Xie and Dong (AJS 2021): "A New Methodological Framework for Studying Status Exchange in Marriage."

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2021 Soc Stats Reading Group

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Overview

1. Motivation
2. Why Loglinear Models Are Not Enough
3. Exchange Index (IE)
4. Applications*
5. Discussion

Motivation

- What is? “Status exchange in marriage refers to a marriage pattern in which one spouse compensates for his or her disadvantage—relative to the other spouse—in one status dimension with an advantage in another status dimension.” (pp. 1179-1180)

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- Why such debates? Methods!

Why Loglinear Models

Parent\Child	Farming	Non-Farming	Total
Farming	F_{11}	F_{12}	F_{1+}
Non-Farming	F_{21}	F_{22}	F_{2+}
Total	F_{+1}	F_{+2}	$F_{++} = 100$

Table: Intergenerational Mobility: A Hypothetical Population of 100 Pairs

- $F_{ij} = \tau\tau_i^R\tau_j^C\tau_{ij}^{RC}$
- F_{i+} or τ^R: marginal distribution of the parental generation
- F_{+j} or τ^C: marginal distribution of the offspring generation
- τ^{RC}: family (dis)advantage transmitted

Why Loglinear Models

Parent\Child	Farming	Non-Farming	Total
Farming	$F_{11} = 20$	$F_{12} = 20$	$F_{1+} = 40$
Non-Farming	$F_{21} = 15$	$F_{22} = 45$	$F_{2+} = 60$
Total	$F_{+1} = 35$	$F_{+2} = 65$	$F_{++} = 100$

Table: Intergenerational Mobility: A Hypothetical Population of 100 Pairs

- $F_{ij} = \tau\tau_i^R\tau_j^C\tau_{ij}^{RC}$
- $log(F_{ij}) = \mu + \mu_i^R + \mu_j^C + \mu_{ij}^{RC}$
- $log(\theta) = log(\frac{F_{22}/F_{21}}{F_{12}/F_{11}}) = \mu_{22}^{RC}$
- e.g., under the American Dream assumption, $\hat{F_{22}} = 0.65 * 0.6 * 100 = 39$

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Loglinear Model for Status-Exchange

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\begin{aligned}
log(F_{ijkl}) = \mu \\
&+ \mu_1(G_H = i) + \mu_2(S_H = j) + \mu_3(G_W = k) + \mu_4(S_W = l) \\
&+ \mu_{12}(G_H = i, S_H = j) + \mu_{34}(G_W = k, S_W = l) \\
&+ \mu_{13}(G_H = i, G_W = k) + \mu_{24}(S_H = j, S_W = l) \\
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&+ \textit{extra control parameters} \\
&+ \textit{status exchange parameters}
\end{aligned}
$$

- complicated high-way interaction: $(G_H$ - $G_W)$*$(S_H$ - $S_W)$
- model selection
- up next: moving beyond "expected frequencies vs. observed frequencies"

Redefining Status Exchange as a Treatment Effect

Treatment vs. Control

$$D = 1 \; if \; \mathrm{G}_{Hi} \neq \mathrm{G}_{Wi}$$
$$D = 0 \; if \; \mathrm{G}_{Hi} = G_{Wi}$$

Potential Outcomes

$$S_{Wi} = S^1_{Wi} \; if \; D = 1$$
$$S_{Wi} = S^0_{Wi} \; if \; D = 0$$

Redefining Status Exchange as a Treatment Effect

Individual Level

$$\delta_{Wi} = S^1_{Wi} - S^0_{Wi}$$

Group Level

$$ATE(\delta_W) = E(S^1_W - S^0_W)$$

Redefining Status Exchange as a Treatment Effect

Suppose we observe n_1 intermarriages and n_0 in-group marriages:

Naive Estimator

$$\frac{1}{n_1}\sum_{i=1}^{n_1} S_{Wi}^1 - \frac{1}{n_0}\sum_{i=1}^{n_0} S_{Wi}^0$$

Redefining Status Exchange as a Treatment Effect

"[B]etween intermarriages ($D = 0$) and in-group marriages ($D = 1$), if we statistically control for observed differences in the social status of one spouse (e.g., S_H), do we still observe a difference between the two marriage types in the other spouse's social status (e.g., S_W)?" (pp. 1187-1188)

$$e.g.,\ ATT(\delta_W | G_H = 0) = E(S_W^1 - S_W^0 | G_H = 0)$$

EI Estimator

- Step 1: Convert Status to Percentile Ranking
- Step 2: Equalizing the Nonfocal Spouse's Status Distributions between Controls and Treated Cases.
    - "... may appear somewhat counterintuitive to some methodologically sophisticated readers, as the distribution of potential outcomes is commonly assumed to be independent of treatment assignment and therefore does not need to be balanced between treated and control groups." (pp. 1191)

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    - "Intuitively, this distribution balancing procedure ensures that the husband's decision to intermarry or not will not lead to finding a wife from different candidate pools by social status." (pp. 1189)

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    - e.g., for $(G_H = 0, G_W = 1)$, resample so that $Dist(S_w(G_W = 1)) = Dist(S_W(G_W = 0))$

EI Estimator

- Step 3: Matching Controls to Treated Cases by the Focal Spouse's Status and Other Covariates (Ignorability)
- Step 4: Calculating the "Exchange Index"

e.g., Black husband

$$EI_H(G_H = 0, G_W = 1) = \frac{1}{n_{01}} \sum_{i=1}^{n_{01}} (S^1_{Wi} - S^0_{Wi*})$$

Example: Status-Race Exchange

TABLE 2

Status-Race Exchange in Black-Husband and White-Wife Intermarriages in the United States, 2000

	From the Husband's Perspective:				From the Wife's Perspective:			
	Black-Husband and White-Wife Intermarriages (D = 1) vs. Black Marriages (D = 0), i.e., $\mathrm{EI}_H(G_H = \text{black}, G_W = \text{white})$				Black-Husband and White-Wife Intermarriages (D = 1) vs. White marriages (D = 0), i.e., $\mathrm{EI}_W(G_H = \text{black}, G_W = \text{white})$			
	Observed		Resampled for Dist ($S_W(G_W = \text{white})$) Matched on S_H		Observed		Resampled for Dist($S_H(G_H = \text{black})$) Matched on S_W	
	$D = 1$	$D = 0$	$D = 1$	$D = 0$	$D = 1$	$D = 0$	$D = 1$	$D = 0$
Husband's social status (S_H)	51.28	46.12	51.55	51.55	51.28	54.21	51.31	50.27
Wife's social status (S_W)	50.59	47.84	50.71	52.15	50.59	53.33	50.64	50.64
EI	2.75*** (naive)		−1.44***		−2.93*** (naive)		1.04***	
N	7,513	96,861	7,342	66,424	7,513	1,181,505	7,495	562,007

*** $P < .001$, based on robust SEs.

Heterogenous Treatment Effect

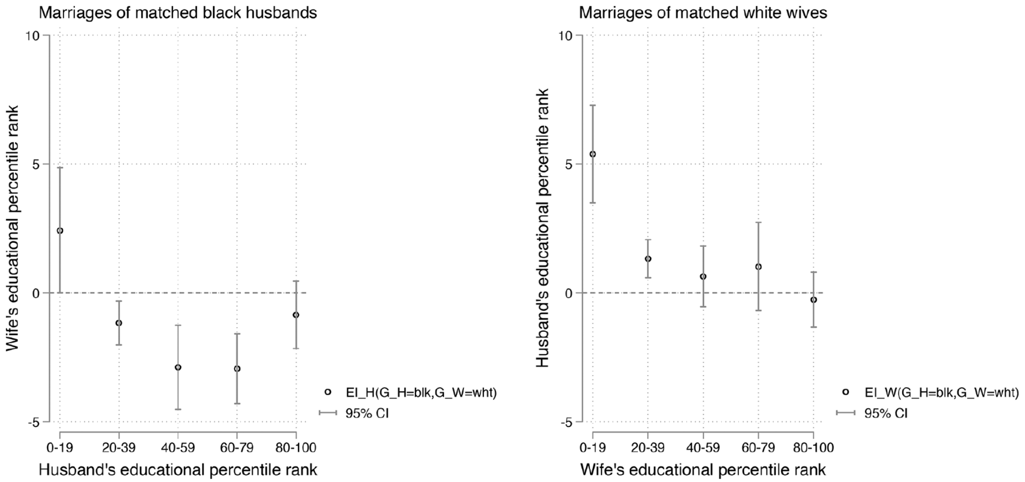

FIGURE 1.—Heterogeneous status-race exchange by own status in black-husband and white-wife intermarriages in the United States, 2000

Nice Properties

- status-EXCHANGED
- flexibility in incorporating other covariates
- heterogeneous treatment effect because of matching
  - individual preferences vs. contextual exposure
- intersectionality

Discussion

- applications: ”especially in the presence of structural changes”
- results vs. process
- understand the effect size substantively