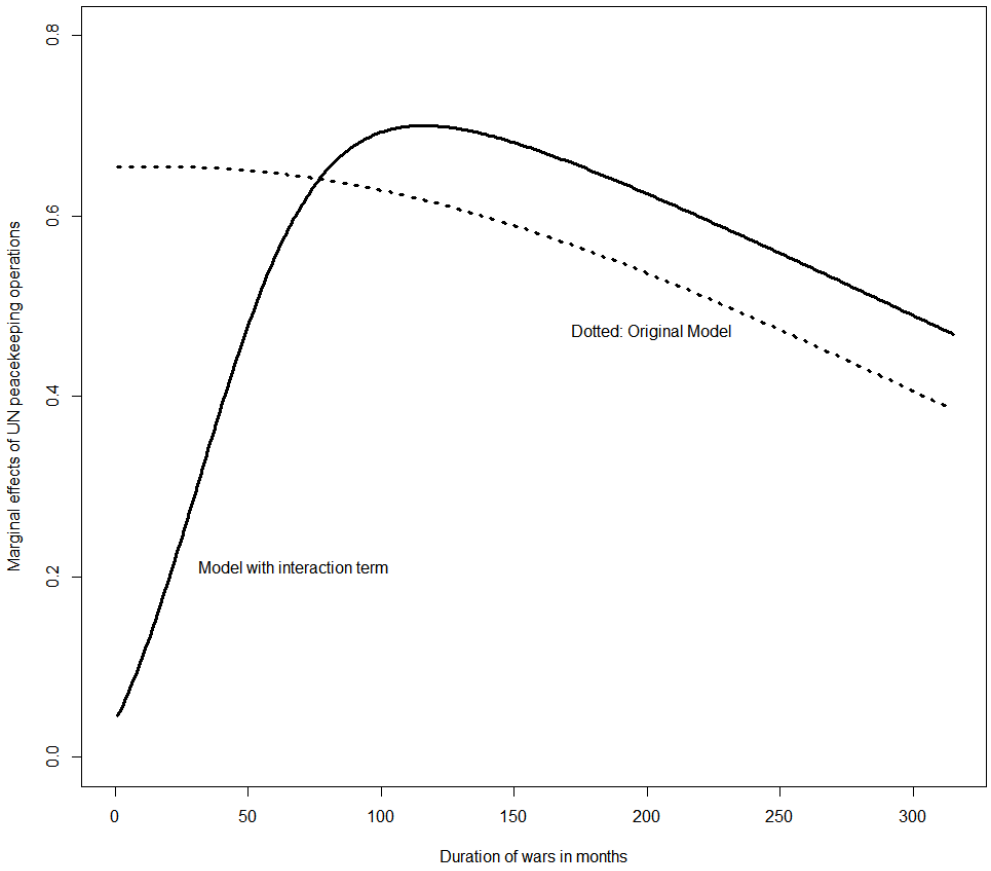

Fig. 1 Replication of Fig 8. (King & Zeng, 2007):
Causal Effect of Multidimensional UN Peacekeeping Operations

3. The code below uses the *untype* variable to create a Tr vector of the same length and mark any type of intervention as 1 and leave everything else as zero.

```
Tr <- rep(0, length(foo$untype))
Tr[which(foo$untype != "None")] <- 1
```

4.

a. What effect does UN intervention, versus no intervention, has on peace measured leniently after 2 and 5 years?

b. $SUTVA$ requires observations of potential outcome on one unit to be unaffected by treatment assignment to the other units; we can imagine that the peacekeeping assignment to one country will have an effect on the peace of nearby countries, thereby violating $SUTVA$. Using the restrict argument in $Match()$ we can specify a matrix of neighbouring countries not to be matched.

c.

TABLE 1. Estimates of the effect of UN peacekeeping on peace using logistic regression, propensity score and genetic matching.

		Treatment effect (BA)	**Treatment Effect (No BA)**	**p-value for mb**
Logistic Regression	len success 2 years	NA*	0.06818	0.00011
	len success 5 years	NA*	0.09848	
Propensity Score Matching	len success 2 years	0.36359	NA**	0.012
	len success 5 years	0.39389	NA**	
Genetic Matching	len success 2 years	0.17608	0.15152	0.228
	len success 5 years	0.20638	0.18182	

*No non bias-adjusted treatment effect was calculated for Logistic Regression
**Leximin p-value was below 0.10

d. DECISION MEMO to *UN Security Council*

i. **Summary**: We were interested in how effective our peacekeeping interventions have been. To find out we have first used a logit model, but as we can see from our figure in **2.**, estimates of the causal effects of intervention on peace are highly model-dependant, which informs us that we need to do some pre-processing in order to get a reliable estimate. Using the treatment variable $untype$, and two different outcome variables we estimated the treatment effect via a simple logistic regression, propensity score and genetic matching and find that with a good balance our causal effect is moderately positive and therefore our efforts are not in vain, we can keep up our peacekeeping activities.

ii. **Conclusion**: Our calculations show that before matching, balance on our covariates was quite low (i.e. p-value of 1e^4). This balance improved a little after propensity score matching (0.012) and then again significantly after genetic matching (0.23). Our treatment estimates (ATT) of UN intervention of any sorts (see our Tr definition in **3.**) on lenient peace definitions are consistently positive. If we take the bias-adjusted estimates for our best-balanced dataset they are 0.176 and 0.206 on our outcome variables *PBS2L* and *PBS5L* respectively, which constitutes a moderately positive effect, therefore we can keep up our peacekeeping activities. Further research could be made into finding out the specific treatment effect of different types of interventions, so we can optimise our operations.

References

King, G., & Zeng, L. (2007). When can history be our guide? The pitfalls of counterfactual inference. *International Studies Quarterly*, 51(1), 183-210.