the role of conflict in sex discrimination: the case of missing girls

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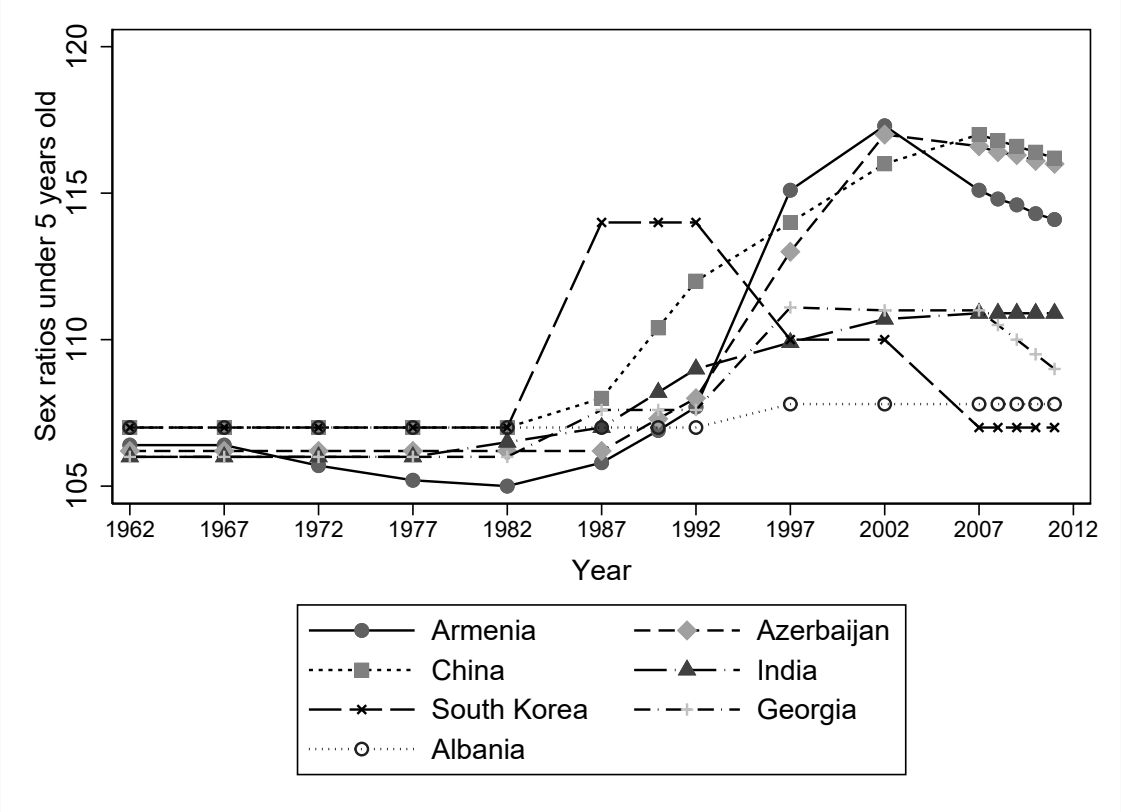
background and context

missing girls - sex ratios at birth exceeding $\sim$ 110



- natural sex ratios at birth: around 105 boys for 100 girls; armenia: 117
- about 100 million women "missing" - females who would be alive if their survival was not interrupted (sen 1990).

literature: reasons for missing girls

- perception of males as the more productive sex (ahn 1995).
- women's low earnings potential (qian 2008).
- old age support from male children (das gupta et al 2003).
- patrilineal kinship systems (ebenstein 2010).
- *our explanation*: threat of conflict.

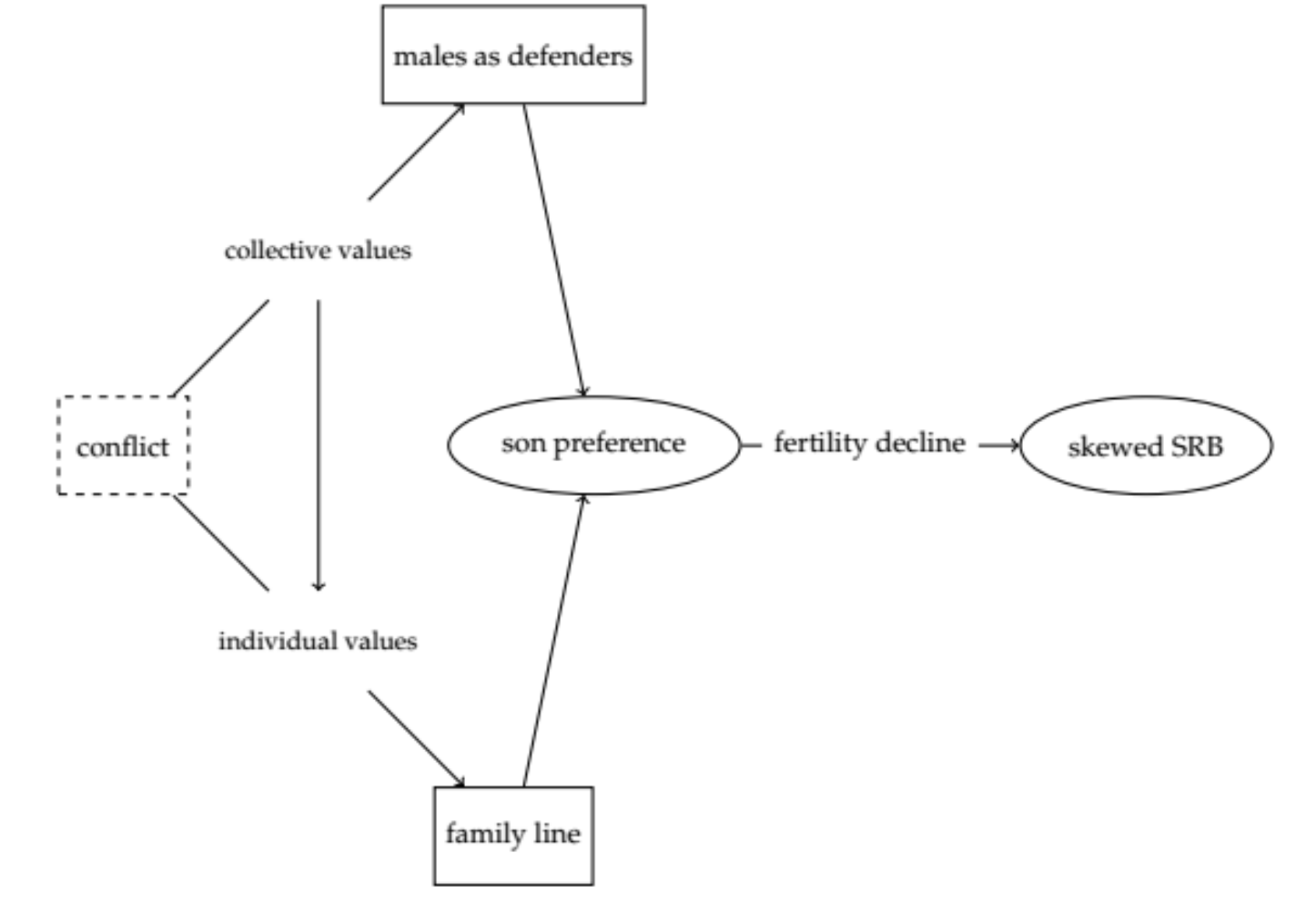
literature: gender-related consequences of conflicts

- la mattina (2018) and ramos-toro (2018) on conflict and gender disparities in outcomes.
  - within household; overall social positioning but not sex ratios at birth.
- biological literature on sex ratios at birth during and after wars based on stress hormones, coital frequency and timing.
  - ambiguous findings, predicted consequences disappear shortly after the war.
- tight marriage markets led to an increase in the percentage of boys among newborns immediately after the war (bethmann and kvasnicka 2014).

some premises

- prospect theory and conflict (mcdermott et all 2008) - once survival is at threat, individuals make risky choices.
  - son preference - forgoing daughters; risk of death in war.
- when there is threat to group's survival, individual preferences are derived from in-group preferences (weisel & zultan, 2016).
  - son preference as group-conforming, traditional choice.
- sons increase the likelihood of group survival, especially in patrilineal and patriarchal societies.
  - vertical and horizontal cultural transmission (cavalli-sforza & feldman 1981).

conceptual framework

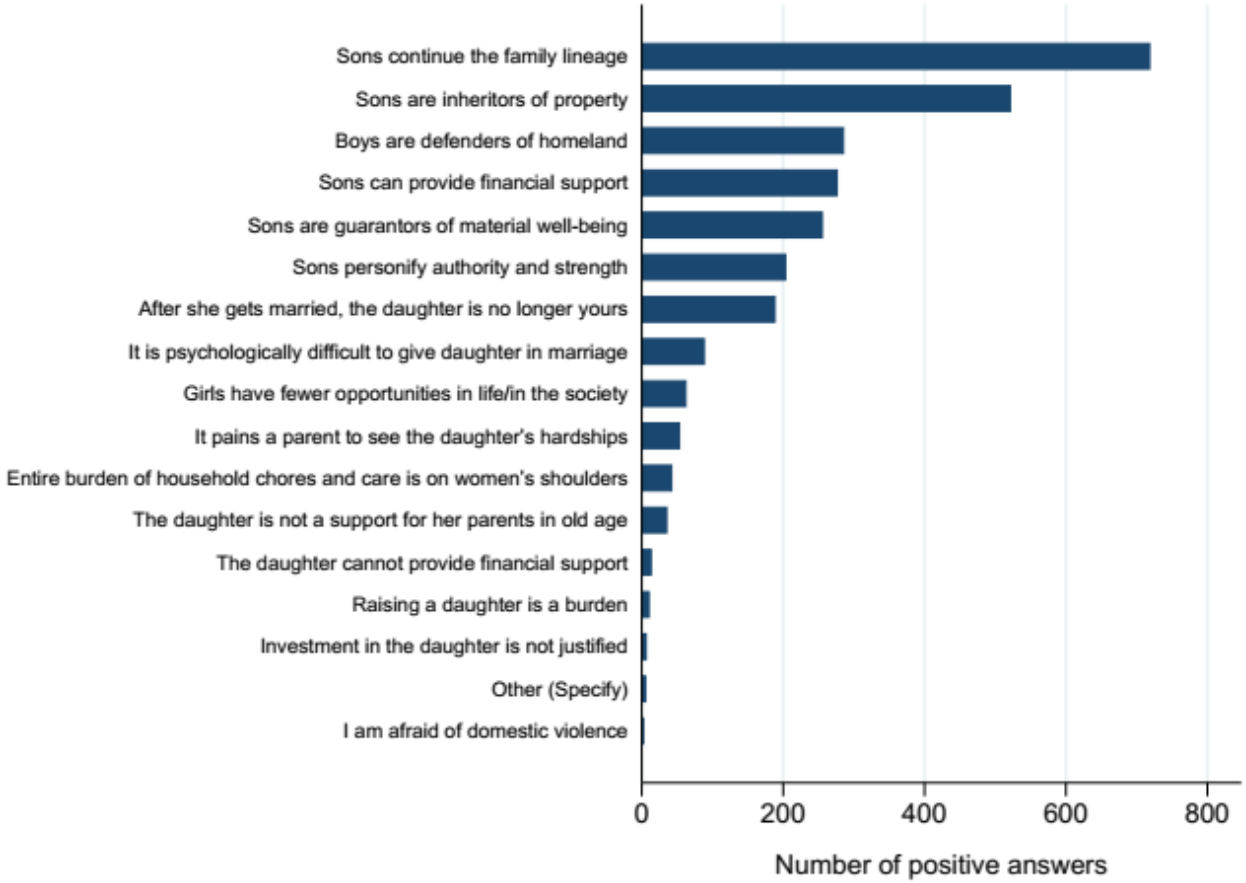


nagorno-karabakh conflict

Note. Source: De Waal (2010), p.161

- nagorno karabakh war 1992-1994 - unresolved.
- increased violations of ceasefire since 2008.
    - "an arms race, excalating front-line clashes, war rhetoric and a virtual breakdown in peace talks are increasing the chance armenia and azerbaijan will go back to war" (icg 2011).

reasons for son preference: armenian households



Note. The source is the household survey conducted in 2011 within the framework of Strengthening Sexual and Reproductive Health Services project (Abrahamyan et al., 2012). Responses are based on survey question asked in the sub-sample of women who express son preference: "Why does your family give preference to sons rather than to daughters?" More than one answer could be given.

empirical strategy

individual-level approach

hypothesis 1: fear of conflict exacerbates son preference.

- data: caucasus barometer wave 2010; population: individuals aged 18-80.
- method: univariate probit model (with extensive controls); bivariate probit model using History of forced displacement as an IV; matching approaches (entropy balancing, traditional psm).
    - dv: Son bias; RHS variable of interest: Fear of conflict.

community-level approach

hypothesis 2: Close distance to the conflict zone leads to higher sex ratios at birth (given fertility decline and access to ultrasound).

- data: 2001 and 2011 censuses; population: 76 communities; includes all the cities and towns, and the villages with over 5000 inhabitants.
- method: community level difference-in-difference; dv: sex ratio at 0-4 years old.
- period: pre-ceasefire: 1987-1996 and post ceasefire: 1997-2001, 2002-2006, 2007-2011.
- treatment group: communities closer than the sample average to conflict centre are in the treatment group, otherwise in the control group.

individual-level analysis

individual-level descriptive statistics

Variables	Definition	Mean (s.d.)		
		No Fear	Fear	All
Fear of conflict	0-1 binary variable; equals 1 if the peace/territorial integrity are rated as key national issues	0	1	0.21 (0.41)
Son bias	0-1 binary variable; equals 1 if the preferred gender for a single-child family is a boy	0.51 (0.50)	0.65 (0.48)	0.54 (0.50)
Male	0-1 binary variable; equals 1 if respondent is a male	0.49 (0.50)	0.52 (0.50)	0.50 (0.50)
Age	Respondent's age in years	40.87 (16.42)	42.96 (15.83)	41.30 (16.32)
Partnered	0-1 binary variable; equals 1 if respondent has a partner	0.66 (0.47)	0.69 (0.46)	0.67 (0.47)
Educ$\leq$ 10	0-1 binary variable; equals 1 if respondent has at most 10 years of education	0.43 (0.50)	0.36 (0.48)	0.42 (0.49)
Educ 11-14	0-1 binary variable; equals 1 if respondent has between 11 and 14 years of education	0.35 (0.48)	0.38 (0.48)	0.35 (0.48)
Educ$\geq$ 15	0-1 binary variable; equals 1 if respondent has 15 or more years of education	0.22 (0.42)	0.27 (0.44)	0.23 (0.42)
N		1318	358	1676

Note.---Means are representative of the population. Standard deviations in parentheses.

individual-level descriptive statistics continued

Variables	Definition	Mean (s.d.)		
		No Fear	Fear	All
Employed	0-1 binary variable; equals 1 if respondent reports having a job	0.38 (0.48)	0.43 (0.50)	0.39 (0.49)
Poor standing	0-1 binary variable; equals 1 if household's perceived economic standing is relatively poor	0.22 (0.41)	0.16 (0.37)	0.21 (0.40)
Fair standing	0-1 binary variable; equals 1 if household's perceived economic standing is relatively fair	0.65 (0.48)	0.68 (0.47)	0.65 (0.48)
Good standing	0-1 binary variable; equals 1 if household's perceived economic standing is relatively good	0.14 (0.35)	0.16 (0.36)	0.14 (0.35)
Capital city	0-1 binary variable; equals 1 if respondent lives in capital city	0.34 (0.48)	0.31 (0.46)	0.34 (0.47)
Other urban	0-1 binary variable; equals 1 if respondent lives in urban area	0.34 (0.47)	0.30 (0.46)	0.33 (0.47)
Rural	0-1 binary variable; equals 1 if respondent lives in rural area	0.31 (0.46)	0.39 (0.49)	0.33 (0.47)
N		1318	358	1676

Note.---Means are representative of the population. Standard deviations in parentheses.

baseline individual model - probit marginal effects

Control variables	(1)	(2)	(3)	(4)	(5)
Fear of conflict	0.138***	0.140***	0.146***	0.145***	0.122***
	(0.028)	(0.029)	(0.029)	(0.029)	(0.030)
Male		0.108***	0.110***	0.109***	0.098***
		(0.025)	(0.025)	(0.026)	(0.026)
Age		-0.002**	-0.002**	-0.002**	-0.001*
		(0.001)	(0.001)	(0.001)	(0.001)
Partnered		0.043	0.043	0.035	0.010
		(0.027)	(0.027)	(0.027)	(0.028)
Educ$\leq$ 10			0.150***	0.151***	0.090**
			(0.031)	(0.033)	(0.035)
Educ 11-14			0.125***	0.131***	0.105***
			(0.032)	(0.033)	(0.034)
Employed				0.008	0.030
				(0.028)	(0.028)
Poor standing				-0.021	-0.000
				(0.044)	(0.044)
Fair standing				0.047	0.058
				(0.038)	(0.038)
Other urban					-0.015
					(0.032)
Rural					0.228***
					(0.030)
N	1723	1696	1693	1676	1676

Note.--- Dependent variable is Son bias.

individual models by different sub-samples - probit marginal effects

Control variables	(1)	(2)	(3)	(4)	(5)	(6)
Fear of conflict	0.149***	0.076*	0.141***	0.103**	0.102**	0.138***
	(0.040)	(0.044)	(0.042)	(0.044)	(0.047)	(0.039)
Baseline controls included	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.080	0.059	0.085	0.065	0.065	0.074
N	824	852	864	812	695	981

Note.--- Dependent variable is: Son bias. Sample is limited to: males in column (1); females in column (2); 46-80 years-old individuals in column (3); 18-45 years-old individuals in column (4); individuals with at most 10 years of education in column (5) and individuals 11 or more years of education in column (6). Marginal effects for a discrete change of a variable from 0 to 1 for a person with Fear of conflict=0; controls are fixed at sample means. Standard errors in parentheses. *Denotes significance at 10 percent; **at 5 percent; ***at 1 percent levels.

individual model with comprehensive controls

Control variables	(1)	(2)	(3)	(4)	(5)	(6)
	A: Univariate probit estimates					
Fear of conflict	0.122***	0.121***	0.119***	0.107***	0.104***	0.108***
	(0.030)	(0.030)	(0.030)	(0.032)	(0.033)	(0.033)
Russian fluent		-0.013	-0.011	-0.027	-0.030	-0.036
		(0.039)	(0.039)	(0.042)	(0.043)	(0.043)
Russian native		-0.084	-0.102	-0.108	-0.111	-0.126
		(0.076)	(0.078)	(0.084)	(0.084)	(0.086)
No overseas trips			0.010	0.026	0.025	0.028
			(0.029)	(0.032)	(0.032)	(0.032)
Racial tolerance			-0.084***	-0.071**	-0.075**	-0.074**
			(0.030)	(0.032)	(0.032)	(0.033)
Religious majority				0.006	0.007	-0.008
				(0.072)	(0.072)	(0.074)
Very religious				-0.027	-0.024	-0.018
				(0.029)	(0.029)	(0.030)
Has close people					-0.015	-0.001
					(0.040)	(0.041)
Feels emptiness					-0.008	-0.002
					(0.029)	(0.029)
Distrust in army						0.038
						(0.034)
Baseline controls included	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.069	0.070	0.074	0.077	0.074	0.074
N	1676	1671	1649	1430	1409	1387
	B: Bivariate probit estimates					
Fear of conflict						0.066*
						(0.036)
Comprehensive controls included						Yes
N						1363

Note.--- Dependent variable is Son bias. Panel B reports the bivariate predicted probability In the bivariate probit model, History of forced displacement is excluded from the equation of Son bias but is included in the equation of Fear of conflict with an estimated coefficient of 0.334 significant at 1 percent level.

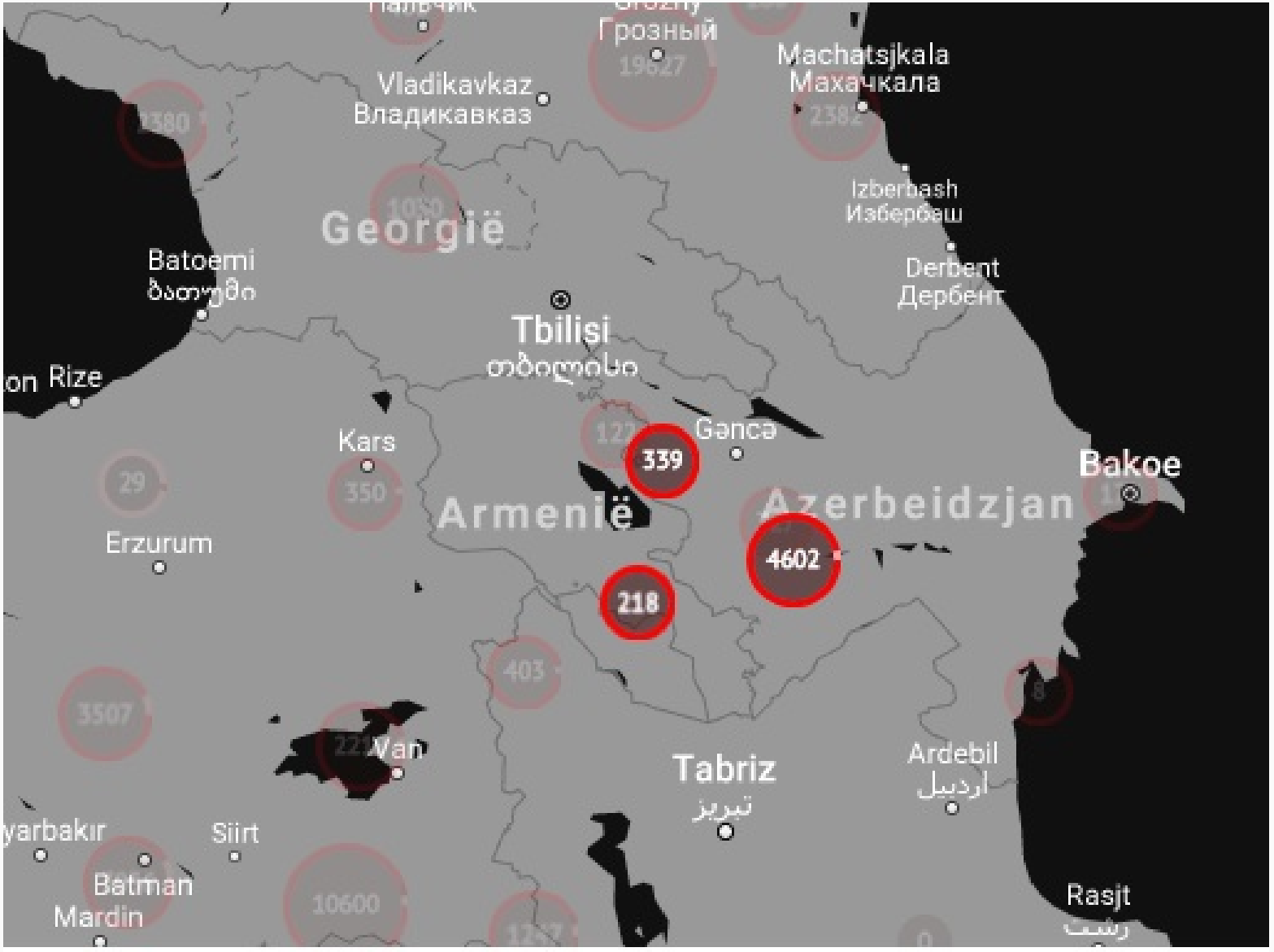
matching estimations

	(1)	(2)	(3)
Fear of conflict	0.093***	0.104**	0.095**
	(0.026)	(0.046)	(0.041)
N	1387	1387	1387

Note.---Column (1) reports average treatment effects on the treated obtained by weighted least squares regressions where observations in the treatment group have a weight of 1 and observations in the control group have a positive weight obtained from matching using entropy balancing; the full set of matching covariates are included as control variables. Column (2) and column (3) report the average treatment effects from Kernel and radius matching estimators with bandwidth = 0.0009 and with standard errors calculated from bootstrapping with 50 replications; the propensity scores are calculated using the entire set of comprehensive controls.

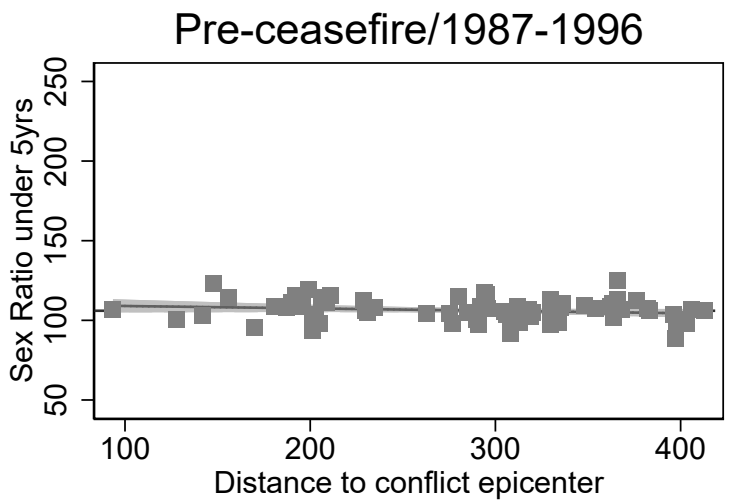
community-level analysis

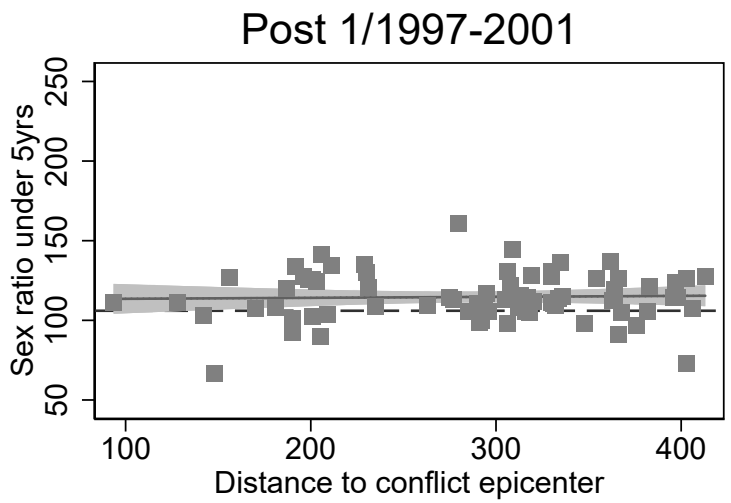
conflict epicentre: battle-related deaths 1987-2011

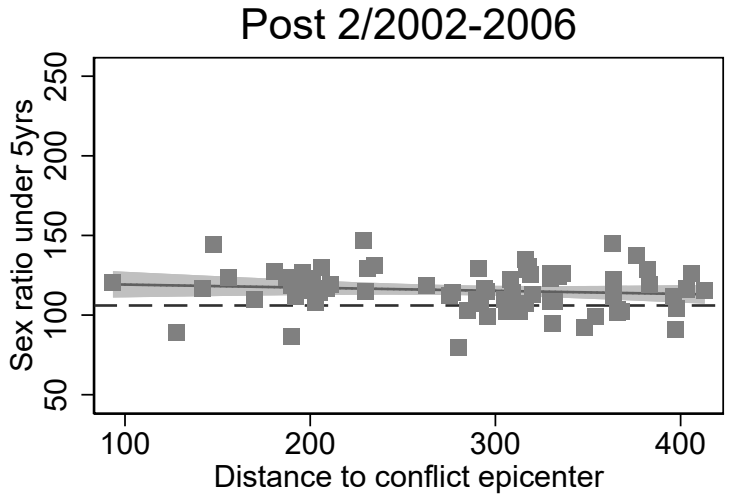


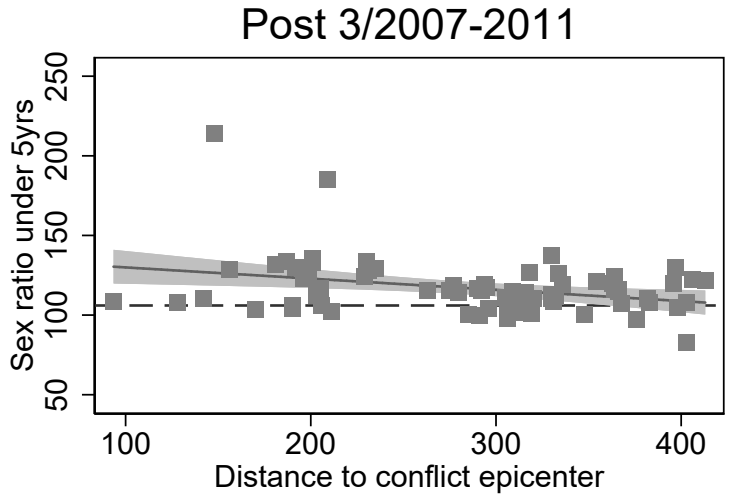
ceasefire epicentre: battle-related deaths 1996-2011

distance to conflict epicentre and sex ratios at birth

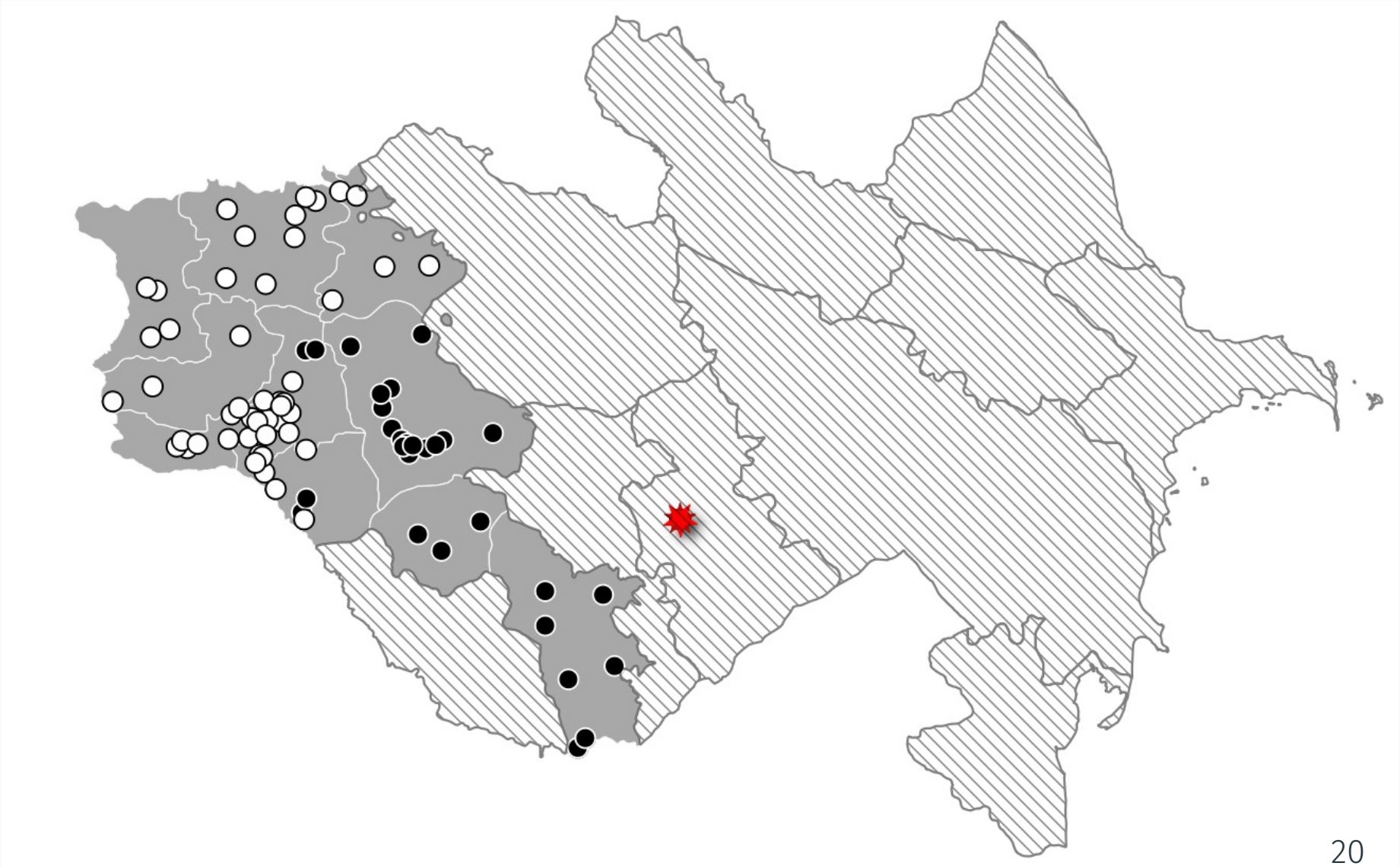




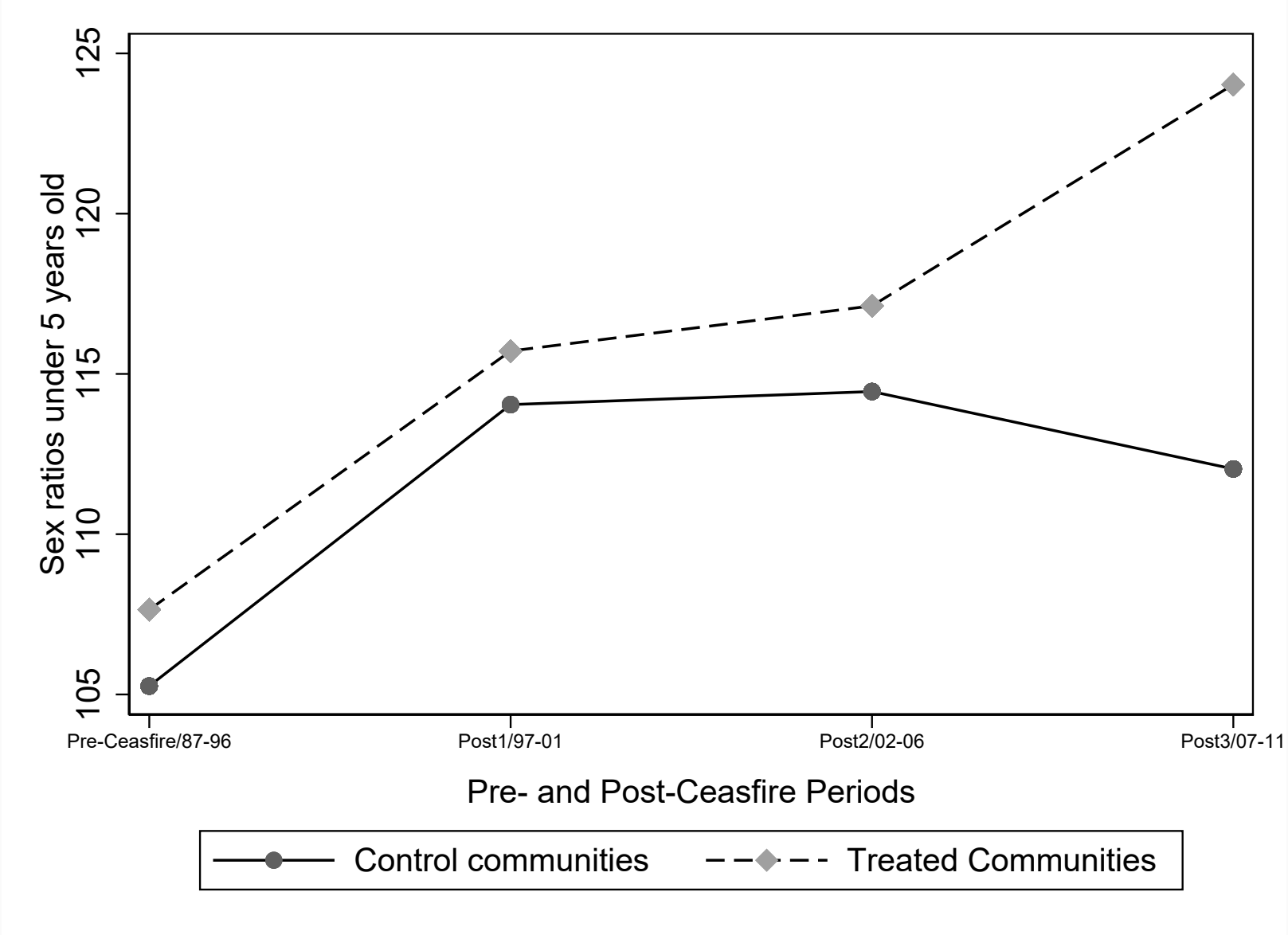




treatment and control communities



parallel trends assumption



post-ceasefire effects using treatment and control groups

Control variables	(1)	(2)	(3)	(4)
Post=1	8.782***	4.334	2.082	-5.188
	(2.245)	(3.044)	(4.064)	(4.615)
Post=2	9.711***	7.928***	6.965*	-6.944**
	(2.078)	(2.111)	(3.616)	(3.389)
Post=3	7.296***	12.965***	7.452**	-13.307***
	(1.766)	(3.695)	(3.286)	(1.896)
Treat=1 × Post=1	-0.711		3.686	6.453
	(4.020)		(4.405)	(5.870)
Treat=1 × Post=2	-0.233		1.576	6.079
	(3.383)		(4.372)	(4.075)
Treat=1 × Post=3	9.088**		9.021**	15.604***
	(4.511)		(4.325)	(2.207)
Close to Capital =1 × Post=1		7.935**	9.543**	15.153***
		(3.714)	(4.202)	(5.162)
Close to Capital=1 × Post=2		3.194	3.885	16.766***
		(3.271)	(4.241)	(3.718)
Close to Capital=1 × Post=3		-4.204	-0.371	19.226***
		(4.089)	(3.651)	(2.118)
Constant	106.035***	106.070***	106.064***	106.237***
	(0.869)	(0.877)	(0.858)	(0.967)
Community time trend	No	No	No	Yes
Community FE	Yes	Yes	Yes	Yes
Number of communities	76	76	76	76
Observations	298	298	298	298

Note.The dependant variable is SRB: male over female sex ratios at 0-4 ages. Standard errors are clustered at the community level.

robustness tests

- no outliers:
  - all post-ceasfire effects positive and significant, increasing in each period.
- treatment cut-off not mean but 25th percentiles:
  - effects in 2nd and 3rd post-ceasefire periods; strongest in the 3rd period.
- placebo: distance not to stepanakert but to a north-west armenian city gyumri (close to turkey):
  - negative and small coefficient (-4.2* for the 3rd period).

conclusion

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- policies to ensure gender-specific egalitarian values in times of survival.
    - e.g. media and state counter-cyclical interventions.
- ban on determination of sex? - studies show not to be effective (e.g. india).
    - implemented in armenia since 2016.
- external validity

thanks.