When Do Citizens Support Peace-Building?

Economic Hardship and Civilian Support for Rebel Reintegration

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Supplementary materials.

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Mathematical Appendix

A1 Proof of Proposition 1

Since each citizen's production choice has a marginal impact on aggregate output each citizen optimally produces k_i units. Aggregate production is $\int kf(k)dk$ and equilibrium price is

$$p(q) = \frac{1}{b}\left(a - (1+m)\left(\int kf(k)dk\right)\right)$$

We can define each citizen's agricultural income as a function of the level of reintegrees, m, and their capital endowment k_i,

$$\pi(m, k_i) = \frac{1}{b}\left(a - (1+m)\left(\int kf(k)dk\right)\right)k_i \tag{A-1}$$

Optimal reintegration level is given by the first order condition,

$$u'(\pi(m^i, k_i))\pi_1(m^i, k_i) + \psi = 0$$

where m^i denotes the optimum for citizen i. Re-write m^i as a function of k_i,

$$u'(\pi(m^i(k_i), k_i))\pi_1(m^i(k_i), k_i) + \psi = 0$$

Differentiating with respect to k_i we then have,

$$\begin{aligned}
&\frac{d}{dk_i}\left[u'(\pi(m^i(k_i), k_i))\pi_1(m^i(k_i), k_i) + \psi\right] = \qquad (A\text{-}2)\\
&\quad u''(\pi(m^i(k_i), k_i))\left[\pi_1(m^i(k_i), k_i)\frac{d}{dk_i}m^i(k_i) + \pi_2(m^i(k_i), k_i)\right]\cdot\pi_1(m^i(k_i), k_i)\\
&+\ u'(\pi(m^i(k_i), k_i))\left[\pi_{11}(m^i(k_i), k_i)\frac{d}{dk_i}m^i(k_i) + \pi_{12}(,^i(k_i), k_i)\right]\\
&\qquad\qquad = 0
\end{aligned}$$

Noting that $\pi_{11}(m^i(k_i), k_i) = 0$ and re-arranging,

$$\frac{d}{dk_i}m^i(k_i) = -\frac{u'(\pi(m^i(k_i), k_i))\pi_{12}(m^i(k_i), k_i)}{u''(\pi(m^i(k_i), k_i))\left[\pi_1(m^i(k_i), k_i)\right]^2} - \frac{\pi_2(m^i(k_i), k_i)}{\pi_1(m^i(k_i), k_i)} \tag{A-3}$$

So $\frac{d}{dk_i}m^i(k_i) \geq 0$ if and only if,

$$-\frac{u'(\pi(m^i(k_i),k_i))\pi_{12}(m^i(k_i),k_i)}{u''(\pi(m^i(k_i),k_i))\left[\pi_1(m^i(k_i),k_i)\right]^2} - \frac{\pi_2(m^i(k_i),k_i)}{\pi_1(m^i(k_i),k_i)} \geq 0 \tag{A-4}$$

Differentiating (A-1) we have,

$$\begin{aligned}
\pi_1(m^i(k_i),k_i) &= -\frac{k_i}{b}\int kf(k)dk \\
\pi_2(m^i(k_i),k_i) &= \frac{1}{b}\left(a-(1+m)\left(\int kf(k)dk\right)\right) \\
\pi_{12}(m^i(k_i),k_i) &= -\frac{1}{b}\int kf(k)dk
\end{aligned}$$

Plugging into (A-4) and re-arranging,

$$\begin{aligned}
-\frac{u'(\pi(m^i(k_i),k_i))}{u''(\pi(m^i(k_i),k_i))} &\geq \frac{1}{b}\left(a-(1+m)\left(\int kf(k)dk\right)\right)k_i \\
&\geq \pi(m^i(k_i),k_i)
\end{aligned}$$

Then there exists a $\bar{a}$ such that if $\bar{a} > a$ then the optimal level of re-integrees, m^i, is increasing in capital for any $k_i \in (\underline{k},\bar{k})$.

A2 Proof of Proposition 2

Since $f(k)$ first order stochastically dominates $f'(k)$, then $\mathbb{E}_f[m^i(k_i)] > \mathbb{E}_{f'}[m^i(k_i)]$.

A3 Variation 1: Asymmetric Distributions of Capital

Suppose that reintegrees have capital levels given by distribution g rather than f. Now aggregate supply is $\int kf(k)dk + m\int k(g(k)dk$. Equilibrium price is

$$p(q) = \frac{1}{b}\left(a-\left[\int kf(k)dk + m\int kg(k)dk\right]\right)$$

and income for a citizen with capital k_i is

$$\pi(m,k_i) = \frac{1}{b}\left(a-\left[\int kf(k)dk + m\int kg(k)dk\right]\right)k_i$$

Differentiating the income function we have,

$$\begin{aligned}
\pi_1(m^i(k_i), k_i) &= -\frac{k_i}{b}\int kg(k)dk \\
\pi_2(m^i(k_i), k_i) &= \frac{1}{b}\left(a - \left[\int kf(k)dk + m^i(k)\int kg(k)dk\right]\right) \\
\pi_{12}(m^i(k_i), k_i) &= -\frac{1}{b}\int kg(k)dk
\end{aligned}$$

Plugging into (A-4) from the proof of Proposition **??** we have,

$$\begin{aligned}
-\frac{u'(\pi(m^i(k_i), k_i))}{u''(\pi(m^i(k_i), k_i))} &\geq \frac{1}{b}\left(a - \left[\int kf(k)dk + m\int kg(k)dk\right]\right)k_i \\
&\geq \pi(m^i(k_i), k_i)
\end{aligned}$$

So the result is identical to the case of a symmetric distribution of capital.

A4 Variation 2: Endogenous Demand

Next suppose that price is given by $\frac{1}{b}\left(a(m) - (1+m)\left(\int kf(k)dk\right)\right)$. Equilibrium supply is the same, so price is

$$p(q) = \frac{1}{b}\left(a(m) - (1+m)\left(\int kf(k)dk\right)\right)$$

and profits are,

$$\pi(m, k_i) = \frac{1}{b}\left(a - (1+m)\left(\int kf(k)dk\right)\right)k_i$$

Differentiating the profit function gives,

$$\begin{aligned}
\pi_1(m^i(k_i), k_i) &= -\frac{k_i}{b}\int kg(k)dk \\
\pi_2(m^i(k_i), k_i) &= \frac{1}{b}\left(a - \left[\int kf(k)dk + m^i(k)\int kg(k)dk\right]\right) \\
\pi_{11} &= \frac{k_i}{b}a''(m) \\
\pi_{12}(m^i(k_i), k_i) &= -\frac{1}{b}\int kg(k)dk
\end{aligned}$$

Recall from line (A-3) we have,

$$\begin{aligned}
&\frac{d}{dk_i}\left[u'(\pi(m^i(k_i),k_i))\pi_1(m^i(k_i),k_i)+\psi\right]= \\
&\quad u''(\pi(m^i(k_i),k_i))\left[\pi_1(m^i(k_i),k_i)\frac{d}{dk_i}m^i(k_i)+\pi_2(m^i(k_i),k_i)\right]\cdot\pi_1(m^i(k_i),k_i) \\
&+\ u'(\pi(m^i(k_i),k_i))\left[\pi_{11}(m^i(k_i),k_i)\frac{d}{dk_i}m^i(k_i)+\pi_{12}(m^i(k_i),k_i)\right] \qquad \text{(A-5)} \\
&\qquad\qquad = 0
\end{aligned}$$

Noting that in this case $\pi_{11}(m^i(k_i),k_i)\neq 0$ and re-arranging we have,

$$\frac{d}{dk_i}m^i(k_i)=-\frac{u'(\pi(m^i(k_i),k_i))\left[\pi_{11}(m^i(k_i),k_i)+\pi_{12}(m^i(k_i),k_i)\right]}{u''(\pi(m^i(k_i),k_i))\left[\pi_1(m^i(k_i),k_i)\right]^2}-\frac{\pi_2(m^i(k_i),k_i)}{\pi_1(m^i(k_i),k_i)}$$

Suppose that $0>\frac{d}{dk_i}m^i(k_i)$. Then,

$$0>-\frac{u'(\pi(m^i(k_i),k_i))\left[\pi_{11}(m^i(k_i),k_i)+\pi_{12}(m^i(k_i),k_i)\right]}{u''(\pi(m^i(k_i),k_i))\left[\pi_1(m^i(k_i),k_i)\right]^2}-\frac{\pi_2(m^i(k_i),k_i)}{\pi_1(m^i(k_i),k_i)}$$

But since $\frac{d}{dk_i}m^i(k_i)<0$, $\pi_1 1(m^i(k_i),k_i)<0$ and $u''(\pi(m^i(k_i),k_i))<0$ is must also be that,

$$0>-\frac{u'(\pi(m^i(k_i),k_i))\pi_{12}(m^i(k_i),k_i)}{u''(\pi(m^i(k_i),k_i))\left[\pi_1(m^i(k_i),k_i)\right]^2}-\frac{\pi_2(m^i(k_i),k_i)}{\pi_1(m^i(k_i),k_i)} \qquad \text{(A-6)}$$

Suppose that $a'(m)>\int kf(k)dk$ so that $\pi_{12}(m^i(k_i),k_i)<0$. Then using (A-5) we can re-write (A-6),

$$\frac{1}{b}\left(a(m)+(1+m)\int kf(k)dk\right)k_i>-\frac{u'(\pi(m^i(k_i),k_i))}{u''(\pi(m^i(k_i),k_i))} \qquad \text{(A-7)}$$

But say $\bar{m}>m$ for some $\bar{m}>0$. Then there exists a $\bar{a}$ such that if $\bar{a}>a(\bar{m})$ the last line is a contradiction for any $m\in(0,\bar{m})$. So the same result holds provided that $\int kf(k)dk>a'(m)$ for any $m\in(0,\bar{m})$ and the setting is relatively impoverished ($\bar{a}>a'(\bar{m})$). The left hand side is aggregate supply. So if the marginal impact of m on demand is smaller than total equilibrium supply under $m=0$ than the same result obtains.

Empirical Appendix

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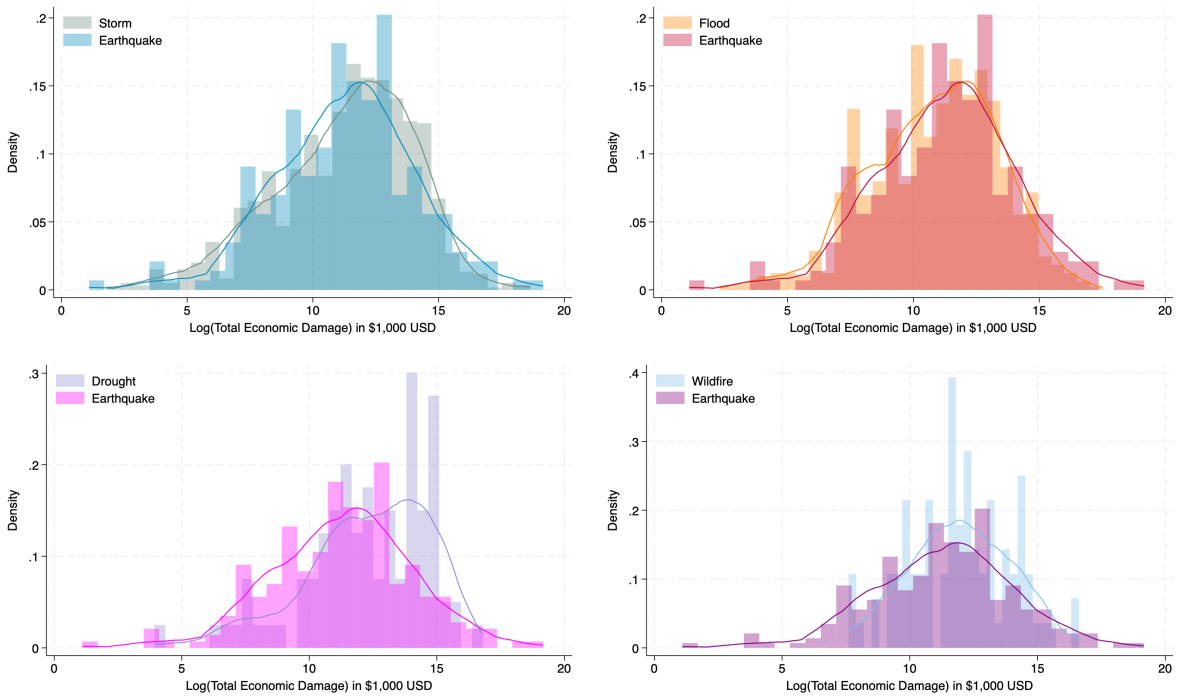


Figure B-1: Economic Damage from Earthquakes Vs. Other Disasters

Damage estimates obtained from the EM-DAT database.

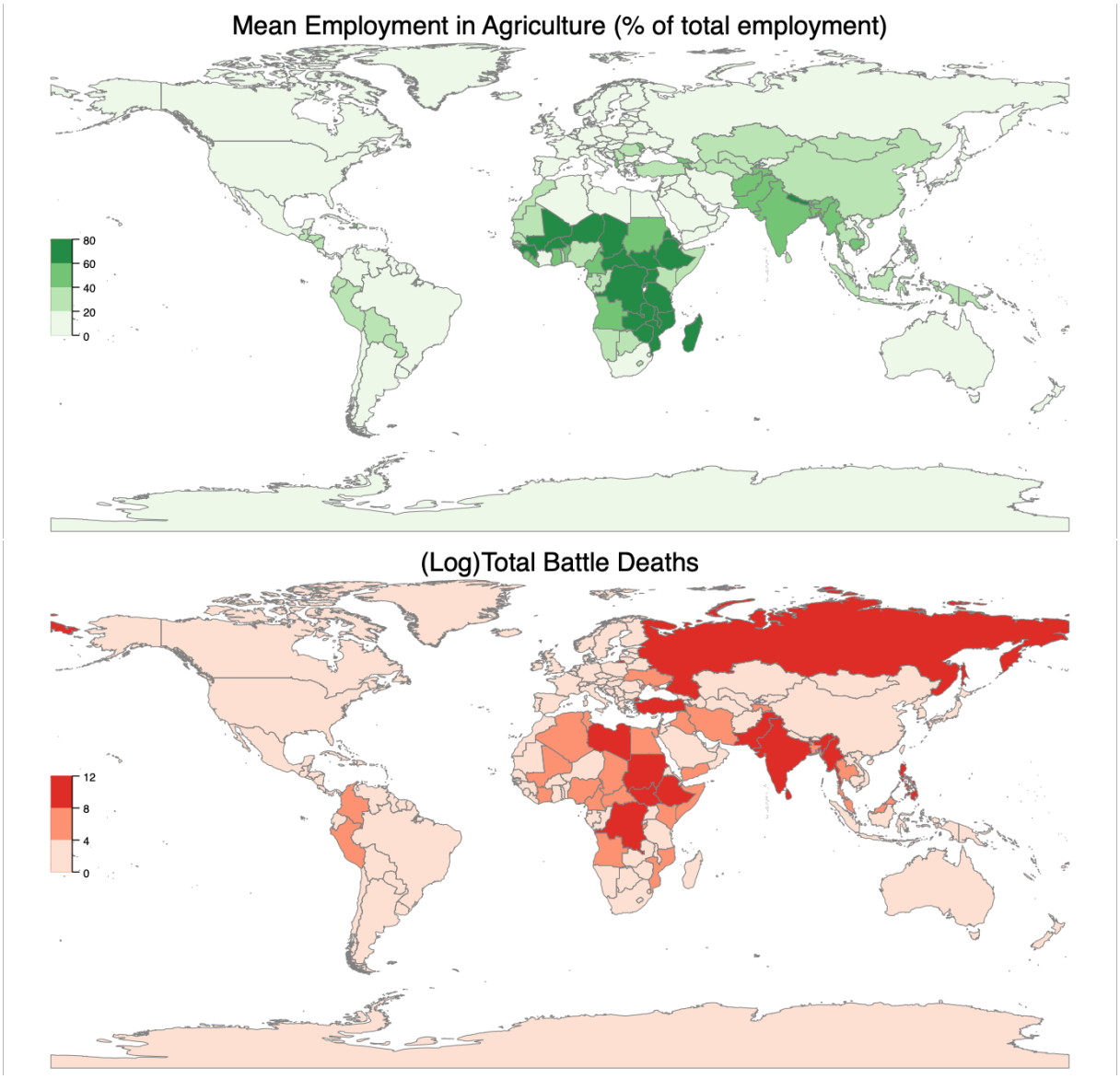
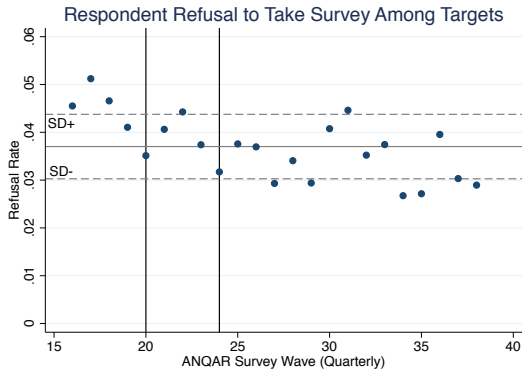
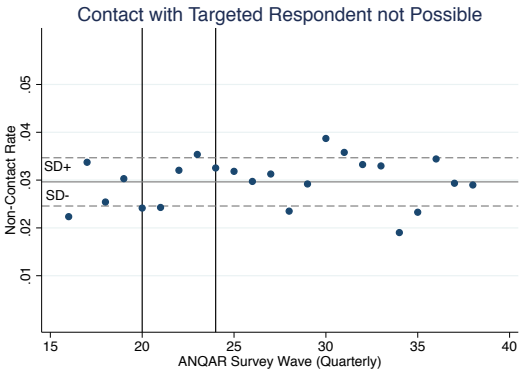


Figure B-2: Agricultural Reliance in Conflict-Prone States, 2008-2017

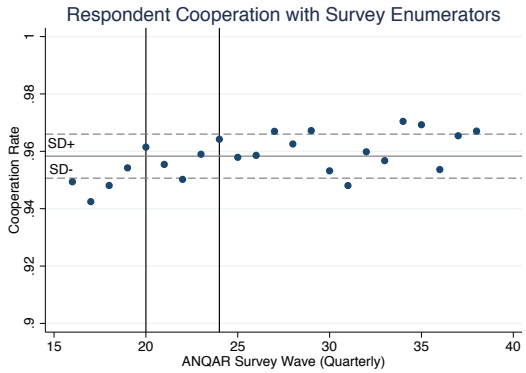
Agricultural employment obtained from the World Bank's Word Development Indicators database. Battle deaths obtained from Uppsala Conflict Data Program.



(a) Refusal rate



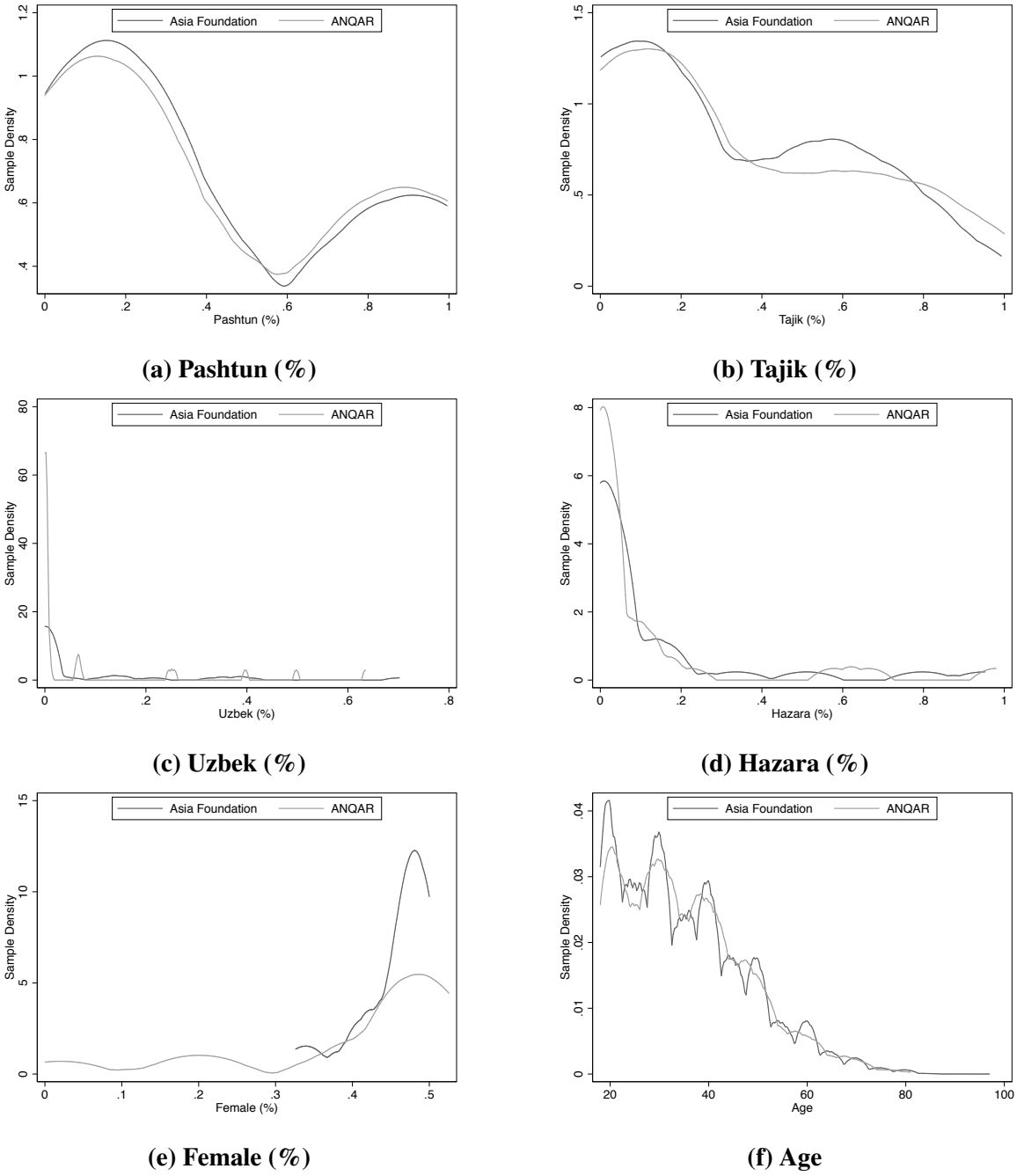
(b) Non-contact rate



(c) Cooperation rate

Figure B-3: ANQAR diagnostics during later waves (16-38) conducted by firm collecting ANQAR (ACSOR).

Data on refusal, non-contact, and overall cooperation were shared with the authors by NATO. Author's own calculations.



(a) Pashtun (%) **(b) Tajik (%)**

(c) Uzbek (%) **(d) Hazara (%)**

(e) Female (%) **(f) Age**

Figure B-4: Comparison of ANQAR and Asia Foundation Demographic Data.

Panels A-E are province averages of binary demographics; Panel F uses individual-level age data (continuous). Asia Foundation data includes information from 2006 to 2018 and is plotted in black; ANQAR is plotted in gray. Demographics are highly consistent across the two data sources.

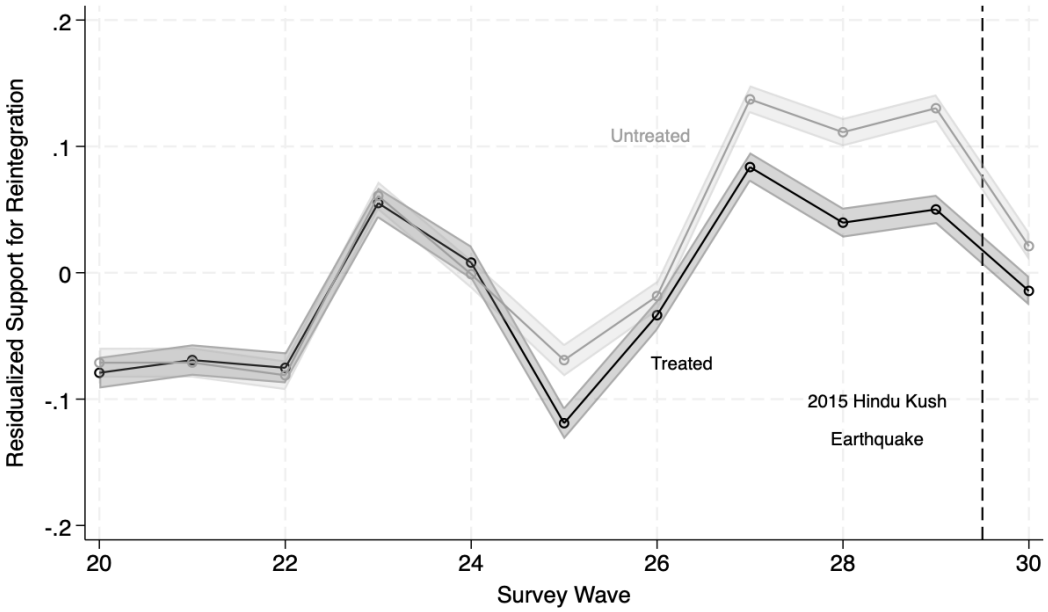


Figure B-5: Residualized support for integration, pretend

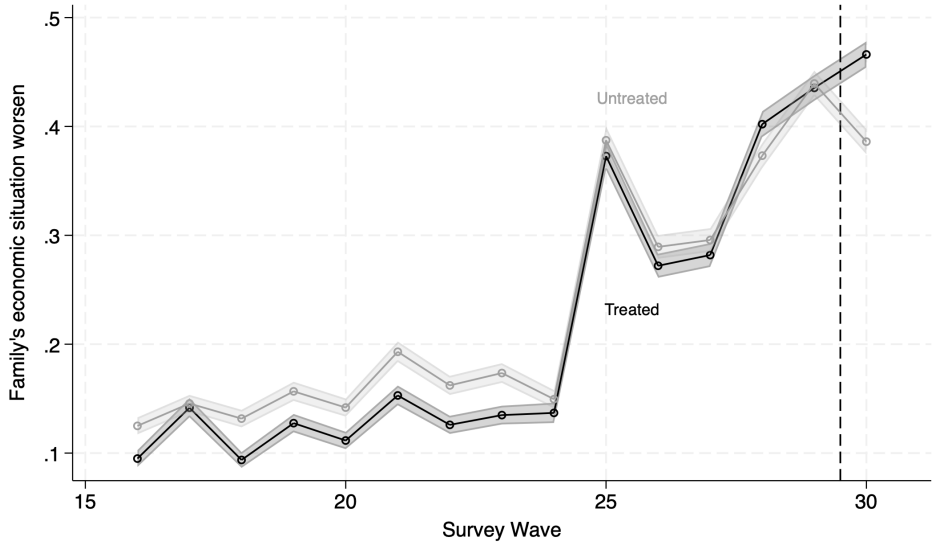


Figure B-6: Trends in worsening economic situation

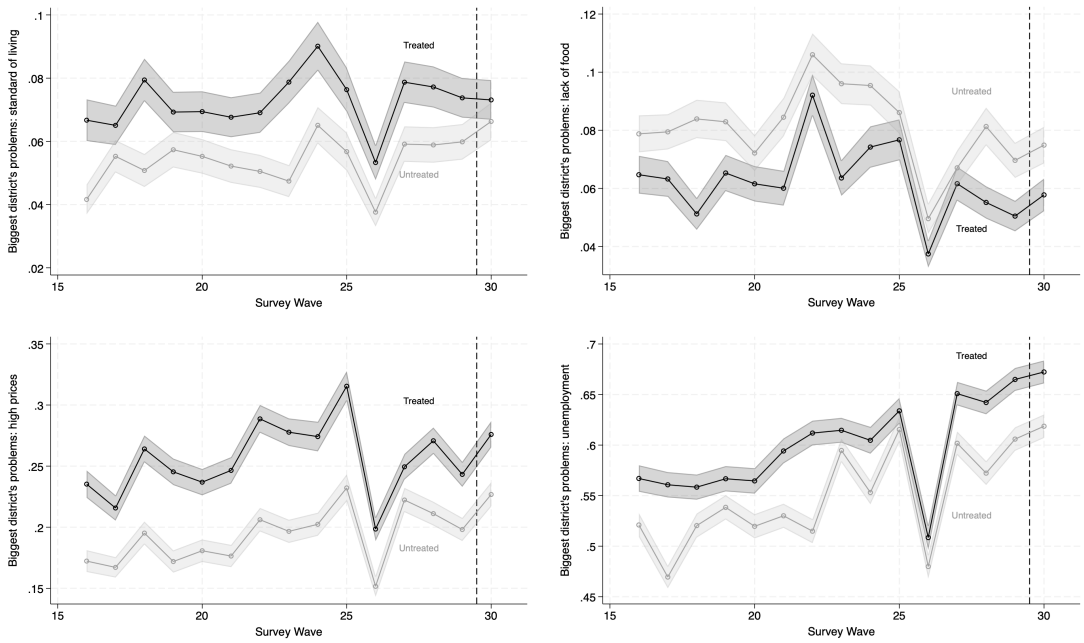


Figure B-7: Parallel trends in treated versus untreated units for key macroeconomic variables.

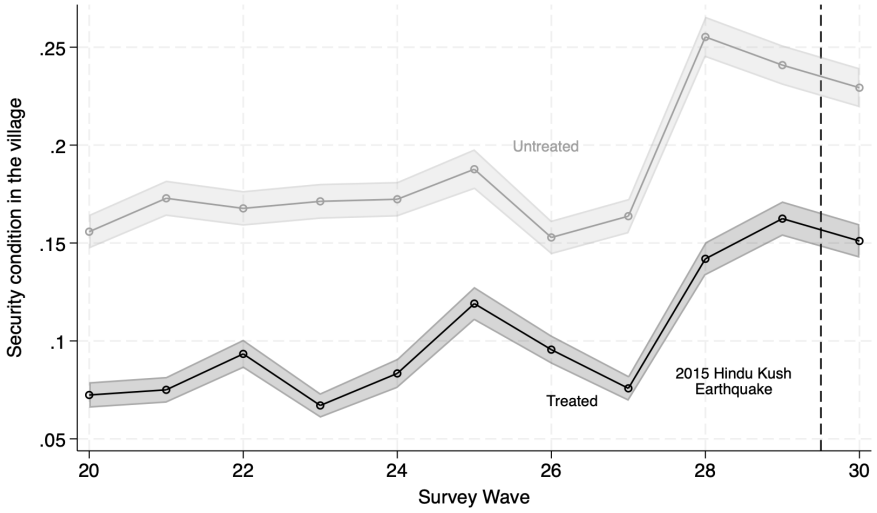


Figure B-8: Trends in perceived security

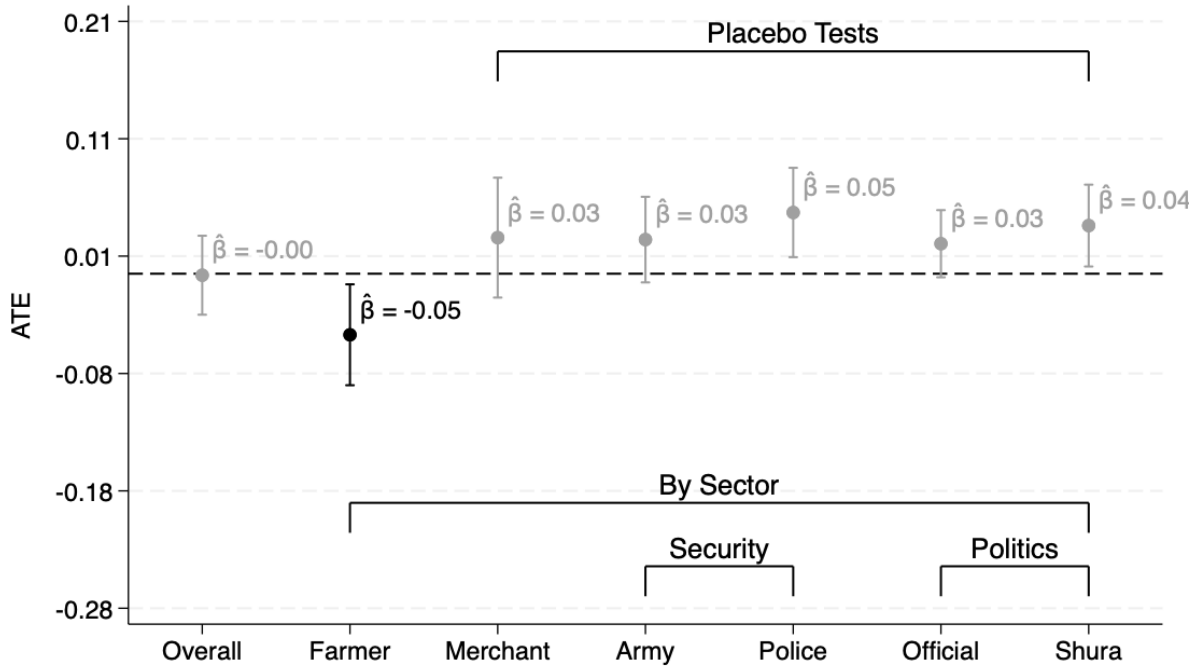


Figure B-9: Additional Sensitivity Tests for Treatment Classification using distance-based measure.

Additional regression controls include: number of persons living in the household; number of persons present during the interview; the level of comfort of the respondent; the level of understanding exhibited by the respondent; security condition in the village; government control over the respondent's village or neighborhood (mantaqa); patrol frequency of government forces.

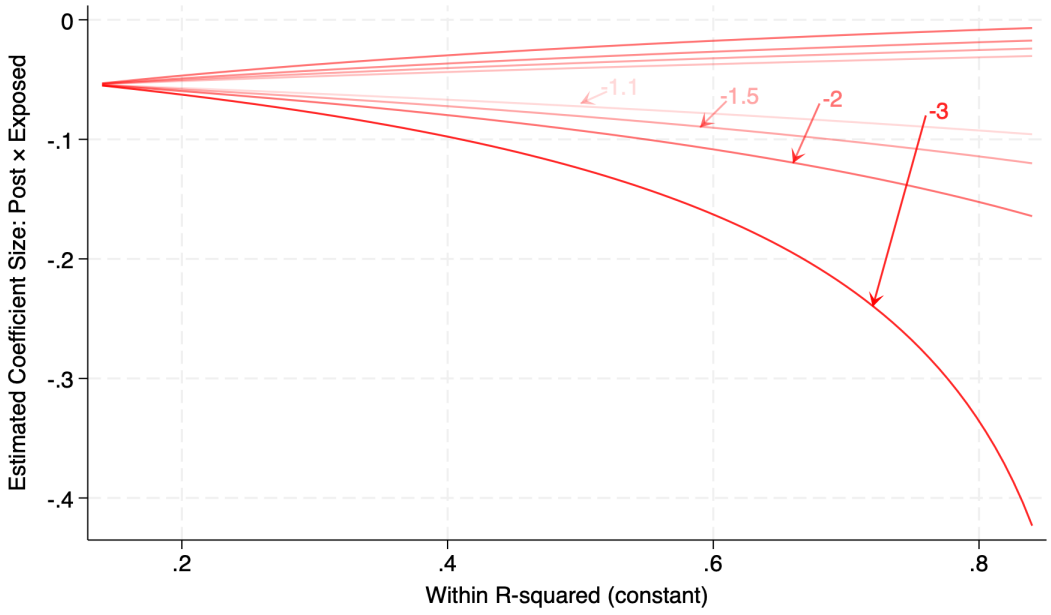


Figure B-10: Sensitivity analysis (Oster test)

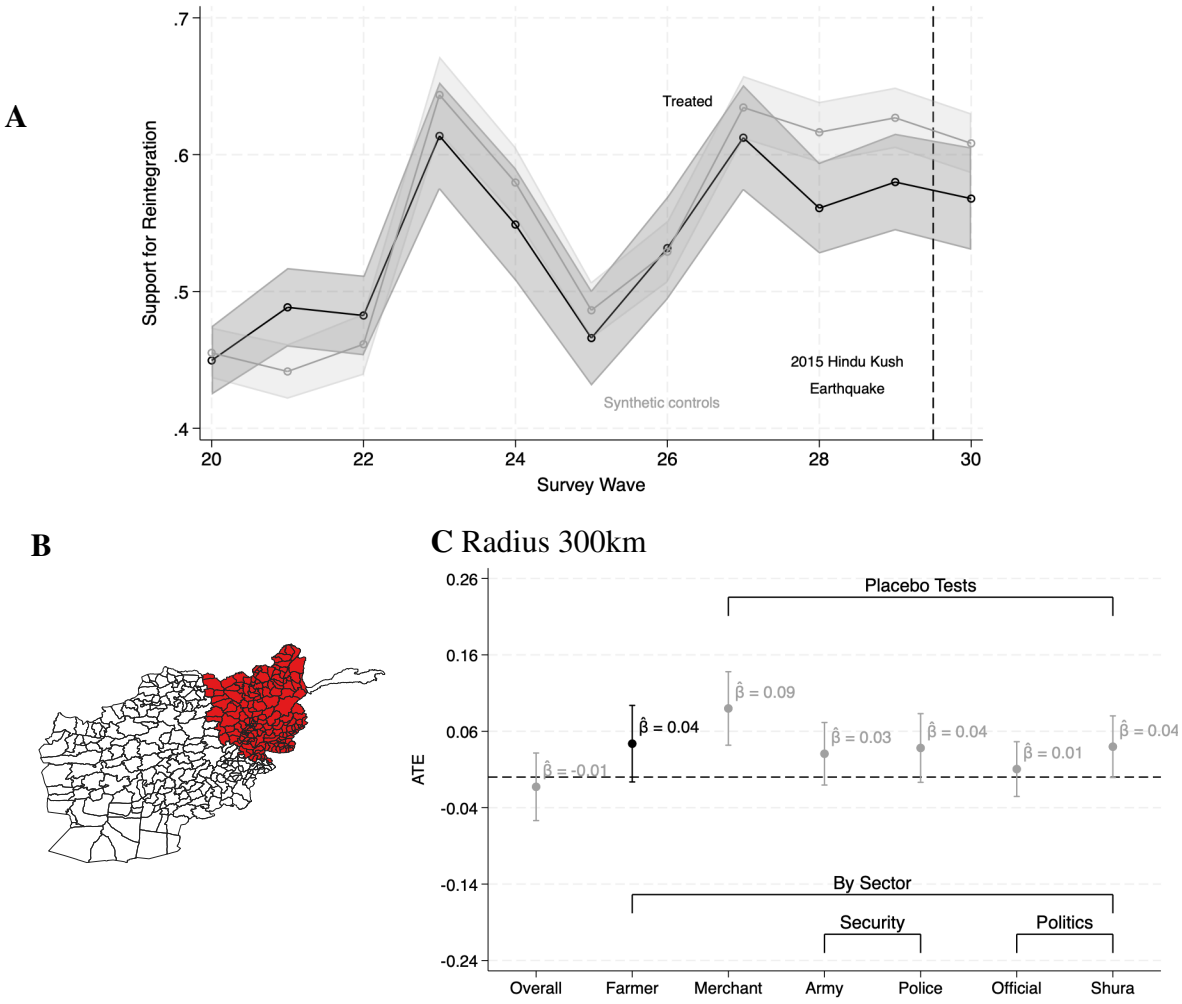


Figure B-11: Parallel Trends, Treatment Classification, Generalized Synthetic Control Method

Panel (A): Over time comparison of average overall support for combatant reintegration between districts, treated district versus synthetic controls. Panel (B): Treatment classification using 300km radius from epicenter. Panel (C): Estimated effect of the earthquake on mean overall support for reintegration, support for reintegration into agriculture, and reintegration into various non-agricultural sectors.

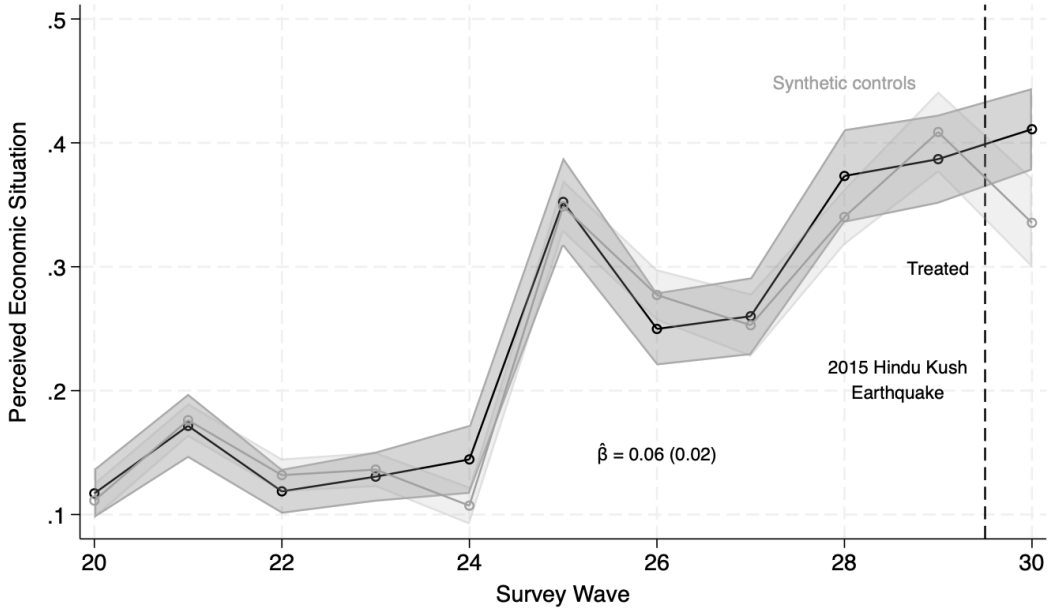


Figure B-12: Pre-trends and treatment effect of economic situation (district level)

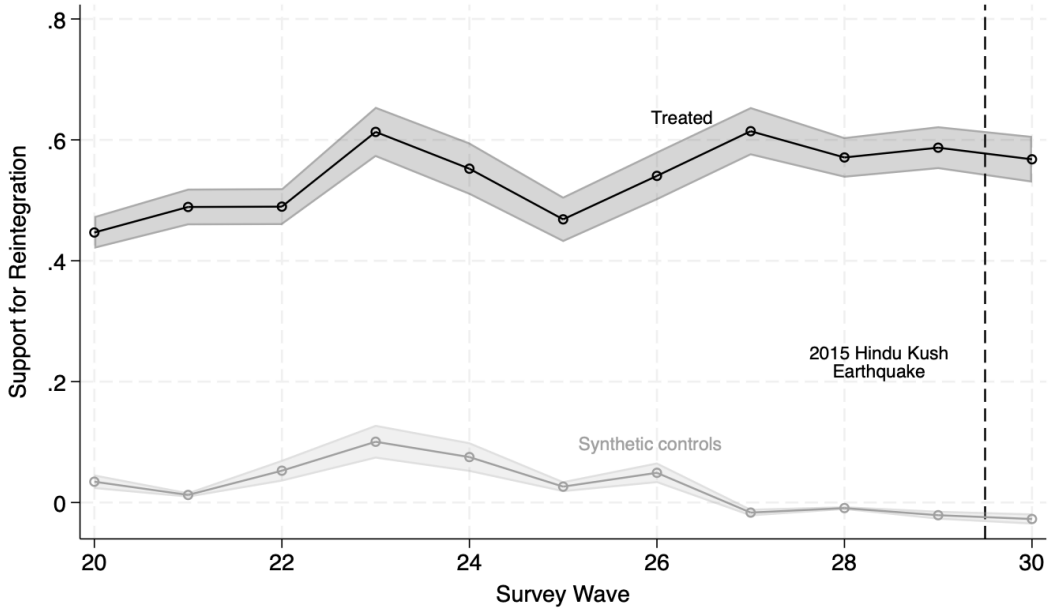


Figure B-13: Pre-trends of mean support of reintegration on district level (with GSC on economic situation)

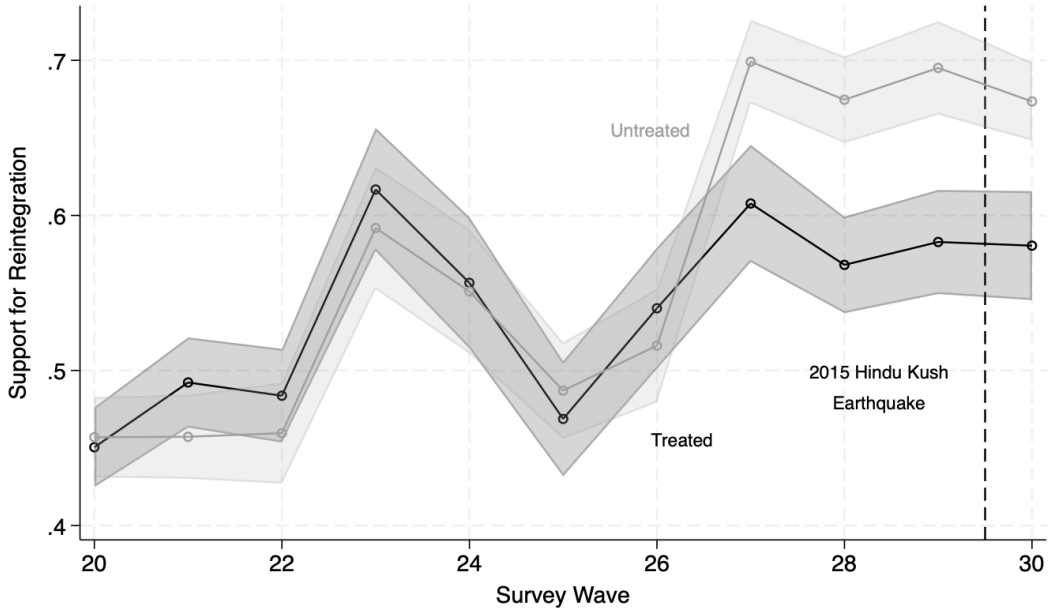


Figure B-14: Pre-trends of mean support of reintegration on district level

	(1) Age	(2) Age2	(3) Some Schooling	(4) Soci-economic Status	(5) Gender	(6) Pashtum	(7) Tajik	(8) Uzbek	(9) Hazara
Post	0.146	4.678	0.014	-0.041	0.009	-0.001	-0.006	0.001	-0.002
	(0.309)	(24.799)	(0.014)	(0.055)	(0.010)	(0.014)	(0.012)	(0.009)	(0.006)
Post × Treated	0.761	58.561	-0.014	0.124	-0.012	0.006	-0.019	-0.000	0.021**
	(0.470)	(38.695)	(0.020)	(0.108)	(0.013)	(0.020)	(0.018)	(0.012)	(0.008)
Observations	23340	23340	23340	23340	23340	23340	23340	23340	23340

Table B-1: Pre-Treatment Demographic Changes (Waves 24-25)

	(1) Age	(2) Age2	(3) Some Schooling	(4) Soci-economic Status	(5) Gender	(6) Pashtum	(7) Tajik	(8) Uzbek	(9) Hazara
Post	0.164	13.529	-0.010	-0.065	-0.017**	0.027**	-0.025*	-0.001	0.001
	(0.295)	(23.928)	(0.014)	(0.045)	(0.008)	(0.013)	(0.013)	(0.009)	(0.006)
Post × Treated	-0.248	-14.473	0.029	0.025	0.009	-0.012	0.010	-0.001	0.006
	(0.394)	(31.203)	(0.018)	(0.058)	(0.010)	(0.017)	(0.018)	(0.011)	(0.008)
Observations	26210	26210	26210	26210	26210	26210	26210	26210	26210

Table B-2: Pre-Treatment Demographic Changes (Waves 26-27)

	(1) Overall support	(2) Farmer	(3) Merchant	(4) Police Officer	(5) Army Officer	(6) Shura Member	(7) Local Official
Post	-0.018	-0.069	-0.116	-0.138**	-0.115*	-0.056	-0.042
	(0.069)	(0.075)	(0.075)	(0.066)	(0.059)	(0.056)	(0.044)
Post × Treated	-0.001	-0.045*	0.040	0.044*	0.026	0.038*	0.023
	(0.021)	(0.025)	(0.028)	(0.023)	(0.021)	(0.021)	(0.017)
Observations	25917	26755	26743	26743	26621	26555	26501

Table B-3: Treatment-Covariate Interactions

Notes: All regressions include interaction of Post with demographic controls (ethnicity, gender, socio-economic status, age, and educational attainment).Stars indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.