Journal of Economic Behavior & Organization 132 (2016) 78–92

Contents lists available at ScienceDirect

Journal of Economic Behavior & Organization

journal homepage: www.elsevier.com/locate/jebo

Trust and in-group favoritism in a culture of crime☆

Stephan Meier[a,b], Lamar Pierce[c,*], Antonino Vaccaro[d], Barbara La Cara[e]

[a] Columbia University, Graduate School of Business, 3022 Broadway, New York, NY 10027, USA
[b] NBER, USA
[c] Washington University in St. Louis, Olin Business School, One Brookings Drive Box 1133, Saint Louis, MO 63130, USA
[d] University of Navarra, IESE Business School, Avenida Pearson, 21, 08034 Barcelona, Spain
[e] ETH Zurich, Weinbergstrasse 56/58, CH-8092 Zurich, Switzerland

ARTICLE INFO

Article history:
Received 10 June 2016
Accepted 15 September 2016
Available online 3 October 2016

Keywords:
Trust
Cooperation
In-group preferences
Crime
Culture
Experiments

ABSTRACT

We use experiments in high schools in two neighborhoods in the metropolitan area of Palermo, Italy to experimentally support the argument that the historical informal institution of organized crime can undermine current institutions, even in religiously and ethnically homogeneous populations. Using trust and prisoner's dilemma games, we found that students in a neighborhood with high Mafia involvement exhibit lower generalized trust and trustworthiness, but higher in-group favoritism, with punishment norms failing to resolve these deficits. Our study suggests that a culture of organized crime can affect adolescent norms and attitudes that might support a vicious cycle of in-group favoritism and crime that in turn hinders economic development.

Trust towards strangers is critical for facilitating the exchange that leads to economic development and prosperity.[1] Formal institutions like rule of law, property rights, or the integration of ethnic groups have been argued to be the key to facilitating both trust outside narrow groups and clans as well as economic growth and development (North, 1990; Henrich et al., 2001; Frey and Bohnet, 1995; Bohnet and Huck, 2004). Yet even within countries with common institutions, we observe regional differences in both general trust and in-group favoritism. Italy, for example, has well-known regional differences in trust between the South and the North (Banfield, 1958; Putnam et al., 1994; Guiso et al., 2006; Bigoni et al., 2013). Similar within-country variation in trust has been documented in Africa (Nunn and Wantchekon, 2011), Europe (Tabellini, 2010; Dohmen et al., 2012), and Israel (Fershtman and Gneezy, 2001). While formal institutions cannot explain these regional differences, they may be attributable to historically-persistent informal or social institutions linked to regional culture (Tabellini, 2010; Greif and Iyigun, 2013). Yet isolating the relationship between specific informal institutions and local variation in trust remains elusive. The core challenge is that even within national boundaries, regions may differ on numerous dimensions that might impact trust, including religion, language, ethnicity, economic wealth, and multiple formal and informal local institutions.

In this paper, we directly address this challenge by studying one of the most globally important informal institutions in a region with common formal institutions and nearly uniform population demographics. We examine how the specific

☆ We thank Ray Fisman, Lorenz Goette, Benedikt Herrmann, Matthias Sutter, Richard Zeckhauser, and participants at seminars at UCSD, UT Austin, and the conference of Swiss Economists Abroad. Funding was provided by the Don and Sybil Harrington Foundation and the McCombs School of Business at UT Austin.

* Corresponding author.
E-mail address: pierce@wustl.edu (L. Pierce).

[1] See Algan and Cahuc (2013) for a review of the link between trust and economic growth.

http://dx.doi.org/10.1016/j.jebo.2016.09.005
0167-2681/

informal institution of organized crime is tied to low general trust and in-group favoritism by conducting behavioral experiments among high school students in the Palermo metropolitan area in Sicily. We exploit a natural experiment in which one of two neighborhoods in the Palermo metropolitan area that had similarly high levels of organized crime thirty years ago saw a dramatic drop over one generation in the dominant informal institution: the Sicilian Mafia. The shock to Mafia involvement in the central Palermo neighborhood resulted from the Italian government's response to the Mafia's assassination of multiple high-ranking officials in Palermo during the 1980s. The government increased police and judicial focus toward the Mafia, locating two major anti-Mafia institutions in a central Palermo neighborhood to be near other government buildings. This locational choice effectively stymied organized crime activity in the neighborhood. In comparison, another neighborhood, Bagheria received no change and thus persisted in its high level of organized crime.[2]

We compare the extent of trust and in-group favoritism in the two Palermo neighborhoods by conducting experiments in high schools located in either the high- or the low-Mafia area. Our adolescent participants ($N = 444$) played standardized experimental games (trust and prisoner's dilemma games with and without third-party punishment), all with anonymous partners from either their class (in-group) or another class in their school (out-group).[3] This approach is consistent with recent work in experimental economics that attributes behavioral differences in two populations to specific environmental features that vary across these groups (Gneezy et al., 2009; Leibbrandt et al., 2013).

The benefits of studying this setting are threefold. First, the Palermo metropolitan area is characterized by relative uniformity in ethnicity, religion, language, and wealth levels, as well as by extremely low levels of inter-neighborhood migration. This is in contrast to prior studies of regions within countries, which often have different local institutions, dialects, religions, and wealth levels that might also explain variation in trust (Nunn and Wantchekon, 2011; Tabellini, 2010; Bigoni et al., 2013). Our comparison of experimentally-measured trust levels *across* neighborhoods in the *same* city is closest to recent work by Falk and Zehnder (2013) and Gneezy et al. (2014). Second, our use of experimental games complements the more widely-used survey-based measures of trust across regions that some argue are more representative of trustworthiness than trust (Sapienza et al., 2013).[4] Although the Sicilian Mafia's culture of low trust toward institutions and outsiders has been widely discussed in political science, sociology, and economics (Gambetta, 1993; Bandiera, 2003; Varese, 2011), we provide behavioral evidence of organized crime's relationship to trust and cooperation. Our experimental approach also allows us to examine the in-group favoritism and parochialism that is both common in organized crime and believed to foster intense intergroup war and violence (Choi and Bowles, 2007; Bowles, 2008; Fershtman and Gneezy, 2001; Gneezy and Fessler, 2002) and constrain economic development (Banfield, 1958; Putnam et al., 1994; Knack and Keefer, 1997; Greif and Tabellini, 2010). Third, organized crime is among the most economically impactful informal institutions in the world. Given estimates that organized crime generates almost $1 trillion per year worldwide, or nearly 2% of global GDP (on Drugs and Crime, 2010), it is important to explore how a culture of organized crime changes the behavioral norms and attitudes of those exposed to it.

We find substantial differences in trust across the two neighborhoods. Students in the high-Mafia neighborhood show lower average trust and trustworthiness levels, and are less likely to cooperate in prisoner's dilemma games than students in low-Mafia areas. This cannot be due to differences in general altruism (Ashraf et al., 2006), since non-strategic dictator games show no differences across the neighborhoods. Furthermore, students in high-Mafia neighborhoods show much stronger patterns of in-group favoritism, transferring higher levels to classmates than to those from other classes. Growing up in a culture of crime therefore appears to be associated with lower general trust, but also increased trust toward in-group members.

Our results also show that while introducing a norm enforcement mechanism can increase cooperation in both high- and low- Mafia areas, as in Fehr and Gächter (2000), adding a punishment mechanism fails to remediate the difference in trust between the two areas. More importantly, adding a punishment mechanism greatly intensifies the in-group favoritism in high-Mafia schools while it actually reduces it in low-Mafia schools. As such, the informal institution of norm enforcement can exaggerate the negative consequences, in-group favoritism, of another informal institution – organized crime. While in a number of cultures and situations the informal institution of norm enforcement turns out to be anti-social and ineffective in motivating trust and cooperation (Herrmann et al., 2008; Goette et al., 2012b), our result suggests that norm enforcement can actually negatively interact with other informal institutions (such as organized crime), reducing trust and cooperation even further.

Our results make important contributions to at least three related lines of research. First, we contribute to the growing literature on how culture affects norms and values. For a long time, economists took norms and values as exogenous primitives, studied their implications, and left the analysis of the endogenous evolution of norms and preferences to sociologists. Only recently, there has been a shift in economics towards studying the endogeneity of norms and preferences to their environment (see Bowles, 1998, for an excellent overview). Tabellini (2008), for example, shows that traditional economic methods allow the study of the evolution of norms and values, modeling how cooperation and in-group favoritism can be culturally shaped through parents' choice of what values to transmit to their children. Similarly, recent experimental work by Voors et al. (2012) shows that shocks from conflict in Burundi can impact preferences on risk, time discounting, and altruism.

[2] This shock is similar to the Buenos Aires Jewish Center bombing used as an exogenous shock to policing in Di Tella and Schargrodsky (2004).

[3] A growing number of papers study the influence of the distinction between in- and out-group on economic behavior experimentally (e.g., Charness et al., 2007; Sutter, 2009; Chen and Li, 2009; Goette et al., 2006, 2012a; Falk and Zehnder, 2013).

[4] We also use the World Values questions on trust to show similar results.

Leibbrandt et al. (2013) show that proximate fishing societies in Brazil can develop different norms and traits to meet local social and economic needs.[5] We provide empirical evidence consistent with endogenous norms and values and with other cultural and environmental factors such as informal institutions shaping the norms and values surrounding trust. A culture of organized crime seems to be associated with the necessary uncertainty that has been argued by Kollock (1994) to change the norms that are consequentially applied in our anonymous, one-shot experimental setup. Additionally, our evidence from an adolescent population is relevant to broader society because of the known importance of the development of trust and in-group favoritism in childhood and adolescence (Sutter and Kocher, 2007; Fehr et al., 2008, 2013; Algan et al., 2013).

Second, this paper provides empirical evidence on the deleterious effects of low trust and in-group favoritism. Many countries appear to be trapped in conditions of low economic development sustained by low trust and high in-group bias (Putnam et al., 1994), while others exhibit generalized trust and economic growth. Such variation in how people trust strangers across countries and regions (Algan and Cahuc, 2010; Bohnet et al., 2008; Fershtman and Gneezy, 2001; Nunn and Wantchekon, 2011) cannot be explained by evolutionary theories that argue that in-group favoritism is rooted in the inherent psychology of humans, since altruism, trustworthiness, and trust are all crucial for the coordination necessary for survival and societies without them would therefore have been historically disadvantaged and thus disappeared (Bowles, 2008). Formal institutions certainly explain many differences across countries and regions (Aghion et al., 2010), but our results indicate that informal institutions also play a critical role. This is not to say that we can show a *causal* effect of organized crime on trust. In fact, since a low trust environment is a perfect breeding ground for organized crime, the low trust observed in this study likely makes the persistence of the Mafia more likely. Our results suggest why it is so difficult to escape this trap—organized crime affects trust which affects organized crime, etc., through the reinforcement of generalized mistrust and in-group favoritism. Such a vicious cycle is very difficult to break. However, our results also show that there is hope to break the cycle. The center of Palermo saw a dramatic drop in organized crime due to heavy-handed intervention by the Italian government. Teenagers who grew up in this lower Mafia-involvement environment trust more and show less detrimental in-group favoritism or parochialism. Those same trusting norms will make it harder for organized crime to re-establish itself. This might be the path to a new and better equilibrium.

Third, our results contribute to the literature on organized crime. While there is a large literature on the economics of individual criminal activity (going back to Becker, 1968), only a few studies examine organized crime (for reviews, see, e.g., Fiorentini and Peltzman, 1997; Kumar and Skaperdas, 2009). These studies analyze the origin of the Mafia (Gambetta, 1993; Bandiera, 2003), the functioning of crime organizations (e.g., Baccara and Bar-Issac, 2008; Levitt and Venkatesh, 2000; Leeson, 2007) or try to calculate the economic costs of organized crime and terrorism (e.g., Abadie and Gardeazabal, 2003; Pinotti, 2012; Frey et al., 2007; Acconcia et al., 2014). Although recent experimental work find that criminal identity can indeed shape human behavior (Cohn et al., 2015), to our knowledge, there is little to no empirical evidence highlighting the behavioral effects of a culture of organized crime. The only exception is recent work by Nese et al. (2013), who use experiments to compare prison inmates affiliated with organized crime to university students. Our evidence that a culture of organized crime is associated with low trust and high in-group favoritism is consistent with substantial indirect effects of organized crime, as lower trust and more in-group bias affect even those aspects of economic activities not directly involving organized crime. As such, measuring the direct cost of organized crime most likely underestimates its detrimental effect on society if behavioral effects are left out.

We note that like all cross-cultural studies, we must be careful in interpreting any relationship between Mafia culture and student behavior as causal. See the conclusion section for a more detailed discussion on the limitations in interpreting our results as causal. Although our historical shock to the central Palermo neighborhood is plausibly exogenous, we cannot rule out some underlying pre-existing differences before this shock. Where our setting excels is in the remarkable similarity on other dimensions between the populations in the neighborhoods. Compared to prior studies, the demographic homogeneity in our three schools is remarkable.

While experimental studies such as ours would ideally involve more than two neighborhoods and three schools, we note that the conditions for explicitly studying the Mafia in Sicilian schools are exceptionally difficult. Schools in Palermo are reluctant to allow researchers to study organized crime, given safety concerns for the staff, students, and researchers. Although our studies were carefully designed to protect the anonymity of students, the researcher conducting the studies was not anonymous, and in one instance was confronted and warned by a teacher presumably connected with the Mafia.

The remainder of the paper is organized as follows. In Section 1 we explain the history of organized crime in Palermo, as well as the recent shock that impacted the culture of one neighborhood. Sections 2 and 3 present the experimental designs and results. Section 4 provides robustness tests. Section 5 concludes.

1. The Mafia and its history in two Palermo neighborhoods

The Sicilian Mafia is a strong informal institution that governs everyday life. The Mafia emerged as a protection mechanism when Southern Italy had weak formal institutions (Gambetta, 1993) incapable of enforcing property rights. Sicily, like most of Southern Italy, consisted of clan-like communities whose low social capital developed through a history of occupation and

[5] For other work on preference evolution and endogenous trustworthiness, see, e.g. Bohnet and Huck (2004), Gueth et al. (2009), Alesina and Fuchs-Schündeln (2007). Other models of endogenous preferences show additional channels (see Fehr and Hoff, 2011, for an overview).

poverty (Banfield, 1958; Putnam et al., 1994; Guiso et al., 2006). Unable to trust institutions or outsiders, Sicilians bought protection through association with local Mafia clans (Gambetta, 1993; Bandiera, 2003; Buonanno et al., 2015). Despite the rapid economic development of Italy during the late 20th century that brought much stronger Italian and European institutions capable, at least in theory, of protecting property rights (Gambetta, 1993; Varese, 2011), the Mafia (as well as its counterparts elsewhere in Italy) has continued to thrive and grow economically.

Today, the Mafia has a direct or indirect influence on economic activity not just in Sicily, but in the whole Italian peninsula and North America, with similar organized crime networks in other regions of Italy (e.g., Camorra in Naples) and around the world (e.g., Japanese Yakuza, Russian Mafia, Chinese Triad) (see, e.g., Varese, 2011). The Province of Palermo and, in particular, the metropolitan area of Palermo, has been characterized over the last century by very strong and stable control by Mafia families who imposed their rule on all significant economic and social activities (Commissione Parlamentare d'Inchiesta sul Fenomeno della Criminalità Mafiosa o Similare, Relazione Annuale, 2003).

The Italian government's aggressive response to a series of Mafia murders, however, produced heterogeneous shocks to Mafia culture across the Palermo metropolitan area. In 1980, Piersanti Mattarella, president of the region, was assassinated by the Mafia. In 1982, General Dalla Chiesa, appointed prefect to fight the Mafia, was killed less than 200 meters from the central Palermo school in our study, followed by Mafia assassinations of Rocco Chinnici (anti-Mafia judge) in 1983 and Antonino Cassarà (police manager) in 1985.[6] The Italian government responded in two ways. First, it increased the number of police, carabinieri, and judges focused exclusively on the Mafia, concentrating their activities in the center of Palermo. Second, it created two new institutions in the center of Palermo to fight the Mafia: Direzione Investigativa AntiMafia and the Direzione Nationale AntiMafia. Following the assassination in 1992 of two very important judges, Giovanni Falcone and Paolo Borsellino, combined with the enhanced anti-Mafia efforts, a critical mass of anti-Mafia activists emerged in the center of Palermo, shaping a new anti-Mafia culture.[7]

This institutional shock to central Palermo created sharp cultural differences between it and surrounding neighborhoods. Even though the center of Palermo is less than 15 km from the town of Bagheria, the two areas are extremely different in terms of Mafia-related attitudes. For example, in 2004, one of the most influential anti-Mafia organizations, Addiopizzo, was founded in the center of Palermo in order to build a community of businesses and consumers who refuse to pay "pizzo" – Mafia extortion money (Vaccaro, 2012). At the time of the study, more than 90% (over 400) of the firms participating in the initiative are located in the center of Palermo, while only 4% are in Bagheria (despite Addiopizzo devoting considerable energy toward Bagheria).[8] In addition, many criminals collaborating with police authorities confirm that the Mafia still controls nearly every kind of economic activity in Bagheria, with much less power in the center of Palermo.[9] Interviews with anti-Mafia experts, teachers and principals of the three schools confirmed this substantial difference between the two areas (see Table 1).

Table 1
Exposure to Mafia activities judged by experts.

	Bagheria	Palermo
Ratings of school mafia involvement by School administrators	7 (6)	2 (3)
Ratings of school Mafia involvement by teachers	6.9 (16)	2.3 (8)
Ratings of neighborhood Mafia involvement by experts at Addiopizzo (anti-mafia organization)	7 (4)	1.5 (4)
Number of stores adopting Addiopizzo anti-Mafia certificate within 5 km	7	403

Notes: Experts are asked to rate the Mafia involvement on a 7-point scale with 7 indicating high involvement. Numbers in parenthesis are number of respondents. Addiopizzo numbers reflect the time period of the study (January, 2012), with the gap between the two neighborhoods growing since then.

Thus, students enrolled in the schools in the two neighborhoods are exposed to very different informal institutions: in the center of Palermo they are exposed to a predominantly anti-Mafia culture (both inside and outside of the school), while students attending schools in Bagheria live in a context that is more supportive toward the Mafia. In the survey that we administered following the experiments, students were asked a series of questions on attitudes toward the Mafia (see questionnaire in Appendix F). Table 2 lists these questions, and shows the answers to be consistent with a higher Mafia involvement in Bagheria than in Palermo – even though it is very likely that students expressed fear of revealing their true attitudes to the researchers. On a seven-point or three-point scale, the Bagheria schools tended to report greater impact from the Mafia as well as more positive views.[10]

[6] These are only a few examples of a much larger set of murders associated with the Mafia.

[7] This history is based on extensive interviews with local police organizations and leaders of the anti-Mafia organization Addiopizzo.

[8] Since then, the number of certified shops in central Palermo has grown to 800, while the count in Bagheria has not changed. Although central Palermo has more firms in total than Bagheria, proportionally there are still more certified shops in central Palermo.

[9] Furthermore, both police and journalists believe Bagheria to be so pro-Mafia as to harbor the fugitive Mafia boss Matteo Messina Denaro, one of the most notorious Mafia leaders. See http://archivio.antiMafiaduemila.com/rassegna-stampa/30-news/13404-matteo-messina-denaro-protetto-a-bagheria-la-citta-di-provenzano.html?start=1.

[10] These questions correspond with Questions 21f, 23, 21d, 22, 21e in the survey in Appendix F. Question 23 was recoded to be ordinal. Questions 24 and 25 were not included in the analysis because they were only asked to students in central Palermo after receiving low response rates for question 21d.

Table 2
Students' attitudes towards Mafia.

	Bagheria (high-Mafia)	Palermo (low-Mafia)	*p*-Value of *t*-test
Indicate if you agree: In general, the impact of the Mafia on the Sicilian society is positive (1–7)	1.67 (0.08) [251]	1.35 (0.07) [186]	0.00
Please indicate the impact of Mafia on the environment where you live (1–3)	2.34 (0.05) [253]	1.73 (0.06) [186]	0.00
Indicate if you agree: Mafia is on the wrong side (1–7)	6.32 (0.09) [247]	6.67 (0.13) [51]	0.10
In general, what's the Mafia's impact on your friends and your family? (1 = Positive, 3 = Negative)	1.28 (0.03) [250]	1.44 (0.04) [186]	0.00
Mafia substitutes for the state because it provides work and security to people (1–7)	1.77 (0.09) [249]	1.89 (0.11) [185]	0.44

Notes: Means and standard errors in parentheses. Number of observations in brackets. Students respond to the statements/questions (in Appendix F) using either a 7-point scale from 1 "strongly disagree" to 7 "strongly agree" or a 3-point scale. The fourth question was recoded to be ordinal. Many students (139) refused to answer the question about the Mafia being on the wrong side.

2. Set-up and design of study

2.1. Set-up and subjects

2.1.1. School and area characteristics

We selected schools that were in areas in the metropolitan area of Palermo that differ starkly in the local population's support for the Mafia. Our schools are located in Bagheria (two schools) and in the center of Palermo (one school). All schools are public high schools that use similar syllabi with similar teaching objectives. An experienced high school teacher who had worked for the Italian Ministry of Education in the Province of Palermo for more than 35 years helped us select three schools with very similar curricula, whose administration all agreed to participate in the study. The Palermo school has a completely identical curriculum to one of the Bagheria schools, with 9 core courses in Italian, Math, History and Philosophy, English, Sport, Religion, Sciences, History of Art, and Latin and Greek. The other Bagheria school shares the first six courses, but replaces the last three with additional technical and scientific coursework.

All classes were from the final 3-year cycle of high school (the "triennio") and were of similar size and involved quasi-random student assignment. Students then stay in these classes for five years. Within each school, there are few notable differences across classrooms in observable characteristics other than age (because of grade level) and average grades (see Table A2 in the Appendix for more details). The study was particularly designed to ensure the complete anonymity and safety of the students, given past patterns of severe violence in the student population. The study was approved by the Sicilian Ministry of Education as well as the principals of all three schools. All students signed consent forms.

The three schools are located respectively in the center of Palermo and in the center of Bagheria. All of them are part of the Palermo metropolitan area — an area that is highly integrated and with very similar socio-economic conditions. The driving distance between the two neighborhoods is approximately 14km, and as Fig. 1 shows, they are connected by metropolitan rail and bus system.[11] Table 3 shows useful demographics that characterize the areas of the three schools. Populations in both areas are relatively stable. Net internal migration as a percentage of population was less than half a percent in each area.

Fig. 1. Palermo metropolitan rail system. The central Palermo school is located near the "Notarbartolo" station.

[11] See the regional law (Legge Regionale 9/1986) and the Regional Ordinance (Decreto Presidente Regione 10/8/1995) for more details.

Table 3
Area characteristics.

	Palermo	Bagheria
Male	47.4	48.6
Female	52.6	51.4
Average age	40.4	38.9
Net internal migration as percentage of population in 2012	−0.0045	−0.0001
Percentage of population leaving in 2012	1.56%	3.08%
Percentage of population arriving in 2012	2.00%	3.08%
Percentage of population aged 15–19	6.60%	6.70%
Average population density where the students live (per km^2)	4120	3837[a]
Salary per capita (€/year)	14345	17710
Average no. of members per family	2.52	2.81

Notes: Information is from the Italian National Institute of Statistics (ISTAT), 2011.
[a] Numbers for Bagheria are calculated and weighted considering that 35% of the student population live in the Villabate area, 35% in the Ficarazzi area and 30% in the Bagheria area. Palermo numbers reflect Palermo city.

2.1.2. Student characteristics

Within the schools, we randomly chose 24 classes that were in the last three years of high school. The reasons for focusing on later cohorts of high school students are threefold: First, they would have less difficulty in understanding and playing the games; second, most of them were directly exposed to the social norms of the local society; and third, they would be more capable of taking part in such a long experiment. We immediately dropped all 16 students in two classes (one from in-group and one from out-group) following the first day of the study at one of the high-Mafia schools because discussions following the games indicated neither the teachers nor the students had understood the procedures. To rectify this lack of comprehension, we added practice problems and allowed additional time for questions and clarification, then collected the 444 students included in our study. The first Bagheria school had 79 students in 6 classes, while the second had 178 in 8 classes. The central Palermo student had 187 students in 8 classes.

The two sets of schools and the subjects in the high- and low-Mafia area have very similar socio-demographic characteristics, with all students being native-born Italians. Table 4 shows descriptive statistics of socio-demographic variables for the two set of schools. It also shows statistics of two-sided *t*-tests or Fisher's exact tests for differences in any of the characteristics. The two demographic differences between the two sets of schools are religion and age. Religious differences are extremely minor, compared with other cross-cultural studies, since all students were born in Italy and nearly all were born and baptized Catholic. The minor difference is that students in the high-Mafia area are more likely to self-identify as Catholic and to attend church, although the implications of these differences from prior work are unclear. Although Porta et al. (1997) found that individuals in Catholic countries self-reported lower trust than others, more recent experimental work finds greater fairness for individuals associated with world religions (Norenzayan and Shariff, 2008; Henrich et al., 2010). Differences in age could matter as trust develops in adolescence (e.g. Sutter and Kocher, 2007) which would bias our results against finding lower trust in low-Mafia school. Older students could, however, also have stronger group identity because they had been together longer. The slightly higher number of siblings in the high-Mafia neighborhood likely biases against our results. Cameron et al. (2013) found lower trust among single children by exploiting the discontinuous drop in siblings following China's one-child policy implementation. Regardless, supplemental analysis, which will be explained in detail below, shows that these differences are highly unlikely to explain our results. Including age, religion, and numerous other control variables in regression analyses does not change our results, nor does restricting our sample to only students across the common data support of age or religion.

While all the students from the high-Mafia Bagheria schools were local, 82 of the central Palermo students do not live in the immediate vicinity, but instead commute in from surrounding neighborhoods in the metropolitan area (none live in Bagheria). According to the school vice-principal, these commuting students spend the vast majority of their time in the center of Palermo, including school, sports, and social activities. Although these commuting students are still likely affected by the local neighborhood culture, we compared only the 105 local students to the 257 students from the two Bagheria schools. Results for the trust game remain unchanged, although the differences in the prisoner's dilemma games weaken in statistical significance. We will discuss these results in Section 4.2.

The other major difference in the student population between the two sets of schools is gender distribution. Although the low-Mafia school has a relatively equal gender distribution with 38 percent male, the high-Mafia schools are highly segregated. One school is only 20 percent male, while the other includes only males. While the combined data from the two high-Mafia schools allow us to effectively rule out gender as explaining our results, we are concerned that gender segregation might confound our conclusions. We will present robustness checks in Section 4.3 to address gender segregation as an explanation for our findings.

Table 4
Socio-demographic characteristics of students.

	High-Mafia school	Low-Mafia schools	*p*-Value of test[a]
Birth year	1993.27 (0.06) [256]	1994.03 (0.06) [186]	0.00
Catholic[b]	0.86 [257]	0.75 [187]	0.01
Attend church[b]	0.35 [257]	0.21 [187]	0.00
Male[b]	0.45 [257]	0.38 [187]	0.17
# of cars	2.05 (0.06) [253]	2.07 (0.06) [187]	0.75
# older siblings	0.74 (0.07) [254]	0.72 (0.06) [186]	0.86
# younger siblings	0.77 (0.05) [256]	0.58 (0.05) [187]	0.01
# of kins in house	0.21 (0.05) [257]	0.14 (0.04) [187]	0.34
Grades	6.56 (0.06) [257]	6.58 (0.06) [185]	0.81
Week allowance (euros)	14.84 (1.09) [257]	15.00 (1.30) [187]	0.93

Notes: Weekly allowance is spending money received from family. Means and standard errors in parentheses. Number of observations in brackets.
[a] *t*-Tests for continuous variables and Fisher's exact tests for dummy variables.
[b] Dummy variables.

2.2. Experimental design

2.2.1. Games and in-out-group manipulation

Participants played the following games in the same order (see Appendix G for translated instructions):

1 *Trust*: Participants made the decision of the first mover in a standard trust game (Berg et al., 1995). They received € 1 as endowment and had to decide how much to pass in increments of 10 cents to an anonymous partner. The amount was tripled on the way. The amount passed to the anonymous partner is called "trust" in the paper.
2 *Trustworthiness*: Participants then made decisions as the second mover with a different partner. Using the strategy method (e.g., Brandts and Charness, 2011) they decided for each amount they could receive from a first-mover partner how much they would return to that partner. We take the average amount returned for all possible first mover transfers and call it "trustworthiness" in the paper.
3 *Prisoner's dilemma*: Participants then played a one-shot, simultaneous prisoner's dilemma game with a new partner. Both players were endowed with € 1 and had to decide whether to pass the endowment to an anonymous partner or keep it. The amount passed was doubled on the way.
4 *Third-party punishment*: Participants then had to decide whether to punish participants in a prisoner's dilemma (Fehr and Fischbacher, 2004; Goette et al., 2012b). They were endowed with € 0.9 and decided how much money to deduct from a new randomly-assigned player in a prisoner's dilemma. Each deduction point cost the punisher 1 while costing the punished party 3. The players indicated for each potential action of the players in the prisoner's dilemma how much money they would assign (strategy method). Participants knew that the deduction would apply to a new prisoner's dilemma to be played next.
5 *Prisoner's dilemma with third-party punishment*: Participants then played a prisoner's dilemma game as before but now were punished by a randomly-assigned third-party, based on both their action and the decision of the third party punisher in the previous decision.
6 *Dictator game*: Participants played a dictator game in which they were endowed with € 1 and could give up to that amount in increments of 10 cents to an anonymous partner.

For the in- and out-group manipulation, we randomly assigned half of the classrooms to a condition where they interacted with another person from the same class (in-group condition), while the other half were assigned to interact with a participant from another class but within the same school (out-group condition). Therefore, students played either in-group or out-group versions of the games.

2.2.2. Procedures

The neutrally framed experiments were run between December 2011 and January 2012 and were conducted by the same researcher, who is a native of Sicily. All experiments were conducted using paper-and-pencil in the room where each class conducts its normal educational activities. There was no show-up fee paid. The researcher took great care to ensure the anonymity of the participants. We informed the students at the beginning of the session about the steps to protect their

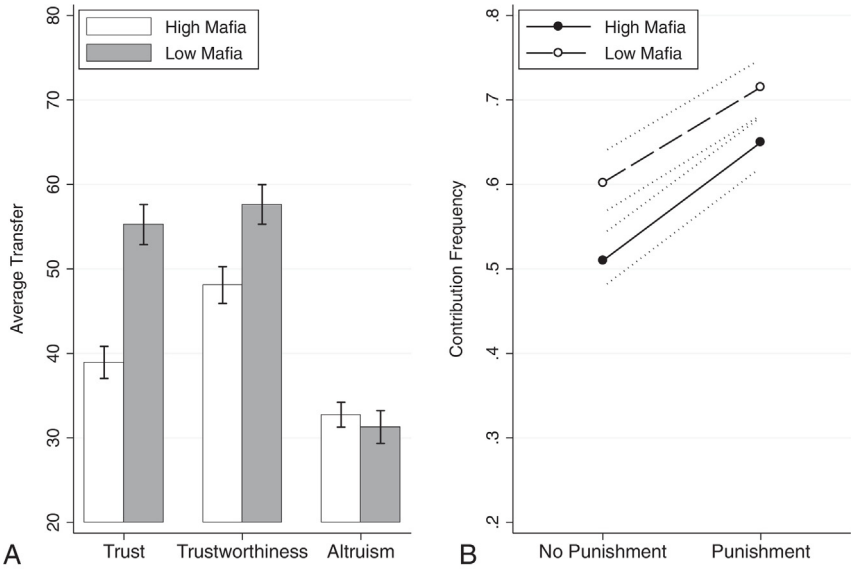

Fig. 2. Contributions in the different games for high- and low-Mafia areas. Panel A shows transfers of Player X in the trust game ("Trust") and the average amount returned by Player Y for all possible contributions of Player X ("Trustworthiness"). "Altruism" indicates the transfer in the dictator game. Panel B shows cooperation rates in the prisoner's dilemma without and with punishment possibility. SEM are shown as bars or bands around the means. Data are pooled from both in-group and out-group conditions.

anonymity. Students were dispersed throughout the rooms to ensure answers were not visible to others. Students were prohibited from speaking before, during, or immediately after the game. Participants were paid within 15 days with sealed envelopes, using an unique identifier that only the student knew. Average payments were 6.99 € in Bagheria and 7.84 € in central Palermo. The vice-principals who delivered the envelopes specifically watched for any bullying or confrontation, but did not observe any, nor was there any bullying reported by students, teachers, or parents following the experiment. The experiments lasted between 90 and 120 min. All students voluntarily decided to participate in the experiments. After all the experiments were completed, participants filled out a short questionnaire (see Appendix F).

To ensure students understood the instructions, we implemented a number of steps. Prior to the studies, we confirmed with several teachers at each school that students would be able to understand them. In conducting the studies, each experiment was explained at least three times, and after the explanation, the students performed several trial runs, after which they were given the opportunity to ask more questions. The game was conducted only when all the students said that they understood the rules. At the beginning of each game, the instructor stated clearly that the outcome of each game was independent of the outcome of the previous games and that for each game, each student would interact with a different person. To calculate participants' payoff, for each game we randomly matched participants to a partner – from the same class or from another class depending on the treatment. While in experiments one can never completely rule out that misunderstanding affected the behavior of participants, our procedures were carefully designed to maximize students' understanding. Furthermore, we do not believe issues of understanding would affect differences *between* our treatments and differences *between* high- and low-Mafia areas.

3. Results

The results are presented in two steps: First, we discuss behavioral differences in the different economic games between high- and low-Mafia schools across both in- and out-group treatments. Second, we investigate the difference between behavior towards in- and out-group members.

3.1. Trust and trustworthiness

Panel A in Fig. 2 shows the mean transfer levels for the trust game separated by the neighborhood of the school (low-Mafia vs. high-Mafia). The average trust levels (i.e., transfers by Player X) are considerably lower in the high-Mafia schools (€ 0.389), than in the low-Mafia schools (€ 0.552) (t-test; $p < .001$). Similarly, the average amounts returned by Player Y, across all possibilities, are lower in the high-Mafia schools (response functions are also different, see the figure in Appendix B). Students in Bagheria returned only € 0.481, compared to € 0.576 in central Palermo ($p < .01$). These results suggest that, on average, students in the high-Mafia schools demonstrate lower levels of trust as well as less trustworthiness. Student

Table 5
Regression results controlling for socio-demographic variables.

Specification:	(1) Tobit	(2) Tobit	(3) Tobit	(4) Tobit	(5) Tobit	(6) Tobit	(7) Tobit	(8) Logit	(9) Logit
Game:	Trust	Trust	Trust	Trust	Trust	Trust	Dictator	PD	PD w/P
Dependent Variable:	Transfer	Transfer	Transfer	Transfer	Transfer	Return transfer	Transfer	Coop.	Coop.
Mafia school	−22.61***	−22.53***	−21.54***	−22.03***	−22.14***	−8.61*	2.48	−0.07	−0.08
	(6.51)	(6.47)	(7.05)	(7.16)	(7.36)	(5.06)	(4.76)	(0.08)	(0.08)
Gender	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Church attendance	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Weekly allowance (€)	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Family wealth (Cars)	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Family makeup	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Grades	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Class size	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Observations	444	444	444	442	431	429	431	430	430
Clusters	22	22	22	22	22	22	22	22	22

Notes: Data are pooled from both in-group and out-group conditions. Weekly allowance is spending money received from family. Family makeup includes kin and sibling variables in Table 4. Logit models present marginal effects. Robust standard errors clustered by class in parentheses. Significance level:
* 10%.
*** 1%.

responses from the survey conducted following all the experiments support these results.[12] Importantly, the mean transfers in the dictator game were nearly identical across schools (€ 0.327 for high-Mafia vs. € 0.313 for low-Mafia; $p = .55$), suggesting that altruism is not driving the general trust results. As alternative tests, we implemented non-parametric Wilcoxon–Mann Whitney tests using class-level means. With 22 classrooms, we found consistent but imprecise results, with higher trust ($p = .02$) and trustworthiness ($p = .33$) and nearly equivalent dictator game transfers ($p = .63$).

To put the magnitude of our trust result in perspective, one could compare our trust differences across neighborhoods to the results in Falk and Zehnder (2013), who find that the average difference in trust between the most and least trusted district in Zurich is 11 percent. The differences between trust levels in low-Mafia and high-Mafia schools are much more pronounced (about 40%), which could indicate the importance of our results. However, we must keep in mind that the two studies differ in many dimensions.

Panel B of Fig. 2 shows the frequency of cooperation in the prisoner's dilemma games for both with and without punishment. Without punishment a smaller percentage of students in the high-Mafia schools (51.0%) transferred their endowment to their partner than in the low-Mafia school (60%) ($p = .054$), similar to the results in the trust game. Importantly, in both low- and high-Mafia areas, the punishment mechanism increases cooperation significantly ($\chi^2(1) = 5.27$, $p = .02$; ($\chi^2(1) = 10.35$, $p = .001$), with no difference between the two sets of schools (($\chi^2(2) = 0.78$, $p = .68$). Organized crime therefore seems not to negatively affect the overall effectiveness of a norm enforcement mechanism, but the norm of punishment fails to resolve the underlying trust and cooperation problems associated with organized crime. Punishment does not elevate cooperation in high-Mafia schools to the level of the low-Mafia school.

Although the demographics of the two neighborhoods are remarkably similar, we are still concerned that differences in student characteristics might be driving our results. Furthermore, we are concerned that class- or neighborhood-specific factors might lead to the correlation of error terms within each class, thereby understating our standard errors. To address both these issues, we first regress trust (measured as 0–100) on a dummy indicating the student was at a high-Mafia school as well as different combinations of control variables using tobit models to account for left- and right-side truncation. The goal is to ensure that the negative relationship between Mafia neighborhood and trust observed in Fig. 2 is robust to demographic control variables, classroom size, and error terms clustered at the classroom level.[13] We present these regressions in Columns (1)–(5) in Table 5. While the control variables have little effect on the coefficient of interest, the clustering correction does increase the standard errors from the basic t-tests in Fig. 2.

We repeat this process for trustworthiness, the dictator game transfer, and the prisoner's dilemma transfers in Columns (6)–(9) of Table 5. For the trust and dictator games, the dependent variable was the transfer amount. For the prisoner's dilemma games our dependent variable was a dummy indicating a transfer. We used a tobit specification for the trust and dictator games and show marginal effects from logit models for the prisoner's dilemmas. Similar to the results in Table 5, the inclusion of control variables does not significantly change our parameters, although the standard errors clustered at the class level decrease their statistical significance.[14]

[12] Using trust questions from the World Values Survey (see Table A1 in the Appendix for details), students in the high-Mafia schools were less trusting of strangers ($p < .01$) and demonstrated higher levels of mistrust ($p < .05$).
[13] Clustering at the neighborhood level suffers from inference problems detailed in Cameron and Miller (2010).
[14] See the table in Appendix B for control variable coefficients.

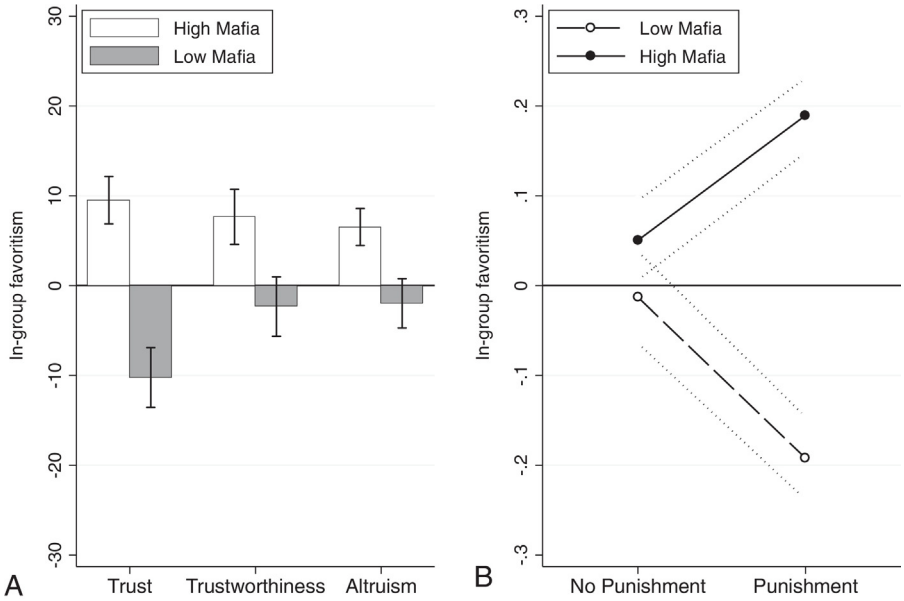

Fig. 3. Figure shows difference of transfer or cooperation rate between in-group members and out-group members (in-group favoritism). Panel A shows behavior in the trust game (trust and trustworthiness) and in the dictator game. Panel B shows in-group favoritism in the prisoner's game without and with punishment. SEM are shown as bars or bands around the means.

In sum, the results show that students in the high-Mafia area are less likely to trust and to be trustworthy.[15] This lower trust is also reflected in lower cooperation rates in the prisoner's dilemma, although these results are weak with clustered errors. These results cannot be due to lower general levels of altruism as we found no difference in dictator game giving. Instead, they may be based in pessimism that partners will reciprocate by transferring back money – a pessimism that appears justified based on our results. Additionally, risk aversion may play some role in explaining reduced transfers in the trust game. Callen et al. (2014) linked risk aversion to exposure to violence, which is more common in the presence of organized crime. While the possibility to punish defectors increases cooperation rates in high- and low-Mafia schools, the norm enforcement mechanism is not able to eliminate the trust difference between the two areas. While these results are based on analysis across group matching, the next section presents differences between behavior towards in- vs. out-group members.

3.2. In-group favoritism

Fig. 3 presents the extent of in-group favoritism in the different games for the low- and high-Mafia schools. The figure reports in-group favoritism, i.e., the mean difference between transfers and cooperation rates between in-group and out-group conditions. Panel A shows that there are substantial differences in in-group favoritism between the high-Mafia and low-Mafia students. For the high-Mafia schools, students were considerably more trusting of in-group partners than out-group partners (43.67 vs. 34.15, $p = .012$). Similarly, as Player Y (i.e., second movers in the trust game), they appeared to transfer more money back to in-group partners (51.94 vs. 44.28, $p = .078$). They were also more altruistic toward in-group partners than out-group partners when playing the dictator game (35.98 vs. 29.46, $p = .026$). This is in stark contrast to students at the low-Mafia school who showed no in-group favoritism in trustworthiness (56.48 vs. 58.82, $p = .619$) or altruism (30.32 vs. 32.28, $p = .613$), and exhibited even higher trust levels towards the out-group (50.21 vs. 60.43, $p = .031$). These results are strongly supportive of enhanced in-group favoritism in the high-Mafia neighborhoods.

Panel B shows that adding a punishment mechanism increases in-group favoritism substantially in the high-Mafia schools. While high-Mafia schools show higher in-group favoritism in games without punishment, in-group favoritism is not statistically significant either for the high-Mafia or the low-Mafia schools (.535 vs. .484, $p = .418$;.596 vs. .609, $p = .857$). However, the addition of punishment changes the dynamics in the prisoner's dilemma considerably. In the high-Mafia schools, contributions to in-group partners rise significantly while those to out-group partners do not (.744 vs. .555, $p = .001$). In contrast, students in the low-Mafia schools do not significantly increase contributions to in-group partners but actually increase

[15] Our results are based on difference between high- and low-Mafia areas within Palermo. We could, however, also have used differences in students' attitudes towards the Mafia. We are reluctant to use those self-reported measures as there is a lot of noise in such measures and substantial demand effect given the sensitive nature of the topic. However, if we would do this analysis (results available on request), the qualitative results mainly hold but are estimated with a lot of noise.

Table 6
Effect of Mafia involvement controlling for socio-demographic variables.

	(1)	(2)	(3)	(4)	(5)
Specification:	Tobit	Tobit	Tobit	Logit	Logit
Game:	Trust	Trust	Dictator	PD	PD w/P
Dependent variable:	Transfer	Return transfer	Transfer	Coop.	Coop.
Mafia school	−32.37***	−17.51***	−4.62*	−.11	−0.26***
	(5.84)	(4.44)	(2.53)	(0.08)	(0.04)
In-group	−103.41	−44.73	−12.43	−0.04	−1.48
	(88.34)	(79.72)	(49.08)	(0.93)	(1.04)
Mafia × in-group	20.13***	12.83**	14.29*	0.05	0.40***
	(10.78)	(7.89)	(7.88)	(0.18)	(0.12)
Age	Yes	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes	Yes
Weekly allowance (€)	Yes	Yes	Yes	Yes	Yes
Church attendance	Yes	Yes	Yes	Yes	Yes
Family wealth (cars)	Yes	Yes	Yes	Yes	Yes
Family makeup	Yes	Yes	Yes	Yes	Yes
Grades	Yes	Yes	Yes	Yes	Yes
Class size	Yes	Yes	Yes	Yes	Yes
Observations	431	429	431	430	430
Clusters	22	22	22	22	22

Notes: Weekly allowance is spending money received from family. Family makeup includes kin and sibling variables in Table 4. All control variables are interacted with in-group condition. Logit models present marginal effects. Robust standard errors clustered by class in parentheses.
* Significant at the 10% confidence level.
** Significant at the 5% confidence level.
*** Significant at the 1% confidence level.

out-group contributions (.621 vs. .813, $p = .004$). While it is unclear what baseline behavior to expect for this age group in Italy due to a lack of previous studies in such a setting, the results suggest that in low-Mafia high schools students show some out-group favoritism. This result, which is similar to the out-group favoritism in the trust game, was unexpected, and the explanation for it is not obvious. Evidence on out-group favoritism, however, has been previously found in ethnic minority groups (Friesen et al., 2012), and may be explained by negative self-stereotypes among Sicilians opposed to the Mafia as has been documented in some ethnic groups (Bilewicz and Kofta, 2011). This explanation, however, is entirely speculative, as we had no prior expectation of finding out-group favoritism.

Table 6 presents regressions that tests the robustness of the results in Fig. 2 to adding control variables and standard error clustering at the class level. We include all control variables as well as their interaction with the in-group dummy. These regressions support the results in Fig. 2 for trust and cooperation rates in the prisoner's dilemma when norm enforcement is possible. While both approaches show the same qualitative results, clustering at the class level predictably increases the standard errors.

In the prisoner's dilemma games, the specter of punishment clearly evokes in-group favoritism in the high-Mafia neighborhoods. Why might this be the case? The pattern of punishment of defectors, i.e., individuals who did not pass their endowment in the prisoner's dilemma, shows that students in high-Mafia schools punish in-group members at both slightly higher levels and with higher frequencies (see Fig. 4 for punishment of defectors. Appendix D shows punishment for all cases). While the in-group favoritism in punishment is not statistically different between the two neighborhoods, this does suggest that the informal institution of organized crime focuses the punishment norm inward in ways that may reduce its efficacy in enforcing broader societal cooperation.

In sum, the results of this section shows that students that grow up in an environment with higher Mafia involvement are more inclined to be in-group biased. The presence of a norm enforcement mechanism exacerbates such in-group favoritism.

4. Robustness

In this section, we provide three additional robustness tests dealing with differences between the schools in the two neighborhoods.

4.1. Age differences

Students in high-Mafia schools are, on average, one year older than students in the low-Mafia school. Regressions with age controls (shown above), suggest that age differences across the two neighborhoods are unlikely to be driving our results. To further ensure this, we repeated our tests using the common data support from ages at the three schools, students born in 1993 and 1994, which reduces our sample to 328 students. Results on trust (55.2 vs. 37.8, $p < .01$) and trustworthiness are very similar (56.3 vs. 49.4, $p < .1$), as is dictator giving (31.5 vs. 32.4, $p = .74$). Prisoner's dilemma results with (73.0% vs. 65.6%,

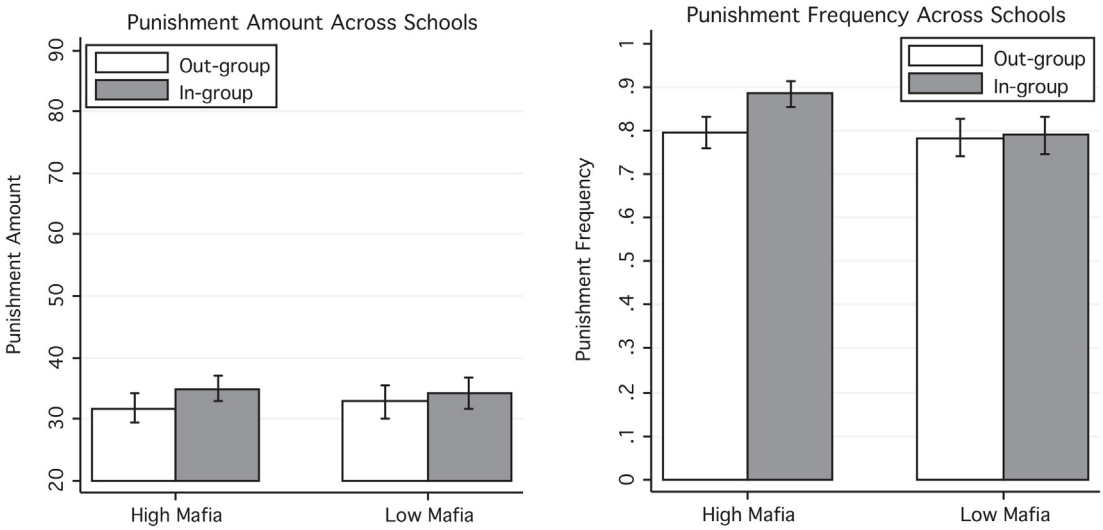

Fig. 4. Punishment of defectors. Panel A shows the average amount of punishment of individuals who did not pass their endowment, i.e., "defectors". Panel B shows the proportion of participants who decide to punish a defector at all.

$p = .16$) and without (60.2% vs. 52.4%, $p = .18$) punishment are also similar but not statistically significance at conventional levels.

4.2. Excluding non-local central Palermo students

As we noted earlier, 82 of the 187 students at the central Palermo school come from surrounding neighborhoods.[16] Although these students are also likely impacted by the anti-Mafia culture in central Palermo, we exclude them in an additional analysis to compare students living in central Palermo with students living in Bagheria. Results for trust (52.2 vs. 38.9, $p<.01$), trustworthiness (56.6 vs. 48.1, $p<.05$), and dictator (31.0 vs. 32.7, $p = .55$) games are nearly identical to the full sample. Prisoner's dilemma results, however, are much weaker both with (68.3% vs. 62.5% $p = .55$) and without (53.3% vs. 51.1%, $p = .68$) punishment.

4.3. Classroom gender composition

Given the differences in gender segregation across the three schools, we next examined whether this segregation appeared to be correlated with any of our dependent variables. To do so, we exploited variation in classroom segregation at the classroom level and included the percentage of males in the classroom as a control variable. We then repeated our regressions from Table 5 for the two schools that had different mixes of gender at the classroom level (one from Bagheria and one from Central Palermo). Including this gender mix variable as an additional control in our regressions does not significantly change our results, but it does make the amount returned in the trust game statistical insignificance and increase precision on the parameter estimate for the prisoners dilemma with punishment game. The coefficients for the percentage male indicate that male dominated classrooms may have lower trust and lower cooperation under threat of punishment, although we note that our results hold even when excluding the most male school in these regressions. Results are presented in Appendix E.

5. Conclusions

Our studies suggest mistrust and in-group favoritism can be sustained by informal institutions such as organized crime long after their utility has expired. Our studies are unique in examining differences within an ethnically, religiously, and linguistically homogeneous population, overcoming some of the omitted variable biases in prior studies of cultural trust and economic activity. By keeping many cultural factors constant and exploiting a historical shock to one of them, organized crime, we are able to better isolate the relationship of this informal norm with economic behavior than in previous work. Furthermore, we complement the large literature on within-country variation in self-reported trust through experimental data.

These results are similar to the role of religion found by Henrich et al. (2010) in facilitating fairness and large-scale interaction, but have key differences. The informal institution in our study, organized crime, focuses pro-social behavior

[16] None of these commuting students are from Bagheria.

such as trust away from society and toward parochial interests. Furthermore, it overpowers religious and other cultural commonalities across our subjects, such as language, religion, and national identity.

Organized crime also appears to pervert the typically pro-social norm of punishment, focusing it toward in-group members in ways that only intensify in-group favoritism in cooperation. This suggests, similar to prior work (Herrmann et al., 2008; Goette et al., 2012b), that norms such as punishment that typically improve broad cooperation interact with institutions in ways that may limit their effectiveness or even produce anti-social outcomes.

Our study also suggests that even in locations with well-developed formal institutions (i.e., Italy and the European Union), informal local institutions such as organized crime can undermine their efficacy and stifle economic exchange and growth. This implies that the development of formal institutions is necessary but insufficient in itself, without the consideration of their interaction with informal institutions with deep historical and cultural roots. Our results are also consistent with the argument that low trust and social capital have played a critical role in impeding economic and social welfare in locations such as Sicily (Putnam et al., 1994). Our study may help explain the many difficulties faced by cross-national institutions such as the European Union. Yet our result that adolescents trusting behavior changes for the better in areas in which Mafia involvement has been successfully reduced also suggests that there is hope for overcoming the lack of trust and in-group bias exhibited in countries with informal institutions such as organized crime, historical slave trades (Nunn and Wantchekon, 2011), or caste systems (Dunning and Nilekani, 2013). Such changes can be the beginning of a path out of a vicious cycle of low trust and high organized crime.

At first glance, our results seem counter to recent work by Nese et al. (2013), who find inmates at an Italian prison who are associated with organized crime to be more cooperative than university students. We note, however, that it is difficult to compare our results with theirs, since our comparable high school samples are different on multiple dimensions from their prisoner and university samples. Recent work finds university students to be less pro-social than both the general population and even workers in highly competitive industries (e.g., see Fehr and List, 2004; Belot et al., 2015; Hoffman and Morgan, 2015). Furthermore, the in-group nature of their prisoner population is most comparable to the higher cooperation found in our in-group condition for the high-Mafia schools, so the differences in these papers must remain an open question.

We note that although we argue that Mafia involvement is the primary difference between our two neighborhoods, it is certainly not the only one, which raises questions about which neighborhood characteristics are driving the observed differences in trust, trustworthiness, and in-group preferences. The potential for violence, independent of its source in organized crime, may change behavior (Bauer et al., 2014; Callen et al., 2014). Alternatively, the more central and urban location of our low-Mafia neighborhood may expose children to more foreigners or strangers, which might in turn promote trust and reduce in-group bias (Buchan et al., 2009). Furthermore, we cannot directly observe if Mafia-involved families migrated out of central Palermo following the government's increased anti-Mafia focus there. Studies from a larger number of schools would help address these alternative explanations, but we were unable to do so because of researcher safety concerns that arose in the Bagheria neighborhood. Instead, we attempted to study trust and trustworthiness across a wide array of Palermo neighborhoods using older students at the University of Palermo (see Appendix H for details). Unfortunately, this study suffered considerable implementation problems, and produced noisy and inconsistent results. The majority of recruited students never completed the online study, and of those that did, most failed the comprehension questions for simple trust and dictator games. Furthermore, our attempt to manipulate group-identity through area of study (engineering versus architecture) proved to be of limited salience.

Finally, we note that future work could better estimate causal treatment effects from localized shocks to cultures of crime by examining cohort effects in individuals of different ages. While our setup is limited in establishing causality, a longitudinal design would shed more light on how strong the causal effect of organized crime on cooperation is. Although culture and associated preferences are typically thought to change slowly over time, recent work shows shocks to culture and institutions can produce rapid change within one generation (Bauer et al., 2014; Callen et al., 2014; Alesina and Fuchs-Schündeln, 2007; Voors et al., 2012), particularly through its effect on children and adolescents (Lindbeck and Nyberg, 2006; Giuliano and Spilimbergo, 2009; Fuchs-Schündeln and Masella, 2013). Future research should investigate the conditions when preferences and cultural norms change slowly and when they do not. It is possible that preferences of children and teenagers (as in our study) are more malleable than those in older populations, but this would go far beyond the scope of our study and is left for future research.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2016.09.005.

References

Abadie, Alberto, Gardeazabal, Javier, 2003. The economic costs of conflict: a case study of the Basque Country. Am. Econ. Rev., 113–132.
Acconcia, Antonio, Corsetti, Giancarlo, Simonelli, Saverio, 2014. Mafia and public spending: evidence on the fiscal multiplier from a quasi-experiment. Am. Econ. Rev. 104 (7), 2185–2209.
Aghion, Philippe, Algan, Yann, Cahuc, Pierre, Shleifer, Andrei, 2010. Regulation and distrust. Q. J. Econ. 125 (3), 1015–1049.
Alesina, Alberto, Fuchs-Schündeln, Nicola, 2007. Good-bye Lenin (or not?): the effect of communism on people's preferences. Am. Econ. Rev. 97 (4), 1507–1528.
Algan, Yann, Cahuc, Pierre, 2010. Inherited trust and growth. Am. Econ. Rev., 2060–2092.

Algan, Yann, Cahuc, Pierre, 2013. Trust, institutions, and development. Ann. Rev. Econ. 5 (1).
Algan, Yann, Cahuc, Pierre, Shleifer, Andrei, 2013. Teaching practices and social capital. Am. Econ. J.: Appl. Econ. 5 (3), 189–210.
Ashraf, Nava, Bohnet, Iris, Piankov, Nikita, 2006. Decomposing trust and trustworthiness. Exp. Econ. 9 (3), 193–208.
Baccara, Mariagiovanna, Bar-Issac, Heski, 2008. How to organize crime. Rev. Econ. Stud. 75 (4), 1039–1067.
Bandiera, Oriana, 2003. Land reform, the market for protection, and the origins of the Sicilian Mafia: theory and evidence. J. Law Econ. Organ. 19 (1), 218–244.
Banfield, Edward, 1958. The Moral Basis of a Backward Society. The Free Press, New York.
Bauer, Michal, Cassar, Alessandra, Chytilová, Julie, Henrich, Joseph, 2014. Wars enduring effects on the development of egalitarian motivations and in-group biases. Psychol. Sci. 25 (1), 47–57.
Becker, Gary S., 1968. Crime and punishment: an economic approach. J. Polit. Econ. 76 (2), 169–217.
Belot, Michele, Duch, Raymond, Miller, Luis, 2015. A comprehensive comparison of students and non-students in classic experimental games. J. Econ. Behav. Organ. 113, 26–33.
Berg, Joyce, Dickhaut, John, McCabe, Kevin, 1995. Trust, reciprocity, and social history. Games Econ. Behav. 10 (1), 122–142.
Bigoni, Maria, Bortolotti, Stefania, Casari, Marco, Gambetta, Diego, Pancotto, Francesca, 2013. Cooperation Hidden Frontiers: The Behavioral Foundations of the Italian North-South Divide.
Bilewicz, Michal, Kofta, Miroslaw, 2011. Less biased under threat? Self-verificatory reactions to social identity threat among groups with negative self-stereotypes. J. Appl. Soc. Psychol. 41 (9), 2249–2267.
Bohnet, Iris, Huck, Steffen, 2004. Repetition and reputation: implications for trust and trustworthiness when institutions change. Am. Econ. Rev.ew 94 (2), 362–366.
Bohnet, Iris, Greig, Fiona, Herrmann, Benedikt, Zeckhauser, Richard, 2008. Betrayal aversion: evidence from Brazil, China, Oman, Switzerland, Turkey, and the United States. Am. Econ. Rev. 98 (1), 294–310.
Bowles, Samuel, 1998. Endogenous preferences: the cultural consequences of markets and other economic institutions. J. Econ. Lit. 36 (1), 75–111.
Bowles, Samuel, 2008. Conflict: Altruism's widwife. Nature 456, 326–327.
Brandts, Jordi, Charness, Gary, 2011. The strategy versus the direct-response method: a first survey of experimental comparisons. Exp. Econ. 14 (3), 375–398.
Buchan, Nancy R., Grimalda, Gianluca, Wilson, Rick, Brewer, Marilynn, Fatas, Enrique, Foddy, Margaret, 2009. Globalization and human cooperation. Proc. Natl. Acad. Sci. U. S. A. 106 (11), 4138–4142.
Buonanno, Paolo, Durante, Ruben, Prarolo, Giovanni, Vanin, Paolo, 2015. Poor institutions, rich mines: Resource curse in the origins of the Sicilian mafia. Econ. J. 125 (586), F175–F202.
Callen, Michael, Isaqzadeh, Mohammad, Long, James D., Sprenger, Charles, 2014. Violence and risk preference: Experimental evidence from Afghanistan. Am. Econ. Rev. 104 (1), 123–148.
Cameron, A. Colin, Miller, Douglas L., 2010. Robust inference with clustered data. Handbook Empir. Econ. Financ., 1–28.
Cameron, Lisa, Erkal, Nisvan, Gangadharan, Lata, Meng, Xin, 2013. Little emperors: behavioral impacts of china's one-child policy. Science 339 (6122), 953–957.
Charness, Gary, Rigotti, Luca, Rustichini, Aldo, 2007. Individual behavior and group membership. Am. Econ. Rev. 97 (4), 1340–1352.
Chen, Yan, Li, Sherry Xin, 2009. Group identity and social preferences. Am. Econ. Rev. 99 (1), 431–457.
Choi, Jung-Kyoo, Bowles, Samuel, 2007. The coevolution of parochial altruism and war. Science 318 (5850), 636.
Cohn, Alain, André Maréchal, Michel, Noll, Thomas, 2015. Bad boys: how criminal identity salience affects rule violation. Rev. Econ. Stud. 82 (4), 1289–1308.
Di Tella, Rafael, Schargrodsky, Ernesto, 2004. Do police reduce crime? Estimates using the allocation of police forces after a terrorist attack. Am. Econ. Rev., 115–133.
Dohmen, Thomas, Falk, Armin, Huffman, David, Sunde, Uwe, 2012. The intergenerational transmission of risk and trust attitudes. Rev. Econ. Stud. 79 (2), 645–677.
Dunning, Thad, Nilekani, Janhavi, 2013. Ethnic quotas and political mobilization: caste, parties, and distribution in Indian village councils. APSR 107 (1).
Falk, Armin, Zehnder, Christian, 2013. A city-wide experiment on trust discrimination. J. Public Econ. 100, 15–27.
Fehr, Ernst, List, John A., 2004. The hidden costs and returns of incentives – trust and trustworthiness among CEOs. J. Eur. Econ. Assoc. 2 (5), 743–771.
Fehr, Ernst, Hoff, Karla, 2011. Introduction: tastes, castes and culture: the influence of society on preferences. Econ. J. 121 (556), F396–F412.
Fehr, Ernst, Gächter, Simon, 2000. Cooperation and punishment in public goods experiments. Am. Econ. Rev. 90 (September (4)), 980–994.
Fehr, Ernst, Fischbacher, Urs, 2004. Third party punishment and social norms. Evol. Hum. Behav. 25, 63–87.
Fehr, Ernst, Glätzle-Rützler, Daniela, Sutter, Matthias, 2013. The development of egalitarianism, altruism, spite and parochialism in childhood and adolescence. Eur. Econ. Rev. 64, 369–383.
Fehr, Ernst, Bernhard, Helen, Rockenbach, Bettina, 2008. Egalitarianism in young children. Nature 454 (7208), 1079–1083.
Fershtman, Chaim, Gneezy, Uri, 2001. Discrimination in a segmented society: an experimental approach. Q. J. Econ. 116 (1), 351–377.
Fiorentini, Gianluca, Peltzman, Sam, 1997. The Economics of Organised Crime. Cambridge University Press.
Frey, Bruno S., Bohnet, Iris, 1995. Institutions affect fairness: Experimental investigations. J. Inst. Theor. Econ. (JITE)[[nl]]Zeitschrift für die gesamte Staatswissenschaft, 286–303.
Frey, Bruno S., Luechinger, Simon, Stutzer, Alois, 2007. Calculating tragedy: assessing the costs of terrorism. J. Econ. Surv. 21 (1), 1–24.
Friesen, Jane, Arifovic, Jasmina, Wright, Stephen C., Ludwig, Andreas, Giamo, Lisa, Baray, Gamze, 2012. Ethnic identity and discrimination among children. J. Econ. Psychol. 33, 1156–1169.
Fuchs-Schündeln, Nicola, Masella, Paolo, 2013. Long-lasting effects of socialist education. Rev. Econ. Stat. (00).
Gambetta, Diego, 1993. The Sicilian Mafia: The Business of Private Protection. Harvard University Press, Cambridge.
Giuliano, Paola, Spilimbergo, Antonio, 2009. Growing up in a Recession: Beliefs and the Macroeconomy, Technical Report. National Bureau of Economic Research.
Gneezy, Ayelet, Fessler, Daniel M.T., 2012. Conflict, sticks and carrots: war increases prosocial punishments and rewards. Proc. R. Soc. B: Biol. Sci. 279 (2012), 219–223.
Gneezy, Uri, Leibbrandt, Andreas, List, John A., 2014. Ode to the sea: workplace organizations and norms of cooperation. Econ. J.
Gneezy, Uri, Leonard, K.L., List, J.A., 2009. Gender differences in competition: evidence from a matrilineal and a patriarchal society. Econometrica 77 (5), 1637–1664.
Goette, Lorenz, Huffman, David, Meier, Stephan, 2006. The impact of group membership on cooperation and norm enforcement: evidence using random assignment to real social groups. Am. Econ. Rev. 96 (2), 212–216.
Goette, Lorenz, Huffman, David, Meier, Stephan, 2012a. The impact of social ties on group interactions: evidence from minimal groups and randomly assigned real groups. Am. Econ. J.: Microecon. 4 (1), 101–115.
Goette, Lorenz, Huffman, David, Meier, Stephan, Sutter, Matthias, 2012b. Competition between organizational groups: its impact on altruistic and anti-social motivations. Manage. Sci. 58 (5), 948–960.
Greif, Avner, Tabellini, Guido, 2010. Cultural and institutional bifurcation: China and Europe compared. Am. Econ. Rev. 100 (2), 135–140.
Greif, Avner, Iyigun, Murat, 2013. Social organizations, violence & modern growth. Am. Econ. Rev. 103 (3), 534–538.
Gueth, Werner, Kliemt, Hartmut, Napel, Stefan, 2009. Population-dependent costs of detecting trustworthiness: an indirect evolutionary analysis. In: Till, Gruene-Yanoff, Sven Ove, Hansson (Eds.), Preference Change, Vol. 42 of Theory and Decision Library. Springer, Netherlands, pp. 243–259.
Guiso, Luigi, Sapienza, Paola, Zingales, Luigi, 2006. Does culture affect economic outcomes? J. Econ. Perspect. 20 (2), 23–48.

Henrich, Joseph, Ensminger, Jean, McElreath, Richard, Barr, Abigail, Barrett, Clark, Bolyanatz, Alexander, Cardenas, Juan C., Gurven, Michael, Gwako, Edwins, Henrich, Natalie, Lesorogol, Carolyn, Marlowe, Frank, Tracer, David, Ziker, John, 2010. Markets, religion, community size and the evolution of fairness and punishment. Science 327 (5972), 1480–1484.
Henrich, Joseph, Boyd, Robert, Bowles, Samuel, Camerer, Colin, Fehr, Ernst, Gintis, Herbert, McElreath, Richard, 2001. In search of homo economicus: behavioral experiments in 15 small-scale societies. Am. Econ. Rev. 91 (2), 73–78.
Herrmann, Benedikt, Thoni, Christian, Gachter, Simon, 2008. Antisocial punishment across societies. Science 319 (5868), 1362–1367.
Hoffman, Mitchell, Morgan, John, 2015. Who's naughty? Who's nice? Experiments on whether pro-social workers are selected out of cutthroat business environments. J. Econ. Behav. Organ. 109, 173–187.
Knack, Stephen, Keefer, Philip, 1997. Does social capital have an economic payoff? A cross-country investigation. Q. J. Econ. 112 (4), 1251–1288.
Kollock, Peter, 1994. The emergence of exchange structures: An experimental study of uncertainty, commitment, and trust. Am. J. Sociol. 100 (2), 313–345.
Kumar, Vimal, Skaperdas, Stergios, 2009. In: Nuno Garoupa (Ed.), Criminal Law and Economics, vol. 3. Edward Elgar Publishing, pp. 257–270, chapter Organized crime.
Leeson, Peter T., 2007. An-arrgh-chy: the law and economics of pirate organization. J. Polit. Econ. 115 (6), 1049–1094.
Leibbrandt, Andreas, Uri, Gneezy, List, John A., 2013. Rise and fall of competitiveness in individualistic and collectivistic societies. Proc. Natl. Acad. Sci. U. S. A. 110 (23), 9305–9308.
Levitt, Steven D., Venkatesh, Sudhir Alladi, 2000. An economic analysis of a drug-selling gang's finances. Q. J. Econ. 115 (3), 755–789.
Lindbeck, Assar, Nyberg, Sten, 2006. Raising children to work hard: altruism, work norms, and social insurance. Q. J. Econ., 1473–1503.
Nese, Annamaria, Palomba, Arturo, Sbriglia, Patrizia, Scudiero, Maurizio, 2013. Third party punishment and criminal behavior: an experiment with the Italian Camorra prison inmates. Econ. Bull. 33, 1875–1884.
Norenzayan, Ara, Shariff, Azim F., 2008. The origin and evolution of religious prosociality. Science 322 (5898), 58–62.
North, Douglass C., 1990. Institutions, Institutional Change, and Economic Performance. Cambridge Univ Pr.
Nunn, Nathan, Wantchekon, Leonard, 2011. The slave trade and the origins of mistrust in Africa. Am. Econ. Rev. 101, 3221–3252.
on Drugs, United Nations Office and Crime, 2010. The Globalization of Crime: A Transnational Organized Crime Threat Assessment. UNODC.
Pinotti, Paolo, 2012. The economic costs of organized crime: evidence from southern Italy. In: Bank of Italy Temi di Discussione (Working Paper) No, p. 868.
La Porta, Rafael, Lopez-de Silanes, Florencio, Shleifer, Andrei, Vishny, Robert W., 1997. Trust in large organizations. Am. Econ. Rev., 333–338.
Putnam, Robert D., Leonardi, Robert, Nanetti, Raffaella Y., 1994. Making Democracy Work: Civic Traditions in Modern Italy. Princeton Univ Pr.
Sapienza, Paola, Toldra-Simats, Anna, Zingales, Luigi, 2013. Understanding trust. Econ. J.
Sutter, Matthias, 2009. Individual behavior and group membership: comment. Am. Econ. Rev. 99 (5), 2247–2257.
Sutter, Matthias, Kocher, Martin, 2007. Trust and trustworthiness across different age groups. Games Econ. Behav. 59 (2), 364–382.
Tabellini, Guido, 2008. The scope of cooperation: values and incentives. Q. J. Econ. 123 (3), 905–950.
Tabellini, Guido, 2010. Culture and institutions: economic development in the regions of Europe. J. Eur. Econ. Assoc. 8 (4), 677–716.
Vaccaro, Antonino, 2012. To pay or not to pay? Dynamic transparency and the fight against the mafias extortionists. J. Bus. Ethics 106 (1), 1–13.
Varese, Federico, 2011. Mafias on the Move: How Organized Crime Conquers New Territories. Princeton University Press.
Voors, Maarten J., Nillesen, Eleonora E.M., Verwimp, Philip, Bulte, Erwin H., Lensink, Robert, Van Soest, Daan P., 2012. Violent conflict and behavior: a field experiment in Burundi. Am. Econ. Rev. 102 (2), 941–964.