

Supplementary Material

Propensity Score Matching

PSM is based on counterfactual modeling. For computing the average treatment effect (i.e., the effect of Forced migration), a counterfactual model is estimated. Counterfactual is the potential outcome that we would have obtained in case the not migrated households. With the help of the counterfactual model, the average treatment effect on the treated (ATT) is estimated as

$$\text{ATT} = E(Y1/D = 1) - E(Y0/D = 1)$$

here $E(Y1/D = 1)$ gives the outcome for forced migrated children and $E(Y0/D=1)$ is the expected outcome if forced migrated children become non-migrated.

Similarly, the average treatment effect on the untreated (ATU) is defined mathematically as

$$\text{ATU} = E(Y1/D = 0) - E(Y0/D = 0)$$

where $E(Y1/D=0)$ is the expected outcome if non-migrated children become migrated and $E(Y0/D=0)$ is the outcome for non-migrated children.

Average treatment effect (ATE) is the difference between the expected outcome for migrated and non-migrated children.

The other issues that are important in PSM are “common support,” “balancing property,” and “quality of matching.” Common support ensures that children with the same values of independent variables have a positive probability of being both migrated and non-migrated (Heckman *et al.* 1999). Common support improves the quality of estimates by excluding children for which there are no matched samples. Balancing property tests whether the matching procedure is able to balance the distribution of relevant covariates. Quality of matching examines whether the distributions of propensity scores of migrated and non-migrated children overlap. Sianesi (2004) suggests comparing the pseudo-R2 before and after matching. The pseudo-R2 indicates how well the regressors “X” explain the participation probability (Caliendo *et al.* 2005). The pseudo-R2 should be fairly low after matching, because after matching there should be no systematic difference in the distribution of covariates between migrated and non-migrated children. Additionally, an “F” test may be performed. The test should not be rejected before, and should be rejected after matching (Caliendo *et al.*, 2005). Notably, PSM does not account for potential hidden bias due to unobserved factors that might bias the estimates of the key relationship of interest. More information about the PSM methods used in this article can be found in Rosenbaum *et al.*, (1983). Statistical estimations were done using STATA 13.0.

We had tested aforementioned properties and found that balancing property was satisfied, quality of matching was good and there was no systematic difference in covariates after matching.

Supplementary Table

Table S1. Results of matching estimates showing the effect of forced migration on child cognitive well-being at age 7–8 years (matching based on nearest neighbor)

Variable		Treated	Controls	Difference	S.E.	T-stat
PPVT-Score	Unmatched	3.80	3.92	-0.12	0.04	-2.74
	ATT	3.80	3.85	-0.05	0.04	-1.25
	ATU	3.91	3.79	-0.12		
	ATE			-0.12		
Math-Score	Unmatched	9.10	11.69	-2.58	0.61	-4.23
	ATT	9.10	10.79	-1.68*	0.62	-2.70
	ATU	11.60	9.46	-2.14		
	ATE			-2.11		
EGRA-Score	Unmatched	4.42	5.39	-0.98	0.32	-3.04
	ATT	4.42	5.14	-0.72*	0.33	-2.21
	ATU	5.37	4.58	-0.79		
	ATE			-0.78		
Memory-Score	Unmatched	3.26	3.81	-0.54	0.17	-3.26
	ATT	3.26	3.74	-0.47*	0.17	-2.81
	ATU	3.81	3.33	-0.47		
	ATE			-0.47		

Note: *Significant at 5%, Control variables: all the variable mentioned under control variables section of the manuscript.

References

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