Online Appendix for, "**Explaining Recidivism of Ex-combatants in Colombia**"

This appendix presents additional robustness tests for the analysis of recidivism of ex-combatants in Colombia.

Balance Tests for the Matched and Unmatched Samples
Table A.1 presents balance tests on the mean values of the independent variables contained in the Fundación Ideas para la Paz (FIP) and other observational variables. The tests compare values between the individual FIP respondents that were successfully matched with the Colombian National Police crime records (n=1,226) and the unmatched respondents (n=259) for whom criminal records and thus outcome measures of recidivism are not available.

The balance tests indicate that there are significant differences in means between the two groups for 12 of the 22 variables in the regression analysis (including department dummy variables). The results indicate, for example, that unmatched individuals are significantly less likely to be employed, have contact with other ex-combatants, and live in the same place—characteristics that may be associated with hiding or poorly integrating into society. While these factors were not significant predictors of recidivism in the analysis of the matched sample, the unmatched were also more likely to be FARC or ELN guerrillas, a characteristic that is associated with lower recidivism. By contract, there are no imbalances on the significant predictors of recidivism in the matched sample of Personal motives, Family accept, Have children, BACRIM (criminal bands), and being Male. The key question for the main analysis of recidivism is whether the predictors of recidivism are different for this less connected, less mainstream group of individuals than for the matched individuals, so much so that were these individuals to be included in the main analysis, it would alter the results for particular factors of recidivism.

**Balance Tests (T-tests) between Matched Individuals (FIP survey-Police data)
and FIP survey-only Individuals**

	Unmatched	Matched	Difference	P-value
Personal motives	0.185	0.153	0.032	0.194
Greed motives	0.216	0.265	-0.049	0.100
Total Armed Actions (2007-8)	17.032	13.451	3.582***	0.000
Contact Any Ex-combatant	0.710	0.797	-0.086**	0.002
Employed	0.422	0.559	-0.137***	0.000
Family accept	0.895	0.906	-0.012	0.555
Have children	0.734	0.764	-0.031	0.295
Capture rate	0.541	0.530	0.011	0.448
BACRIM (2010)	0.911	0.869	0.043	0.063
Coca (ha)	41.111	107.330	-66.219**	0.004
FARC	0.394	0.314	0.080*	0.013
ELN	0.127	0.070	0.057**	0.002
Age	27.720	30.393	-2.673***	0.000
Male	0.817	0.848	-0.031	0.221
Minor demob	0.236	0.132	0.104***	0.000
Live Same Place	0.166	0.227	-0.061*	0.031
Caribbean	0.236	0.215	0.020	0.476
Pacific	0.108	0.015	0.093***	0.000
Andean	0.263	0.229	0.033	0.250
East Andean	0.340	0.464	-0.124***	0.000
Amazon	0.042	0.026	0.016	0.154
Eastern	0.012	0.051	-0.039**	0.005

*$p<0.05$; ** $p<0.01$; *** $p<0.001$

n of matched = 1,226
n of unmatched = 259

To explore whether it is problematic if there is a part of the unmatched that is not an analog for the matched sample we conduct a propensity matching balance analysis in Model 1 of Table A.2. This analysis uses a logistic regression to calculate propensity scores (predicted values) for the likelihood of being in the matched sample based on available covariates (the model excludes the Education increase and Time in group variables since they are constructed with temporal data from the Police, which is not available for unmatched observations). It helps identify and include observations from the matched sample are that are most similar to the unmatched sample on the set of covariates. Model 1 results indicate that security-related variables—Total attacks, BACRIM, and the general department Capture rate—appear to be most strongly correlated with unmatched individuals (perhaps consistent with motives to hide due to security risks).

An analysis of the distribution of propensity scores for being matched across the matched and unmatched samples indicates that the propensity distributions look similar across samples. This suggests that, after combining the covariate estimates into a single propensity score, the distributions for the different samples are relatively balanced. However, as expected, the matched sample distribution has slightly higher propensity scores for being matched. Models 3 and 4 therefore use the propensity scores for being matched to restrict the sample to individuals in the matched sample with recidivism data that are most similar to (overlap with) individuals that could not be matched. The models successively drop more and more observations that have high propensities to be in the matched sample (they drop 101 and 308 observations, respectively). The results in Model 3 (propensity<.95) and the slightly more restrictive Model 4 (propensity<.9) are largely consistent with the results from the main text in Model 2 (Model 2 from Table 4 in the main text). The effects are consistent for the variables for Personal motives, Family accept, Have children, Education increase, while the effects of the FARC and BACRIM variables on recidivism successively diminish in significance (though still in the same direction). Note that the significance of some of the results in Model 4 may in part be diminished because of the smaller sample size.

Table A.2
Models of Data Matching and Recidivism with Balanced Samples

	(1) Matched	(2) Recidivism	(3) Recidivism	(4) Recidivism
Personal motives	0.950	1.569^	1.589^	1.893*
	(0.198)	(0.364)	(0.396)	(0.561)
Greed motives	1.043	1.259	1.362	1.701^
	(0.200)	(0.287)	(0.341)	(0.523)
Total Armed Actions (2007-8)	0.968**	0.992	0.981	0.988
	(0.00960)	(0.0117)	(0.0157)	(0.0193)
Contact Any Ex-combatant	1.152	0.880	1.079	1.125
	(0.209)	(0.210)	(0.294)	(0.338)
Employed	1.232	0.810	0.852	0.699
	(0.195)	(0.149)	(0.167)	(0.161)
Family accept	1.073	0.487**	0.543^	0.419**
	(0.278)	(0.135)	(0.172)	(0.139)
Have children	0.934	0.580*	0.595*	0.595^
	(0.174)	(0.128)	(0.141)	(0.166)
Capture rate	0.0383***	0.413	0.210	0.0703^
	(0.0306)	(0.294)	(0.252)	(0.104)
BACRIM (2010)	0.471*	2.670*	2.497^	2.963
	(0.142)	(1.187)	(1.256)	(3.273)
Coca (ha)	1.001*	1.000^	1.000	0.945
	(0.000310)	(0.000246)	(0.000255)	(0.0486)
FARC	0.863	0.528*	0.581^	0.618
	(0.175)	(0.143)	(0.170)	(0.195)
ELN	0.691	0.483^	0.593	0.679
	(0.190)	(0.209)	(0.261)	(0.314)
Age	1.028*	0.978	0.977	0.979
	(0.0128)	(0.0151)	(0.0178)	(0.0278)
Male	1.121	2.797*	2.507*	2.191
	(0.240)	(1.210)	(1.085)	(1.060)
Minor demob	0.993	0.665	0.653	0.655
	(0.234)	(0.227)	(0.239)	(0.261)
Live Same Place	1.264	0.806	0.847	0.844
	(0.287)	(0.202)	(0.245)	(0.313)
Constant	55.38***			
	(51.04)			
Time in group		1.040^	1.036	1.018
		(0.0210)	(0.0255)	(0.0358)
Education increase		0.584*	0.584^	0.486*
		(0.152)	(0.166)	(0.164)
Observations	1,399	951	850	643
Region effects	YES	YES	YES	YES

^ *p*<0.1; * *p*<0.05; ** *p*<0.01; *** *p*<0.001

Model 1: Logit model of propensity for inclusion in the matched sample (FIP-Police data)

Model 2: Cox Hazard model; Reproduction of Model 2 of Table 4 from the main text

Model 3: Cox Hazard model; Excludes matched individuals with high propensities for being matched (propensity<.95)

Model 4: Cox Hazard model; Excludes matched individuals with high propensities for being matched (propensity<.90)

Additional Cox Proportional Hazard Model Robustness Tests

Table A.3 contains additional Cox Survival models of recidivism to verify the robustness of results under different modeling specifications.

Model 1 in the table is a reproduction of Model 2 in Table 4 in the main text and is included for purposes of comparison.

Model 2 shows results for only the assuredly randomly sampled cases in the FIP survey. The model excludes individuals in groups that were over-sampled using non-random techniques: those who demobilized as minors or who participated in joint or individual micro-enterprise projects. The sample breaks-down as follows:

      Known randomly sampled individuals: 880 (717 of matched sample)
      Either minors or micro-enterprise projects: 549 (465 of matched sample)
      Both minors and micro-enterprise projects: 46 (35 of matched sample)

Unfortunately, it is not possible to identify the type of sampling that was used for each subject in the database since some individuals in the populations that were oversampled using the secondary procedures were included in the initial random sample as well. Model 2 therefore excludes all individuals who either are minors or were involved in micro-enterprise projects (the Minor demob variable is automatically dropped from the model). By imposing this restriction, the available number of observations in the model drops to 544. Nevertheless, in general, the results are robust to the exclusion of the subpopulations that were less likely to have been sampled randomly (albeit some variables have slightly lower levels of statistical significance, likely a result of the reduced sample size).

Model 3 includes only individuals that were captured one or zero times and excludes individuals that were captured for crimes on multiple occasions. The great majority of individuals in the sample were in fact only capture one or zero times: 47 of 197 individuals captured were arrested multiple times (and almost all of those arrested twice). We conduct this test because the police records on captures in our dataset only include types of offenses and dates of arrest for the last time an individual was arrested for a crime instead of data on initial crimes. By excluding individuals that were captured multiple times, we can assure that the dates of capture are for initial crimes (however, this approach may also exclude more recidivism-prone individuals). The models in the main text of the manuscript treat the final arrest date of multiple-capture individuals as their initial arrest dates (in some cases, these dates may be fairly close together, minimizing error in survival model estimation). The results are largely consistent, except that results for the Education increase and Male variables and the results for some other significant variables in Model 1 are now at lower levels of statistical significance.

Model 4 includes the initial Educational level of individuals (at time of demobilization; note that Models 2 and 4 of Table 4 in the main text exclude individuals that had completed high school at the time of demobilization to be able to test for the effect of a post-demobilization increase in education on recidivism). This variable is not included in the models in the main text of the manuscript because it could possibly be collinear with

the Education increase variable that is included. The initial education level variable is not statistically significant and its inclusion does not substantially affect the results for the other independent variables in the model. However, including the initial education variable does dampen the effect of the Education increase variable, which loses its significance, likely because initial education levels are correlated with being closer to graduating high school during the demobilization phase. Note, however, that the Education increase variable does appear to have a significant treatment effect in the propensity-matching model presented in Table 5 in the main text of the manuscript even after controlling for initial levels of education.

Table A.3
Cox Survival Models of Recidivism

	(1) Recidivism	(2) Recidivism	(3) Recidivism	(4) Recidivism
Personal motives	1.569^	2.201**	1.627^	1.566^
	(0.364)	(0.648)	(0.438)	(0.366)
Greed motives	1.259	1.105	1.161	1.305
	(0.287)	(0.326)	(0.318)	(0.294)
Time in group	1.040^	1.028	1.045^	1.038^
	(0.0210)	(0.0285)	(0.0262)	(0.0211)
Total Armed Actions (2007-8)	0.992	1.007	0.998	0.993
	(0.0117)	(0.0194)	(0.0149)	(0.0115)
Contact Any Ex-combatant	0.880	0.789	0.712	0.897
	(0.210)	(0.219)	(0.184)	(0.214)
Employed	0.810	0.972	0.806	0.799
	(0.149)	(0.234)	(0.176)	(0.146)
Education level (demobilization)				0.909
				(0.0701)
Education increase	0.584*	0.555^	0.676	0.667
	(0.152)	(0.194)	(0.201)	(0.174)
Family accept	0.487**	0.298**	0.614	0.524*
	(0.135)	(0.120)	(0.230)	(0.147)
Have children	0.580*	0.554*	0.543*	0.600*
	(0.128)	(0.149)	(0.140)	(0.130)
Capture rate	0.413	0.264	0.178^	0.410
	(0.294)	(0.290)	(0.178)	(0.295)
BACRIM (2010)	2.670*	2.257e+15***	2.936^	2.627*
	(1.187)	(1.212e+15)	(1.726)	(1.165)
Coca (ha)	1.000^	1.000	1.001^	1.000^
	(0.000246)	(0.000298)	(0.000286)	(0.000249)
FARC	0.528*	0.435*	0.435**	0.540*
	(0.143)	(0.175)	(0.140)	(0.144)
ELN	0.483^	0.261^	0.433	0.472^
	(0.209)	(0.200)	(0.227)	(0.204)
Age	0.978	0.990	0.977	0.978
	(0.0151)	(0.0180)	(0.0183)	(0.0150)
Male	2.797*	2.294	1.994	2.944*
	(1.210)	(1.389)	(0.886)	(1.265)
Minor demob	0.665		0.722	0.673
	(0.227)		(0.284)	(0.230)
Live Same Place	0.806	0.755	0.732	0.768
	(0.202)	(0.219)	(0.222)	(0.192)
Observations	951	544	915	1,011
Region effects	YES	YES	YES	YES

Coefficients are hazard ratios; robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05, ^ p<0.1

Model 1: Reproduction of Model 2 of Table 4 from the main text
Model 2: Only randomly sampled cases (excludes minors and micro-enterprise participants)
Model 3: Only individuals that were captured 1 or no times
Model 4: Includes the Educational level at time of demobilization

Exploring Economic Motives and Employment Effects by Armed Group

In Figure A.1, we calculated the proportion of individuals that received salary payments while members of their respective armed groups by whether individuals were formerly guerrillas or paramilitaries. This analysis helps explore the economic motivations of ex-combatants and sheds light on the apparent differential effect that employment has on recidivism, where employment appears to be negatively associated with recidivism for paramilitaries but not for guerrillas. The figure indicates that nearly 90 percent of former paramilitaries reported receiving salaries while less than 20 percent of guerrillas did. This evidence is consistent with economic remuneration and jobs being more important for paramilitaries than guerrillas in decisions to become recidivists and engage in illegal activities.

Figure A.1
Exploring the Economic Motivations of Ex-combatants, by Armed Group
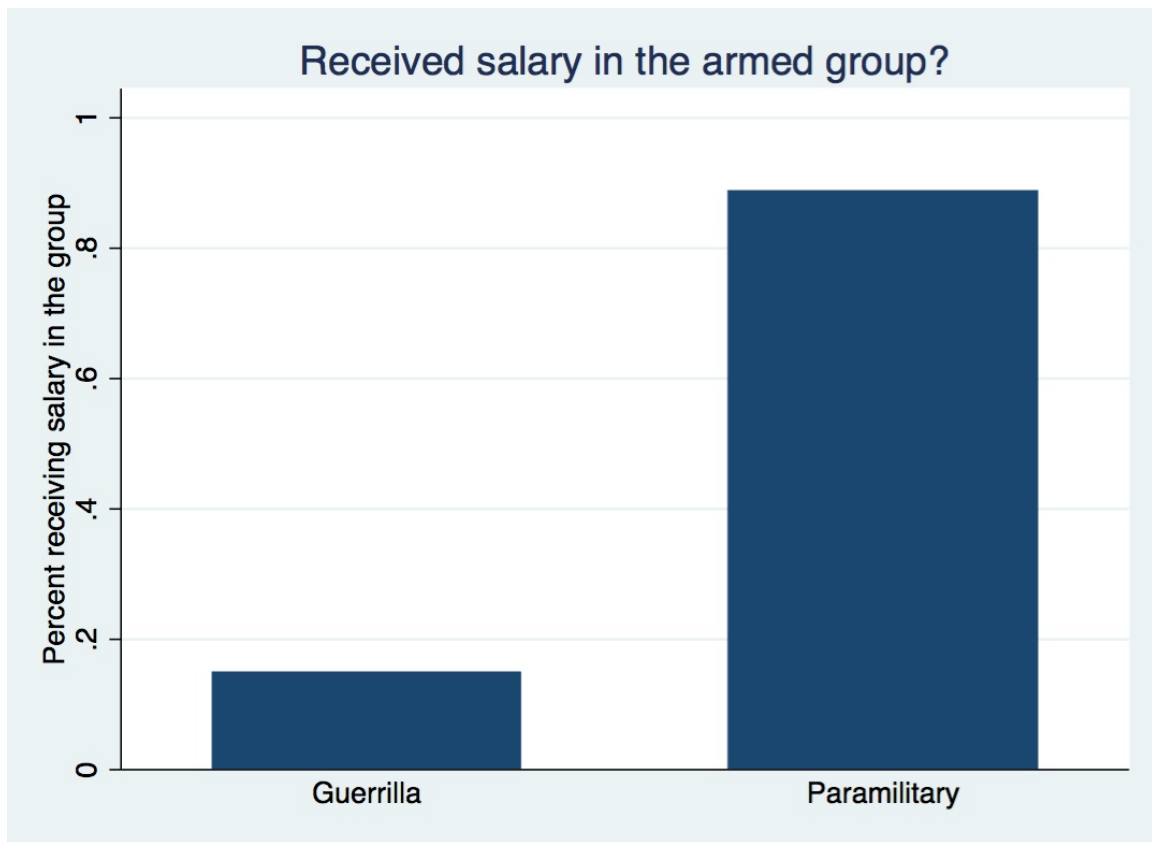
Logit Models of Recidivism

	(1) Logit Recidivism Y/N	(2) Logit Organized Crime Y/N
Personal motives	0.498	0.347
	(1.88)^	(1.17)
Greed motives	0.254	0.107
	(1.05)	(0.38)
Time in group	0.044	0.069
	(1.92)^	(2.70)**
Total Armed Actions (2007-8)	-0.011	-0.016
	(0.88)	(1.21)
Contact Any Ex-combatant	-0.022	-0.143
	(0.09)	(0.51)
Employed	-0.304	-0.174
	(1.51)	(0.77)
Education increase	-0.474	-0.655
	(1.72)^	(1.91)^
Family accept	-0.635	-0.617
	(2.04)*	(1.77)^
Have children	-0.563	-0.653
	(2.34)*	(2.30)*
Capture rate	-1.071	-1.508
	(1.35)	(1.69)^
BACRIM (2010)	1.072	0.702
	(2.28)*	(1.47)
Coca (ha)	0.001	0.001
	(1.83)^	(1.81)^
FARC	-0.591	-0.338
	(2.07)*	(1.08)
ELN	-0.745	-0.368
	(1.62)	(0.74)
Age	-0.023	-0.040
	(1.38)	(2.06)*
Male	1.162	0.758
	(2.64)**	(1.78)^
Minor demob	-0.330	-0.345
	(0.88)	(0.83)
Live Same Place	-0.303	-0.315
	(1.11)	(1.03)
N	1,058	1,003
Region effects	Yes	Yes
Psuedo-R^2	.08	.08

^ *p*<0.1; * *p*<0.05; ** *p*<0.01   Robust Standard Errors

Definitions of Crimes

The definition of the crimes in this article according to the Colombian penal code can be found at:
http://www.alcaldiabogota.gov.co/sisjur/normas/Norma1.jsp?i=6388

FIP Survey Administration and Questions

English translation and original Spanish formulation (survey source in parentheses)
Independent variables constructed with FIP survey:
1. Personal motives and greed motives
What do you think was most important in your decision to enter your first armed group?
Do not read options

   1 Ideology
   2 Vengeance
   3 Tricked into it
   4 Power/status/respect
   5 Protection/security
   6 Salary or promise of money and goods
   7 To escape from domestic violence
   8 To escape from extreme poverty
   9 You had no other job option
   10 Because you thought it would be an adventure. For fun
   11 Because your friends/family members entered before
   12 Forcibly recruited
   13 Preference for weapons or military life
   14 Rejected by the army
   15 Because of loving relationship/friendship
   16 Other: _____

¿Qué cree que fue lo más importante en su decisión de ingresar al primer grupo?
No leer opciones
   1 Ideología
   2 Venganza
   3 Engaño
   4 Poder/status/respeto
   5 Protección/seguridad
   6 Sueldo o promesa de dinero o recursos
   7 Escapar de violencia doméstica
   8 Escapar de pobreza extrema
   9 No tenía otra opción de trabajo
   10 Porque creía que sería una aventura. Por diversión
   11 Porque sus amigos/familiares ingresaron antes

12 Reclutado por la fuerza
13 Gusto por las armas o por la vida militar
14 Rechazado por el ejército
15 Por razones amorosas/amistad
16 Otro:_____

2. Time in group
Constructed with age of joining, birth year and demobilization year (for birth year and demobilization year, see below)

Date of demobilization
  Month, year

Fecha desmovilización
  Mes Año

3. Contact any/other ex-combatant
Do you keep contact with any former combatants from other groups?

  1. Yes
  0. No

¿Tiene usted contacto con algunos excombatientes de otros grupos?

  1. Si
  0. No

Do you keep contact with any former combatants from your group?

  1. Yes
  0. No

¿Tiene usted contacto con algunos excombatientes de su mismo grupo?

  1. Si
  0. No

4. Has a job
Do you have a job at the moment?
  0. Yes
  0. No

¿Tiene trabajo actualmente?

0. Si
1. No

5. High school education
What is/was your education level?

1. None – no writing or reading skills
2. None – has writing and reading skills
3. Primary school - incomplete (1º - 4º)
4. Primary school - complete
5. Baccalaureate - incomplete (6º - 11º)
6. Baccalaureate - complete
7. Technical education - incomplete
8. Technical education - complete
9. Undergraduate education - incomplete
10. Undergraduate education - complete
11. Postgraduate education

¿Cuál era/es su nivel educativo?

1. Ninguno- no sabe leer ni escribir
2. Ninguno- sabe leer y escribir
3. Primaria incompleto (de 1º 4º)
4. Primaria completo
5. Bachillerato incompleto (de 6º a 10º)
6. Bachillerato completo
7. Formación técnica incompleta
8. Formación técnica completa
9. Formación universitaria incompleta
10. Formación universitaria completa
11. Formación postuniversitaria

6. Family accept
Have you had problems to be accepted in your family after demobilizing?
Yes, no

¿Ha tenido problemas para que su familia lo acepte después de desmovilizarse?
Si, no

7. Have children
Number of living children
Number

Número de hijos vivos
        Número

8. Armed Group membership and age of recruitment
Which was the first group you joined?
    0. FARC
    1. ELN
    2. AUC
    3. Other
        ¿How old were you? _____ Years

¿Cuál fue el grupo al que primero se vinculó?
    1. FARC
    2. ELN
    3. AUC
    4. Otro

        ¿A qué edad? _____ Años

9. Age
Birthdate
        Day: _____
        Month: _____
        Year: _____

Fecha de Nacimiento
        Día: _____
        Mes: _____
        Año: _____

10. Male, Female
Gender
    1. Male
    0. Female

Género
    1. M
    0. F

11. Minor when demobilized
By the time you demobilized, where you under age?

1. Yes
0. No

¿Era usted menor de edad al momento de desmovilizarse?
1. Si
0. No

12. Lives in same place as before recruitment
Do you live in the same place you used to before you joined the group?
1. Yes
2. No

¿Vive en el mismo lugar donde vivía antes de ingresar al grupo?
1. Si
2. No