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Social costs of crime: erosion of trust between citizens and public institutions

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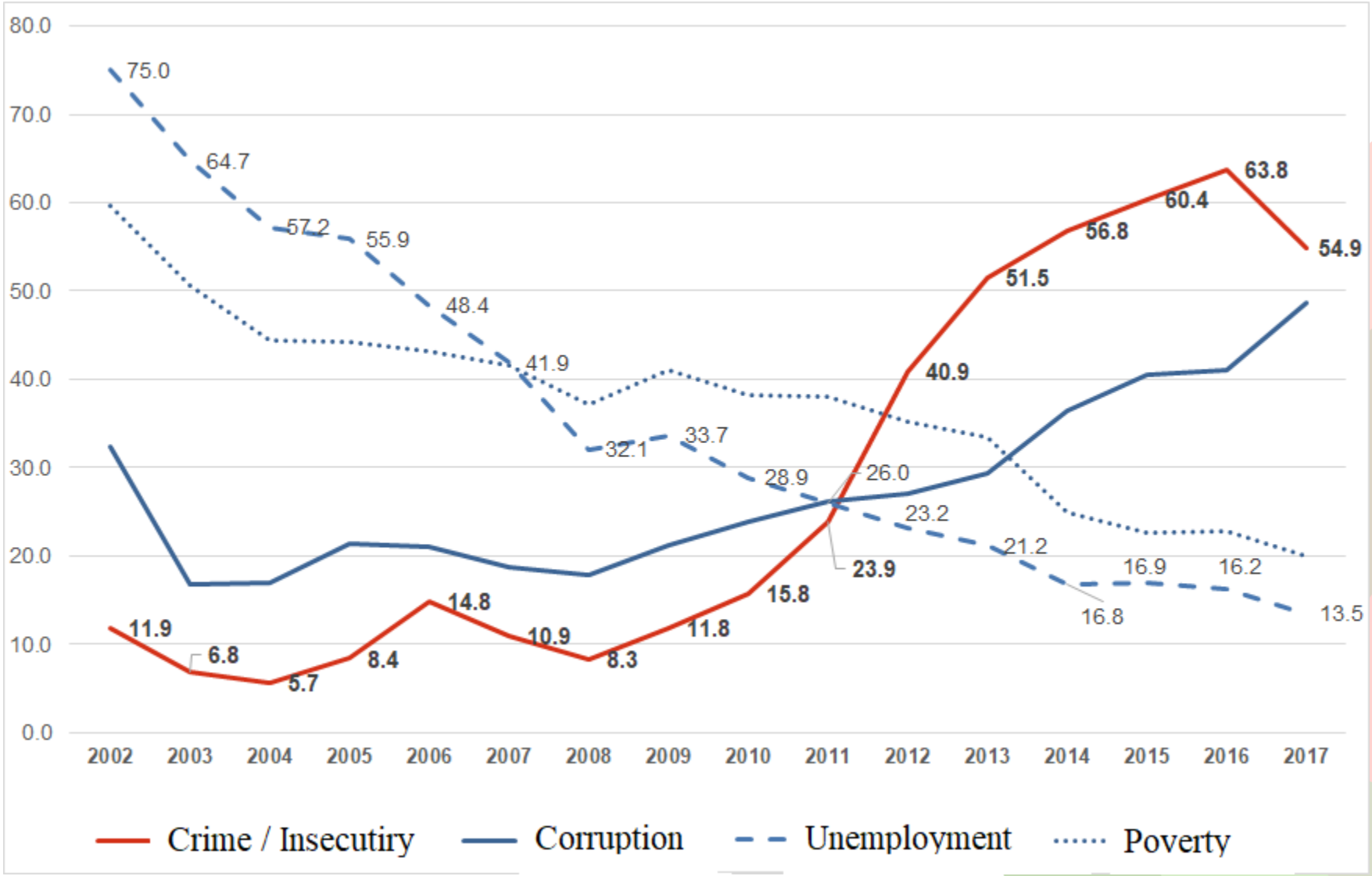
Crime: Peru main problem (according to households)



Source: Herrera (2018)

Motivation

Insecurity in Latin America is one of the greatest in the world (Blanco, 2013).

Crime has negative impacts on institutional trust (Blanco & Ruiz, 2013; Corbacho et al., 2015; Hernández, 2017).

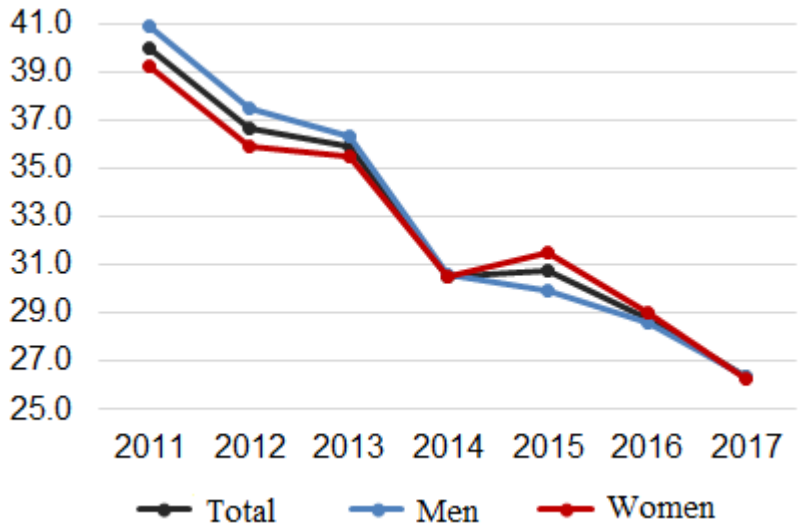
The increase of crime also impacts negatively the stability of institutitions (Soares & Naritomi, 2010).

- Impacts on economic growth and human capital accumulation
- **Stronger effects in institutionally weak countries**

- Citizen insecurity is the main problem for 85% of the population.
- The perception of citizen insecurity exceeds 90%.
- Mistrust in the Police or the Judiciary exceeds 80%.
- Government Strategies: National Plan for Citizen Security 2013-2018 (PNSC), Multisectoral Strategy - Barrio Seguro program

Background. Decreasing victimization but no trust

Crime victims by gender, 2011-2017 (%)



Source: INEI – ENAPRES 2011-2017

For the period 2011-17, the proportion of people victim of a crime has decreased. Women continue to be slightly more victimized than men

Trust in public institutions, 2014-2017 (%)

Year	Police			Local Government		
	No trust	*Some trust*	*A lot trust*	*No trust*	*Some trust*	*A lot trust*
2014	36.2	57.0	6.8	39.0	53.0	8.0
2015	35.4	57.4	7.2	38.1	54.2	7.7
2016	34.6	58.7	6.7	39.9	53.1	7.1
2017	31.9	60.2	7.9	39.0	53.4	7.6
Year	**Judiciary**			**Prosecutor's Office**		
	No trust	Some trust	A lot trust	No trust	Some trust	A lot trust
2014	51.89	42.53	5.58	49.41	44.23	6.36
2015	53.80	41.19	5.01	52.23	42.25	5.52
2016	53.52	41.99	4.49	52.33	42.77	4.90
2017	51.08	43.86	5.06	49.65	44.88	5.47

Source : INEI – ENAPRES 2011-2017

- For the 2013-17, mistrust in the Police is the fourth most recurring reason for not reporting a crime. It is also the reason for not reporting that has increased the most (2.5 perc. points).

What are we trying to measure?

1 **What is the effect of property crime on trust in institutions?**

2 **Are there heterogeneous impacts of crime by gender and revictimization?**

Contributions

1 First study to evaluate the effect of property crime on institutional trust for Peru.

2 First study to measure heterogeneous effects on gender and revictimization

3 Intensive use of different georeferenced data sources

4 Use of an identification strategy that combines Machine Learning and Impact Evaluation techniques

Analytical framework and previous studies

Framework

Intangible costs of crime (Buvinic et al., 1999). Loss of social capital reflected in less institutional trust (Seligman, 2000).

Comparative politics: high crime rates generate immediate distrust (Malone, 2010; Corbacho et al., 2015).

Criminality: citizen-institution interaction (post-crime). Vicious circle of mistrust and lack of cooperation (Tankebe, 2009; Tyler and Blader, 2003).

Previous research

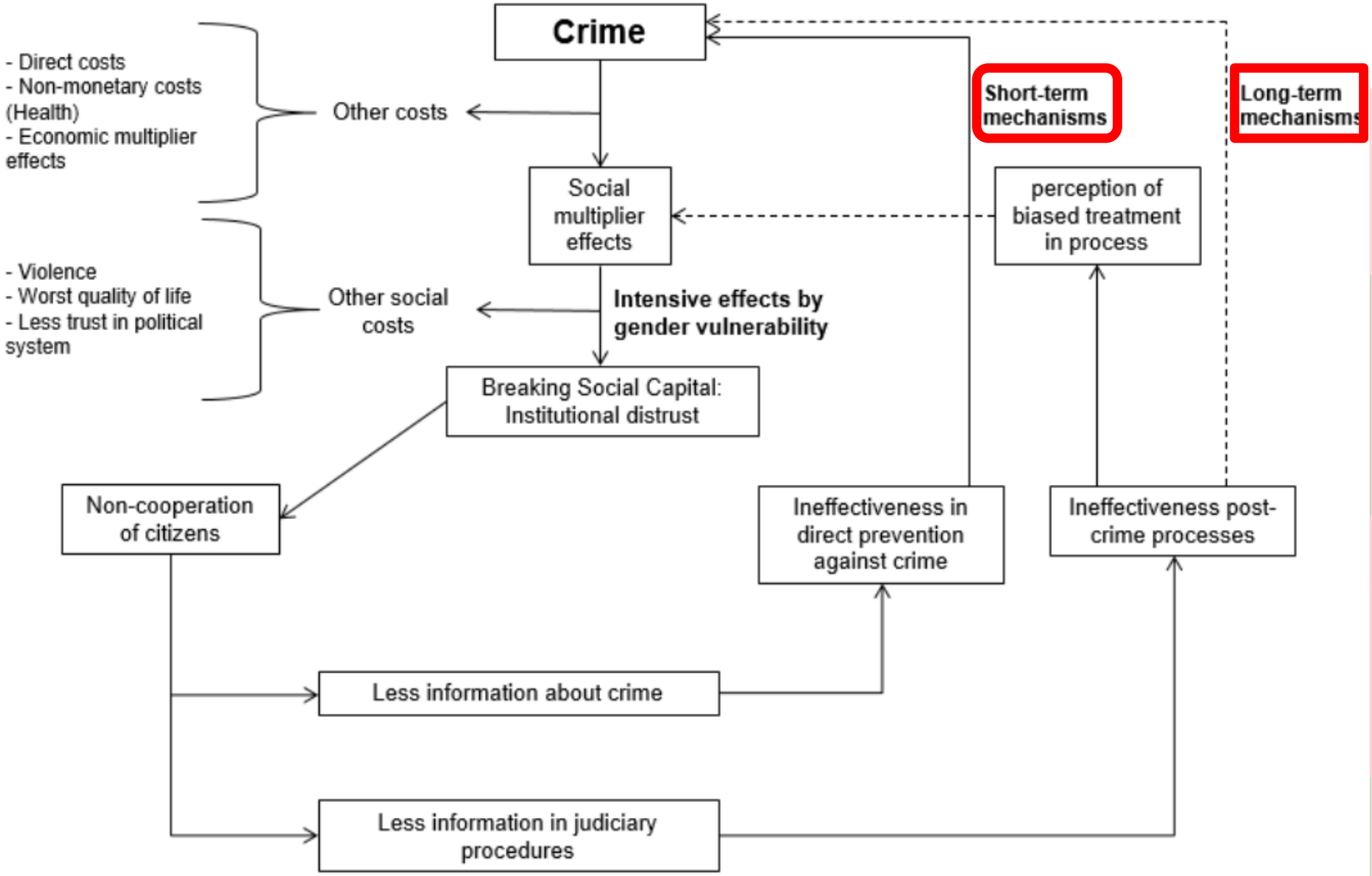
Victimization reduces trust in institutions directly and indirectly related to crime (Corbacho et al., 2015; Hernández, 2017; Malone, 2010).

Gender-differentiated effects of victimization on institutional trust and satisfaction with political systems (Blanco and Ruiz, 2013).

Most harmful impacts on crime related institutions (Blanco, 2013).

Direct economic impacts of crime (Mujica et al., 2015) and fight against it: municipal security (Costa and Romero, 2011) / citizen's participation (Marquardt, 2012).

Transmission Channels and Vicious Circles



Hypothesis

1 **Patrimonial crimes reduce citizens' institutional trust in the short and long term.**

2 **There are heterogeneous effects of victimization on institutional trust. Greater impacts for women and repeated victims**

Databases

Year: 2017
Information merged using police jurisdictions

- National Victimization Survey (ENEVIC)
- National Census of Police Stations (CENACOM).
- National Registry of Municipalities (RENAMU)

Identification Strategy (1)

Probability of being victim of a crime is non-random: X_i
Conterfactual, Selection Bias $\neq$ Causality

Impact Evaluation Literature:
Propensity Score Matching (PSM)

+

Machine Learning Literature:
LASSO prediction

Novel Field:
McCaffrey et al., 2004
Wyss et al., 2014
Athey & Imbens, 2017

- Probability of being victim: ST & LT

$$\Pr(T_i = 1|\boldsymbol{X}) \equiv p(\boldsymbol{X_i}) = F(\boldsymbol{X_i'}\beta)$$

- ATT: matching, One-to-One

$$\widehat{ATT} = \frac{1}{N_1}\sum_{i|T=1}\left[Y_i - \hat{Y}_i^0\right]$$

$$\hat{Y}_i^0(p_i) = \left\{j: |p_i - p_j| = \min_{j\in\{D=0\}}\{|p_i - p_j|\}\right\}$$

- Predictive power improvement
- Predictors selection: 400+ vars
- Overfitting risk: Cross Validation

$$\hat{\beta}^{lasso} = \underset{\beta}{\operatorname{argmin}}\sum_{i=1}^{N}(y_i - \boldsymbol{x_i}'\beta)^2$$

$$s.t.\sum_{j=1}^{p}|\beta_j| \leq s$$

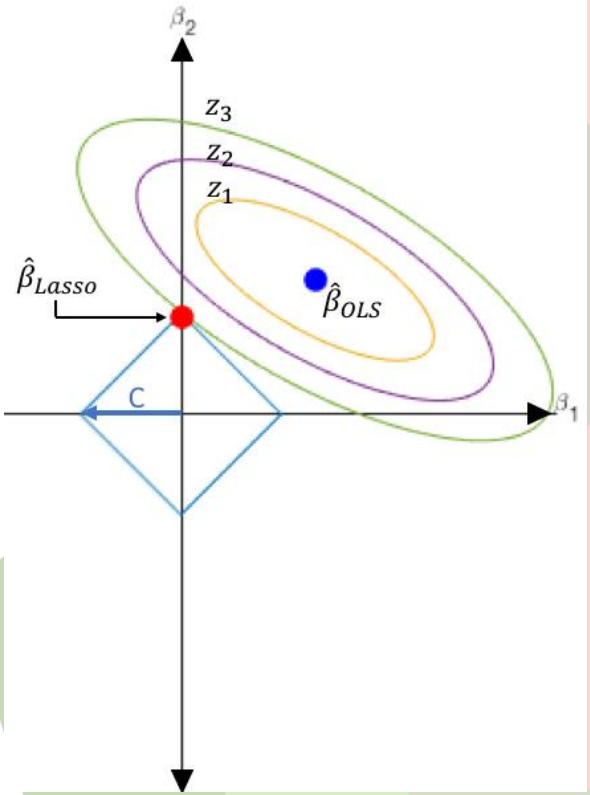
ASSUMPTION:
Selection of victims based in observables

BALANCE & ROSEBAUM TEST

Identification Strategy - LASSO

- Crucial improvement in predictive power (Hastie, 2016)
  - Trade-off bias & variance
- Avoiding under and overfitting
  - Training & Test Sample
  - Cross Validation: Hyperparameter tunning
- Minimizing risk of OVB → 400+ potential predictors
- Potential source of bias: Unobservables
  - Solution: Instrumental Variables
  - No clear instrument for victimization & trust
  - Inappropriate instrument worsens potential bias (Angrist & Pischke)
- Strength: 400+ variables + Unobservable Test

$\hat{\beta}_{OLS}\ vs.\ \hat{\beta}_{LASSO}$



Treatment group and trust outcomes

Variable	Definition
Treatment: Short-term victims	Dummy variable that takes the value of 1 for victims of robbery or robbery attempts in the last twelve months and 0 for non-victims of crime in the last twelve months
Treatment: Long-term victims	Dummy variable that takes the value of 1 for victims of robbery or robbery attempts more than twelve months ago and 0 for non-victims of crime in the last 3 years
Trust: National Police	Dummy variable that takes the value of 1 if individual respond that the National Police is very reliable or reliable and 0 otherwise
Trust: Local Police (Serenazgo)	Dummy variable that takes the value of 1 if individual respond that the Local Police is very reliable or reliable and 0 otherwise
Trust: Prosecutor's Office	Dummy variable that takes the value of 1 if individual respond that the Prosecutor's Office is very reliable or reliable and 0 otherwise
Trust: Judiciary	Dummy variable that takes the value of 1 if individual respond that the Judiciary is very reliable or reliable and 0 otherwise

Revictimization treatment group

Groups	Condition	Definition
Short-term victims	Treatment	Victims of robbery or robbery attempt and any other crime in the last twelve months
	Control	Non-victims of crime in the last twelve months
Long-term victims	Treatment	Victims of robbery or robbery attempt and any other crime more than twelve months ago
	Control	Non-victims of crime in the last 3 years

Variables in LASSO model

Variable Group	Number of variables	Level of aggregation	Merge by	Source
Individual characteristics	20	Individual	-	National Survey of Victimization
Household characteristics	25	Household	Household id	National Survey of Victimization
Citizen security	72	Household	Household id	National Survey of Victimization
Crime characteristics	8	Household	Household id	National Survey of Victimization
Geographical Cluster	4	Household	Household id	National Survey of Victimization
District characteristics	43	District	Household's district	National Registry of Municipalities
Municipality services	41	District	Household's district	National Registry of Municipalities
Number of establishments in the district by type	29	District	Household's district	National Registry of Municipalities
Police Stations characteristics	43	Police Stations	Police Stations Jurisdiction Map	National Census of Police Stations
Police Stations equipment and services	92	Police Stations	Police Stations Jurisdiction Map	National Census of Police Stations
Fight against crime actions	80	Police Stations	Police Stations Jurisdiction Map	National Census of Police Stations

Robustness Tests

Unobservables bias test
- Rosebaum test (2002)
- Sensibility of results to unobservables

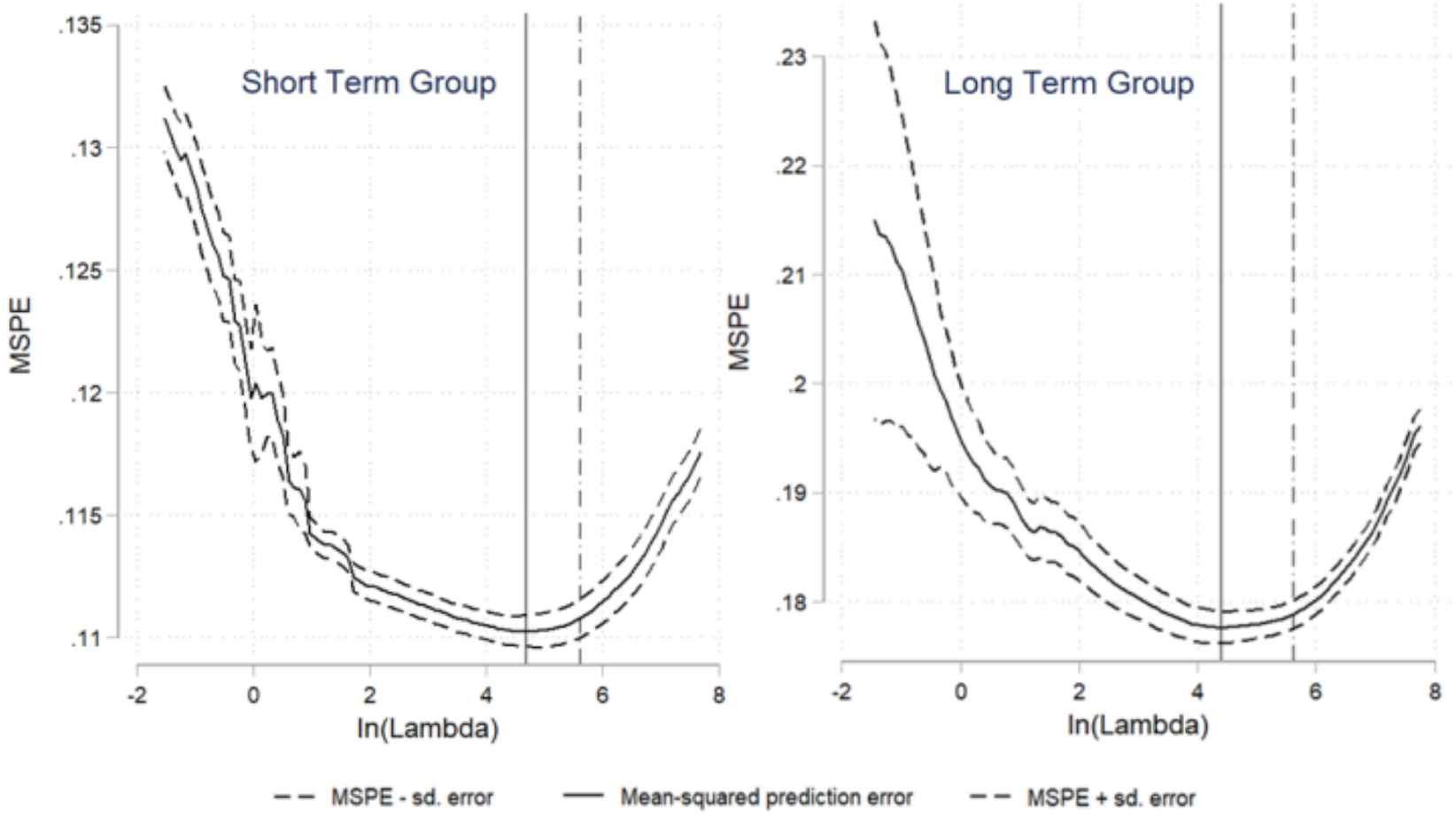
Falsification test
- Exogenous Pseudo-outcomes.
- No expected effect: $ATT = 0$

Matching sensibility
- Alternative matching algorithms
- K nearest neighbors and *caliper*
- ATT sensibility: size and significance

Balance tests
- Mean test: pre & post matching
- Smith & Todd (2005): polynomial forms

Results – Victimization prediction

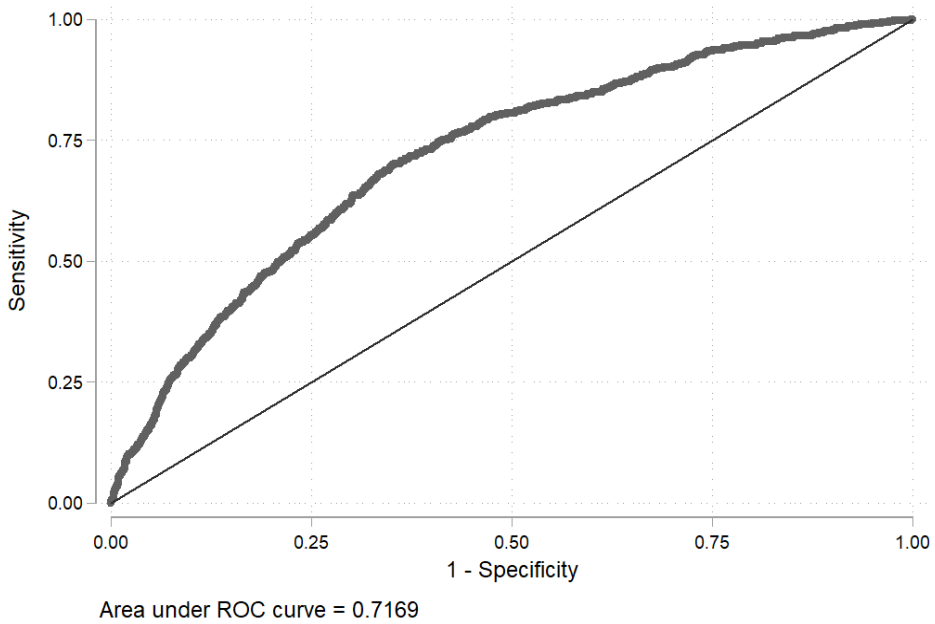
- Hyperparameter tunning by 10-fold Cross Validation



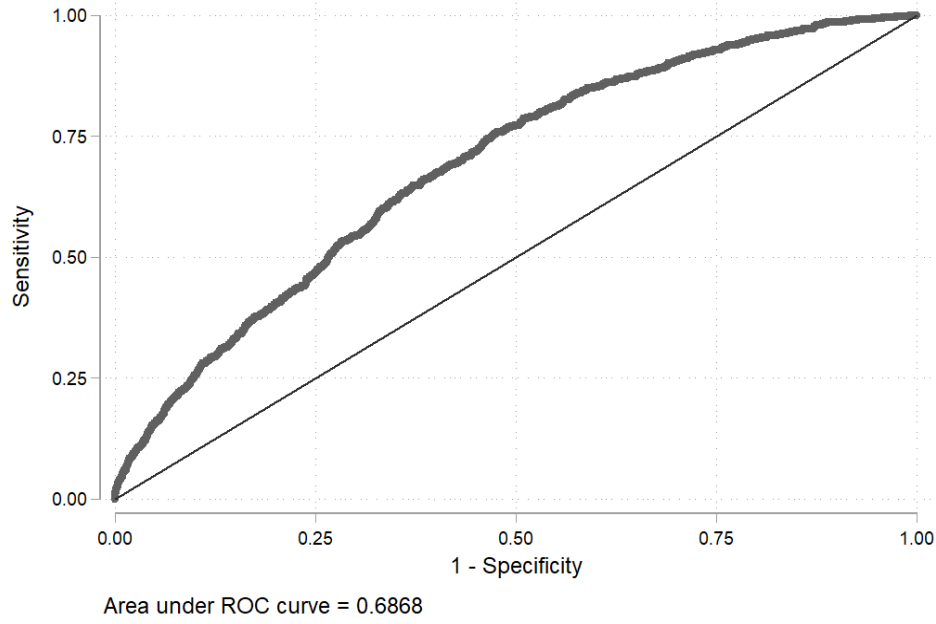
Results – Victimization prediction

- Goodness of fit : ROC curve in and out-of-sample
- ROC in-sample: Short Term (0.73) and Long term (0.72)

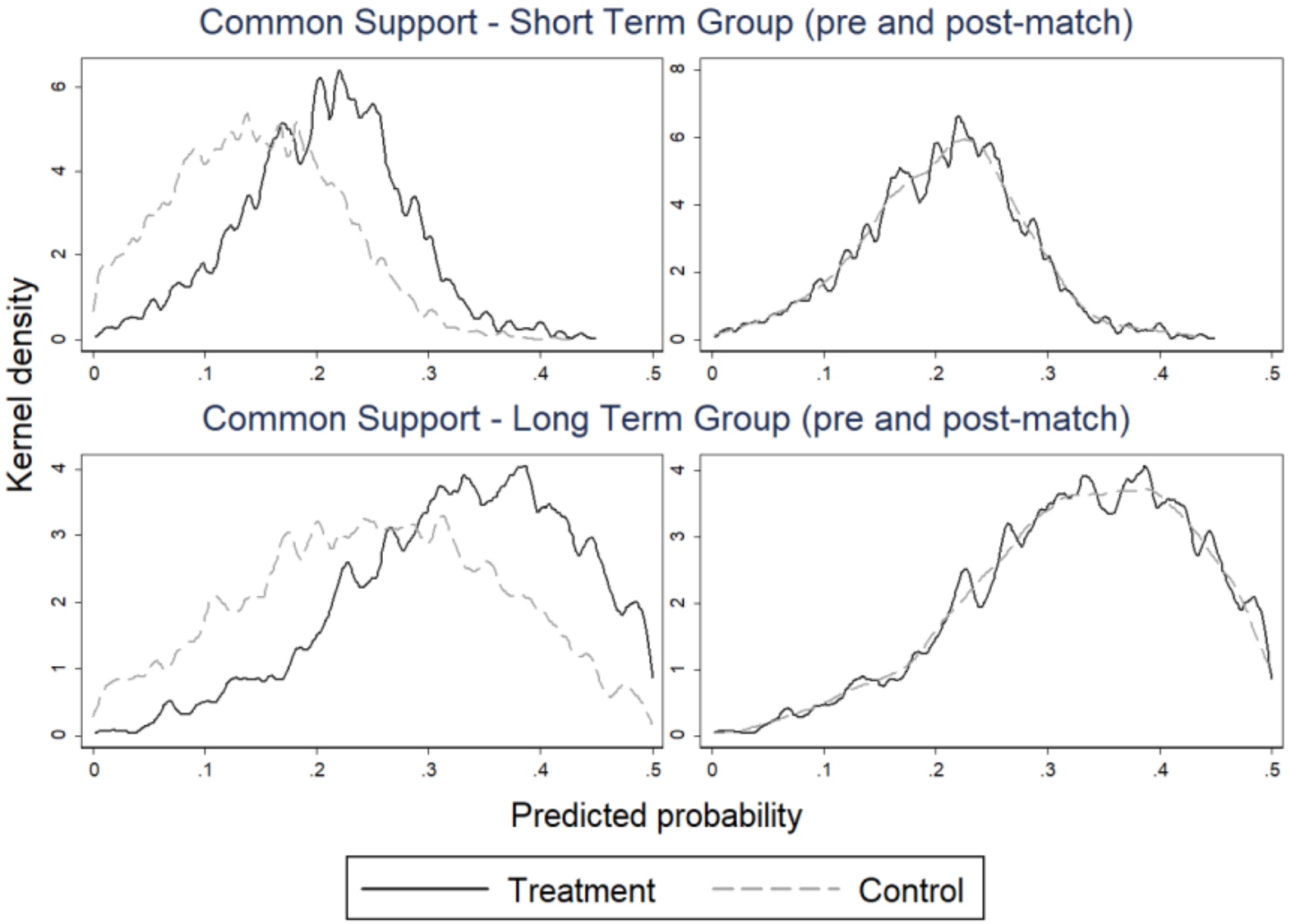
Out of sample prediction Short term victims



Out of sample prediction Long term victims



Results – Common Support



Results by institution and periodicity

Short Term & Long Term

Security

Police

Local Police (Serenazgo)

Sanction

Judiciary

Prosecutor's Office

Benchmark Results

Short Term

2.7 percentage points (pp)** probability of trusting in the Police

2.5* pp. probability of trusting in Local Police

Long Term

2.1* pp. probability of trusting in Judiciary

Heterogeneous effects – female victims

Short Term	Long Term
 ↓ **4** pp.** probability of trusting in Local Police	 ↓ **2.9* pp.** probability of trusting in Local Police
	 ↓ **4.3*** pp.** probability trusting in Prosecutor's Office

Heterogeneous effects - revictimization

Short Term

↓ **6.9*** pp.** probability of trusting in the Police

↓ **4.4* pp.** probability of trusting in Local Police

Long Term

↓ **3.7** pp.** probability of trusting in the Police

↓ **3* pp.** probability of trusting in Judiciary

Results – Robustness Test

Unobservables bias test

- Rosebaum test (2002)
- Sensibility of results to unobservables

Gamma Γ	Panel A		Panel B		Panel C	
	Trust in Police (short-term)		Trust in Local Police (short-term)		Trust in Judiciary (long-term)	
	p_mh+	p_mh-	p_mh+	p_mh-	p_mh+	p_mh-
1	0.071	0.071	0.002	0.002	0.003	0.003
1.5	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000
2.5	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000
3.5	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000
4.5	0.000	0.000	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000	0.000	0.000

r: odds of differential assignment due to unobserved factors.
p_mh+: significance level (assumption: overestimation of treatment effect).
p_mh-: significance level (assumption: underestimation of treatment effect).

- Effects of victimization on trust significant, up to Γ = 5.
- If there was an unobservable variable that ↑x5 the probability of being a victim and also strongly related to the outcomes → Results will not change
- Effects found are still valid in presence unobservables with strong correlation.

Hidden biases does not explain the relationship found

Results – Robustness Test

Matching sensibility

- 1-to-1 caliper, 5 NN and 5 NN *caliper*
- ATT sensibility: same sign, similar size
- Significance consistent between the 3 robustness models and base results

Falsification test

- Non-significant ATT with unrelated pseudo-outcomes
- HH level: assets, death of hh member
- Police station level: Internet Access
- District level: number of administrative offices, number of social organizations

Covariante Balance: 186 selected predictors

- Mean test: 89% (ST) & 82% (LT) covariates balanced after match
- Smith & Todd: 84% (ST) & 87% (LT) covariates balanced after match

Conclusions

1. Crime has non-tangible costs: Social costs
   - Erosion of institutional trust is non-trivial
2. Appearance vicious circles
   - Short term: ↓citizen cooperation, incomplete crime information, ineffectiveness to combat crime
   - Long term: ↓citizen cooperation, incomplete judicial information, ineffectiveness in post-crime processes
3. Robbery or robbery attempts causes
   - Short term: ↓ trust in Police (3 pp.) and Local Police (3pp.)
   - Long term: ↓ trust in the Judiciary (2 pp.)
4. Trust reduction effect is greater on women
   - ↓ trust in Local Police in ST (4 pp.) and LT (3 pp.)
   - ↓ trust in the Prosecutor's Office in LT (4 pp.)
5. Trust reduction effect is greater on repeated victims
   - ↓ trust in Police in ST (7 pp.) and LT (4 pp.)
   - ↓ trust in the Judiciary in LT (3 pp.)
6. Robust results: sensibility to unobservable test, balance mean and Smith-Todd tests, falsification test, and sensibility to matching method

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Summary statistics

Table 1 - Victim profile and perception

Variables	Victims	Male	Female	Diff	p-value
Victim's profile					
Age (mean)	33.5	33.5	33.5	0.0	1.00
Employed	74.3	80.7	68.7	12.0	0.00
Number of years of education (mean)	12.0	11.8	12.2	0.4	0.00
Not affiliated to health insurance	28.6	31.1	26.4	4.7	0.01
Has a disability	2.0	1.7	2.2	0.5	0.45
Reported the crime to the police office	11.6	12.8	10.4	2.4	0.05
Victim of crime with a gun	33.9	40.5	27.6	12.9	0.00
Victim of crime in his neighborhood	43.4	42.1	44.4	2.3	0.19
Perception					
Feels insecure at his job	46.7	47.3	46.0	1.3	0.15
Feels insecure in the street	75.0	72.8	77.2	4.4	0.00
Feel insecure in the public transport	80.1	77.4	82.7	5.2	0.00
Feels that is likely to be victim of crime in the next 12 months	83.3	83.3	83.3	0.0	0.95
Perceives crime has increased in the country	88.1	86.8	89.5	2.7	0.00
Perceives crime has increased in neighborhood	43.0	40.9	45.1	4.2	0.00
Decided to limit any frequent activities due to insecurity	48.2	45.2	51.0	5.9	0.00

Balance – Mean Test

Table 5 – Mean Covariates balance pre and post-match

Mean-values differences test	P-value<10%	P-value>10%	Number of variables
Short-term			
Pre-match	65%	35%	186
Post-match	11%	89%	
Long-term			
Pre-match	62%	38%	186
Post-match	18%	82%	

Results – Aggregating by institution type

Table 7 – Results for alternative outcome definitions, PSM

Outcome, trust in:	Matching one-to-one		
	Treatment group	ATT	SE
Security institutions	Short-term	-0.023**	(0.01)
	Long-term	-0.019**	(0.009)
Sanctions institutions	Short-term	-0.007	(0.01)
	Long-term	-0.023**	(0.01)

Notes. Standard errors are in parentheses. *** significant at 10% level, ** significant at 5% level, *** significant at 1% level

Smith-Todd Test

The matching literature considers stronger tests for covariate balance that go beyond the first moment of the distribution. After verifying the balance in mean of our covariates, we analyze the robustness of our model using the Smith and Todd (2005) test. This procedure contrasts the imbalance by regressing each covariate (X_j) against different polynomial forms of the predicted probability of being treated ($\pi(X)$), the treatment dummy (D) and their interactions.

$$X_j = \zeta_0 + \zeta_1 \pi(X) + \zeta_2 \pi(X)^2 + \zeta_3 \pi(X)^3 + \zeta_d D + \zeta_{d1} \pi(X) D + \zeta_{d2} \pi(X)^2 D + \zeta_{d3} \pi(X)^3 D + u_j \quad (5)$$

By rejecting the null hypothesis of the F-test of joint significance, the test tell us that the covariate X_j is unbalanced between groups. In short, the test seeks to validate the balance assumption more rigorously in order to ensure that the counterfactual group used is valid.

Table 13 – Smith and Todd test

Smith and Todd test	Joint Significant F-Test		Number of variables
	P-value<10%	P-value>10%	
Short-term victims	16%	84%	186
Long-term victims	13%	87%	186