ESSAYS ON THE ECONOMICS OF CRIME

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Abstract

The economic approach to crime issues is a recent field of research, which spawned from Becker's (1968) seminal work. In this PhD thesis we contribute to the existing literature with three original research papers.

The first paper deals with an under-explored field of research, namely the origins of the Sicilian Mafia. We follow an approach closer to that of historians such as Lupo (2004) and Pezzino (1987). In their work, Mafia was strictly linked with the socio and economic struggles amongst emerging classes which took place after the end of feudalism. We tested this hypothesis using a new measure of Mafia activity and new explanatory variables derived from previously under-explored primary sources. Our key findings are that Mafia was likely to be active in councils dominated by large properties, with high land values, lower density of population and where there were few peasants who owned the land.

In the second paper, we explore the channels that favoured the expansion of Italian gangs in the centre and north of Italy in the second half of the XX century. We empirically investigate the role of forced re-settlement and migration through the creation of a panel dataset at the provincial level for the period 1983-2008, again using data from previously under-explored primary sources. Consistent with the community network approach (Bauer and Zimmermann, 1997; Moretti, 1999), we find that migration is by far the most important predictor of Mafia presence in the hosting provinces.

In the final paper, we evaluate the impact of trust on crime in five Caribbean countries: Jamaica, Suriname, Guyana, Trinidad and Tobago and Dominican Republic. We use individual data taken from Americas Barometer for 2010, which contains information on victimization experiences. In order to tackle endogeneity we employ an instrumental variable approach. The results show that our measure of trust exerts a crime reducing effect on property but not violent crimes.

As we argue in the introductory chapter, all three contributions could be considered in the light of the new institutional economics approach. In particular, both organised crime and social capital provide extra legal solutions to securing property rights.

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Declaration

The work “Migrating Mafia” in the third chapter was jointly produced with Paolo Buonanno from the University of Bergamo. However, I am the sole contributor of the rest of the work. The chapter “Trust and Victimization: Evidence from Five Caribbean Countries” was initiated during my work at the Inter-American Development Bank in Washington, USA. This took place in the 2011 summer.

Chapter 1: **Introduction**

> "Pareto is saying, sure, you can produce goods for the purpose of mutually beneficial exchange with other parties—OK, that's Marshall's "ordinary business." But there's another way to get rich: you can grab goods that someone else has produced. Appropriating, grabbing, confiscating what you want–and, on the flip side, defending, protecting, sequestering what you already have–that's economic activity too. Take television. Cops chase robbers, victims are stalked by hitmen (or should I say hitpersons?), posses cut off rustlers at the pass, plaintiffs sue defendants, exorcists cast spells against vampires. What is all this but muscular economics? Robbers, rustlers, hitpersons, litigants —they're all trying to make a living. Even vampires are making economic choices: sucking blood is presumably the cost-effective way of meeting their unusual nutritional needs".
> (Hirshflier, 1994, p.2)

1.1 Introduction

This dissertation consists of three original research papers on different topics related the economics of crime. The first deals with the origins of the Sicilian Mafia in the second half of the XIX century. We employ a new dataset to verify the characteristics most likely to have led to the birth of such an organisation. The second is on the migration of Mafia from the southern Italian regions to the central and northern ones in the post war period. We study the factors that might have facilitated this migration. The third analyses how social capital, and trust in particular, affects contemporary crime levels in five selected Caribbean countries. We follow insights from the economic theory, tested in different economic periods and apply econometric techniques to verify such hypotheses.

Apart from making a contribution to the economics of crime literature, there are two further distinct contributions of this research to the literature: the first two papers are on organised crime and the last is on standard "not organised" crime. In this introduction, we argue that they have many similarities and they can best be analysed and understood through the new institutional economics lens. Both organised crime and social capital can be considered as extra-legal social arrangements for securing property rights and enforce contracts.

This introduction is organised as follow: we first review the main ideas of the new institutional economics, focusing on how crime can be considered to be an economic issue. We then present an overview of the contents of the chapters which give the reader an idea of the topics covered in the dissertation. We further apply the insights of the new

institutional economics to explain how these motivate and explain the importance of our research. The last section concludes.

1.2 The New Institutional Economics: a selected review

New Institutional Economics (NIE) has been one of the most influential theories in economics in the last decades. For example, four of the last Nobel laureates in economics belonged to this school of thought[1]. The ideas behind this approach were formulated as a response to the paradigms postulated in the neoclassical school.

Neo classical economists[2] treated economies as being composed of perfectly rational agents who have complete information over all sets of alternatives. They assumed that property rights are secure and contracts perfectly enforced. Their main focus was on the production process, i.e. how firms maximize their profits given some inputs and constraints. The new institutionalists questioned these assumptions and focused on the institutional environment in which economic transactions take place[3]. As Klein (1999, p.457) argued, the new institutionalists are interested in the "social, economic and political institutions that govern everyday life". This new approach to economics aimed at explaining what institutions do, how they arise, how they evolve and how they behave. As it has evolved, NIE has come to embrace a number of scholarly specialism, ranging from transaction costs theory to the positive political theory. Here, we discuss those insights from NIE that are particularly relevant to this research. We consider first North's macro approach and then the micro approach of Coase and Williamsons[4].

1.2.1 North's view

The main contribution by North, related to institutional setting and the role of the state, distinguishes between institutions and organisations. The former are the centre of his analysis and are defined as "the rules of the game in a society, or, more formally, are the

[1] In chronological order: Ronald Coase (1991), Douglass North (1993), Elinor Ostrom (2009) and Oliver Williamson (2009).
[2] Such as Jevons and Walras.
[3] However, it is agreed that the neoclassical and institutional approach are not antagonistic. Rather, the latter expanded the former's analysis (Menard and Shirley, 2011).
[4] This classification is typical in the NIE analysis (Menard and Shirley, 2011).

humanly devised constraints that shape human interaction" (North, 1990, p.3). Institutions, according to North, are fundamental in defining the space of actions of economic agents. Moreover, and significantly, they reduce uncertainty and provide incentives for agents to trade. North (ibid., p.3-4) argues that

> "In the jargon of the economist, institutions define and limit the set of choices of individuals. Institutional constraints include both what individuals are prohibited from doing and, sometimes, under what conditions some individuals are permitted to undertake certain activities. They are perfectly analogous to the rules of the game in a competitive team sport".

Institutions in formal terms comprise laws, such as constitutions and property rights. However, they also comprise informal institutions such as social conventions, norms and behavioural rules which may not be explicitly written down. Such informal institutions are crucial in our analysis on social capital, as they can work as substitutes for formal rules, especially in developing countries.

However, there are also the organisations, referred to as governance structures, which are the so-called players of the game. Amongst these, we include firms, trade unions and universities. North recognised that, as in any tautological definition, is difficult to draw a clear-cut line between organisations and institutional arrangements. This is because some organisations, such as universities, might at time belong to both classes. As we will see, in some situations organised crime can be considered as a player of the game that operates in weak states.

North's analysis has been mainly devoted to the exploration of institutional arrangements, which are often considered as the macro analyses. Micro applications, as applied to, for example, organisations have been the subject of much work by Coase and Williamson. We discuss this approach in the next section.

1.2.2 Coase and Williamson

The 1937 paper by Coase "The nature of the firm" is often regarded as the foundation of NIE. In this seminal work, the author criticized the neo classical view of the economy as an equilibrating process of supply and demand through the price mechanism. In neoclassical

economics, the firm is a black box that transforms inputs and outputs depending on technology and constraints. Coase concentrated on the governance issues of the firm rather than on production. The author postulated that all the transaction costs[5] involved in trade influence the firm's structure and organisation. Thus, Klein (1999, p.464) argued that "the decision to organise transactions within the firm as opposed to on the open market- the 'make or buy decision'- depends on the relative costs of internal and external exchange." Williamson (1985)[6] built on this approach to provide a complete framework of the role of transaction costs in the economy. His idea was that any kind of economic exchange involves some costs. For example, firms have to spend time bargaining and securing that the business traders behave well. Firms consider all these potential costs when they decide their governance and choose the one that minimize such costs. In this respect, Williamson (1996, p. 46), argued that the aim of an economic organisation is to "align transactions, which differ in their attributes, with governance structures, which differ in their costs and competencies, in a discriminating (mainly, transaction cost economizing) way". Therefore, firms will choose amongst a series of institutional alternatives. Business firms, long-term contracts, public bureaucracies, nonprofit organizations and other contractual agreements are typical examples. Williamson believed that transaction costs not only affect firms but also shape the entire economy[7].

Based on this assumption, the author developed his own classification of institutions. Williamson (2000) identified four levels of social analysis. The first is the social embeddedness level which refers to norms, mores and traditions. This level is similar to the informal agreements described by North. These types of social arrangements are slow to change, as shown by Putnam et al (1993) in his study of civicness in Italy. Level two is the institutional environment which includes "the executive, the legislative, judicial and bureaucratic function of government as well as the distribution of powers across different level of government" (Williamson, 2000, p.598). The third one is "where the institutions of governance are located" (ibid., p.599). This level concentrates on the governance of contractual relationships and how they align with transactions. Finally, the last level is the one at "which the neoclassical analysis works" (ibid., p.600). This includes production,

[5] These could be considered as the sum of production and organisation costs.
[6] Amongst the other works.
[7] In fact, Williamson thought that transaction costs apply not only to firms, but to all economic agents who trade and live in a specific institutional setting.

employment and market equilibrium. For our analysis, we are mainly interested in levels one to three. Level one is strongly related to social capital, which is the topic of our third research paper. Moreover, the analysis of level two and three analysis help us to understand why organised crime emerged and how it could prosper. In fact, these two levels deal with property rights and contract enforcement which need to be well protected and enforced in order for a society to develop (Acemoglu et al., 2001).

Coase was the first scholar to focus specifically on property rights. In fact, the author assumed that when people are trading, they are de facto dealing with property rights. Williamson went further by arguing that the neo classical view wrongly assumed that the protection of property rights is costless and that they are perfectly enforcable. Williamson argued that, given that human beings are opportunistic, they are subject to predation (Menard and Shirley, 2011, p.8). Moreover, since legal enforcement is quite costly, people will prefer to resort to private measures. This analysis is close to that of Dixit which we will analyse in detail shortly. Similar arguments were applied to contract enforcement. Williamson rejected the standard view of contracts as being both complete and perfectly enforced. He claimed that this view fails to take into account the reality of human behaviour. In real markets, contract enforcement is far from being perfect because people will adopt opportunistic behaviour which will lead to increased costs. In this respect, Williamson (2000, p.599) argues : "Costless court ordering being a fiction, much of the contract management and dispute settlement action is dealt with directly by the parties-through private ordering". Indeed, in Sicily in the XIX century (or in some parts of today's Italy) people preferred to resort to private arrangements, rather than going to court.

So far, we have examined the main contributions of the NIE. Extensions of such concepts led to the economic analysis of crime we review in the next sections.

1.2.3 Law and economics

As we have seen, the NIE places a great emphasis on the rule of the games. Amongst them, the legal environment has received particular attention. The specific economic field which deals with this interaction is the well-known of law and economics[8].

[8] For a review on law and economics see Polinsky (1983).

Law and economics analyses the impact of laws, or legal frameworks in a broad sense. However, the impact does not necessarily need to be on markets or prices. Rather, its being subject of economic analysis lies in the fact that it uses the standard economic approach of incentives in predicting the agents' (legal) behaviour[9]. Law and economics' applications are numerous and range from antitrust policy to the economics of marriage. In our case, we are interested in the criminal law perspectives developed first by Becker, in his already-mentioned 1968 paper. In this seminal work, the Nobel laureate models the market for criminal offences using a standard economic framework. Criminals are rational individuals who maximize their expected utility. In particular, a person will commit a crime if the expected utility from committing a crime exceeds that of not doing so. This utility function depends (positively) on the financial rewards of the criminal act, such as the money stolen. It further depends (negatively) on the deterrence variable, i.e. the probability and severity of punishment. Finally, it depends on a series of socio-economic variables which increase (decrease) the utility stemming from illegal behaviour[10]. The greater the probability of being caught, because of, for example, an efficient police, the fewer people will decide to become criminals. This approach has been tested in many works (Levitt, 1998; Di Tella and Schargrodsky, 2004). In general, there is consensus on the role played by the deterrence variable, much less on the socio-economic ones. The paper on trust and victimization in the Caribbean shows an application of the Becker model to the Caribbean countries. However, due to a lack of available deterrence variables we focus on socio-economic determinants of crime.

1.2.4 Lawlessness and economics

Another way of looking at crime connected to the NIE approach is the one that follows directly the view proposed by Williamson (1979, 1985). Contrary to the mainstream neoclassical view, the author recognises that individuals often have opportunistic

[9] Cooter and Rubinfeld (1989, p. 1068) argue that this theory "treats laws, like prices, as incentives for behaviour".
[10] A review of such literature is in chapter three and four.

behaviour[11]. A natural extension of this approach is to consider appropriative behaviour, such as theft and extortion, which are important to our analysis of crime. This type of analysis offers a different perspective on how crime might be integrated in economic analysis.

In the next sections we review two major contributions which deal with these issues. The first is the one by Hirshleifer (1989, 1995) and the second by Dixit (2004). Hirshleifer's starting point is the rent seeking literature developed by Tullock (1980). In Hirshleifer's models, individuals have some initial resources, *R*. However, contrary to the neoclassical view, someone's resources might be deprived by predatory behaviour by other individuals. Alternatively, the same individual might himself engage in predatory activities. Therefore, an individual uses part of his endowment in production and part in "fighting". Analytically we have the following resource constraints:

$$R_i = a_i E_i + b_i F_i$$

Where *E* represents the productive effort and *F* the fighting efforts. The last one is devoted to predatory activities or defence from other people's predatory behaviours. *a* and *b* are unit cost of transforming resources into productive or fighting efforts. This formula shows how destructive interaction might be included in an economic model. The quantity of resources that each individual get from predatory activities is given by the Contest Success function (CSF)[12], which has the following form:

$$p_i = \frac{F_i^m}{F_i^m + F_j^m}$$

Where m is the decisiveness parameter of the fighting technology. Therefore, according to the individual's ability to "fight", he/she will receive a greater share of the contestable resources. This led Hirshflier to formulate two of his most famous theories. One is the paradox of power (1995), which says that even the weakest party (in terms of resources)

[11] Williamson says that the concept of opportunism is quite different from the standard self interested individual depicted in the mainstream economics. It can be derived from the Machiavelli's analysis in the book "The Prince".

[12] See Garfinkel and Skaperdas (2007) for a review of contest success functions and the economics of conflict.

might end up better than his initial position if he fights hard. Therefore, fighting (stealing, committing crimes, etc) is sometimes more convenient than producing. The other one states that, under certain circumstances, anarchy can be an equilibrium outcome. By anarchy, the author means an "order in which participants can seize and defend resources without regulation from above" (Hausken, 2006, p.267). This applies to the analysis of organised crime we conduct in the first and second paper in this dissertation. In fact, the state authorities were so weak to generate an anarchic situation, which was exploited by an organisation as the Mafia.

The second important contribution to the understanding of crime in economic terms is that of Dixit (2004). The author starts his analysis by acknowledging that in certain situations the government/state fails completely to ensure the protection of property rights and to enforce contracts. For example, this could be due to chronic inefficiencies in the judicial system. In all these cases, individuals who want to trade will find it very costly to do so and seek alternative models of economic governance[13]. Dixit defined this as lawlessness and economics. In this regard, Dixit (ibid., p.3-4) argues:

> "of course, economic activity does not grind to a halt because the government cannot or does not provide an adequate underpinning of the law. Too much potential value would go unrealized; therefore, groups and societies have much to gain if they can create alternative institutions to provide necessary economic governance. They attempt to develop, and sometimes succeed in developing, such institutions of varying degrees of effectiveness".

The examples of such alternative ordering, very similar to the one proposed by Williamson, are numerous. Dixit recognises that self-enforcing governance through repeated interaction is the solution that game theorists have analysed most. Thus, if players value the future highly enough, the temptation to cheat might be mitigated by the future gains. Therefore, players can always punish deviant traders in future stages (meetings). However, in reality, many transactions involve one-shot[14] interaction with different actors at each stage. In the case the traders belong to the same group, the fact that a trader cheated will become common knowledge amongst the group. As a result, the next cheater's trading

[13] Dixit (2004, p. 14) says: "the need for governance arises because, in its absence, individuals pursuing their own interests would generate an inferior equilibrium outcome".
[14] Single interactions with no repletion.

partner will always deviate and not cooperate. All future playoffs of the cheater will be reduced. When people get in contact with agents outside their group, such information is not available. Therefore, self-governance is not feasible anymore. One possibility of dealing with this is to use third parties that provide information on individuals' trading history. This is the example of credit-rating agencies or arbitration. Moreover, trading parties require that contracts are enforced. In the absence of law, as we will see shortly, organised crime might function as a contract enforcer. Its efficiency is based on its reputation of preventing people from cheating and not respecting the contracts. This is the analysis we review in section 1.4.

Finally, we provide support to the claim that crime matters in the economic literature and should be taken into account in the mainstream analysis. The NIE and close theories, with their challenges to neoclassical economics, offer a theoretical framework to do so. In the next section, we will give an overview of the contents of the three research papers, and consider the applications of NIE for our understanding of the research questions we address.

1.3 Summaries of the papers

The first paper (second chapter) is titled *Emerging Classes and the Fight for Resources: an Empirical Investigation into the Origins of the Sicilian Mafia*. It deals with an under-explored field of research, that is, the origins of the Sicilian Mafia. The abolition of feudalism (1812) and the Unification of Italy (1861) changed many of the institutional and social settings in Sicily. In particular, violence and banditry became widespread, mainly because the state was not able to impose its authority. This is a typical example of anarchic situation discussed above. Moreover, the institutional changes created and embryonic market for the land and new political and commercial opportunities.

In her seminal work, Bandiera (2003) exploited such features to describe the market for protection. Bandiera adopted a principal agency model in order to analyse such market. Thus in her approach, each landowner is willing to pay more to be the only or one of the few protected. This is because unprotected landowners will certainly be robbed of their goods. The main findings of the model are that the presence of Mafia is higher where the land is

more fragmented and with greater value. Bandiera tested these hypotheses empirically and found evidence to support them. We propose a slightly different theoretical approach, closer to that of leading historians such as Lupo (2004) and Pezzino (1987). This is because they provide a more comprehensive analysis of this phenomenon. These authors focused on the new business and political opportunities created by the changes in the status quo. Since the new State was not able to secure property rights or enforce contracts, social actors used violence to take advantage of such opportunities. Mafia developed as an instrument for emerging elites in their quest for commercial and political power. These struggles were particularly harsh in the rural part of Sicily because of greater opportunities in the market for the land. We test this hypothesis employing a new dataset. We overcome the issues on the measurement of Mafia presence by combining data from two parliamentary enquiries, as Damiani (1881-1886) and Bonfadini and Borsani (1968). Moreover, we use new variables which are helpful in explaining organised crime presence. The key results are that Mafia is likely to be active where there are large properties, which is our proxy for new opportunities for these emerging classes. Also, according to the protection view, Mafia is more present where land value is higher. We also find that organised crime is active in less populated councils and where there were few peasants who owned the land.

In the second paper (third chapter), *Migrating Mafia*, we deal with a new field of research, the migration of criminal organisations outside their original regions. From the 1970s onwards, several criminal organisations transplanted from their southern base to not traditional areas, such as Piedmont and Lombardy. At the beginning, they were mainly interested in profitable illegal markets such as those for drugs and gambling. Soon after, these groups started to control legal markets such as construction and hospitality. In recent times, they managed to establish some relationship with corrupted political actors (DNA, 2009). Despite growing alarms in the media, no one has ever quantitatively studied the drivers of Mafia migration. We try to answer such questions. Amongst others, Varese (2006) recognised two factors as having played a major role in the spread of Mafia. The first is the migration of southerns to the North during the period of Italian industrialization. The second is the policy of forced re-settlement of criminals, which consisted in sending North Mafiosi with the aim of "redeeming" them. We empirically investigate this hypothesis creating panel data at the provincial level for the period 1983-2008. The dataset contains original data from previously under explored primary sources. Our new data on forced re-settlement

have never been used in any quantitative study before whilst our new data on migration have never been employed before in any economic study. We add controls in line with Becker's model of crime. Consistent with the community network approach (Bauer and Zimmermann, 1997; Moretti, 1999) we find that migration is by far the most important predictor of Mafia presence in the hosting provinces. Not only, has migration from Mafia-infested regions seemed to have an even stronger effect on subsequent level of Mafia activity. Contrary to the expectations, we do not find that forced re-settlement significantly affected Mafia expansion. We argue that probably what mattered was not the number of Mafia members sent to the North, but their role in the organised crime hierarchy given their ability to create criminal networks.

The last paper is *Trust and Victimization: Evidence from five Caribbean Countries.* This paper draws from the rich literature on social capital which spawned from Putnam (1995)'s seminal work. This kind of capital has been associated with many positive socio – economic outcomes, such as development, trade and investment (Keefer and Knack, 1997; Guiso et al., 2009). However, few works (Buonanno et al., 2009, and Fajnzylber and Lederman et al., 2002) analysed how social capital affects crime levels. These studies found some evidence of crime reducing effects. Social capital might work as a deterrent to crime as it reduces transaction costs and the possibility of conflicts. These works mainly employed macro data and, so, few observations which leads to a loss of precision in estimation. Moreover, none of them focused specifically on trust. In our paper, we evaluate the role of trust on crime in five Caribbean countries: Jamaica, Suriname, Guyana, Trinidad and Tobago and Dominican Republic. Given that social capital is a multi-faceted concept, we decided to focus exclusively on trust. We use individual data taken from Americas Barometer for 2010. This is an opinion poll conducted by Latin American Public Opinion Project (LAPOP) in several American states every two years. The crime data were taken from a question on victimization experience. Given that trust might be endogenous to crime experience, we employed an instrumental variable approach. As single instrument, we considered trust in the election system. We ran different regressions for all types of crime and, then, separately for property and violent crimes. As sensitivity analysis, we regressed different specifications. The results show that our measure of trust (worthiness) exerts a crime reducing effect on property but not on violent crimes. In particular, a one percent increases in our measure of trust leads to a lower

probability of being a victim of property crimes by 0.286%. We also ran the model for single countries, with much heterogeneity in the results.

Each of these three contributions explores a specific topic of the economics of crime literature. However, they share similarities in the sense that they can be classified through a common theoretical background.

1.4 The New Institutional Economics in this context

The topics treated in this dissertation rely on the insight that often the criminal law system cannot deter criminal actions, fully or partially. As a consequence, individuals resort to "extra-legal" solutions to protect property rights and reduce uncertainty in market transactions. As shown by Dixit, there are several possible alternatives methods to do so. In this dissertation, we deal with two of them: organised crime and social capital. The former is a private entity which substitutes to institutional failure by providing some sort of state functions. Social capital is the typical example of informal agreements (institutions) which alter the incentives of committing crimes. In the next two sub sections, we review how the NIE, and similar theories, fit each of these cases.

1.4.1 Papers on organised crime

The analysis of organised crime presented in the first two papers embrace different aspects of the new institutional economics approach. It is consistent with Williamson's opportunism view explored by Skaperdas and Syropoulos (1995). Moreover, it involves the lawlessness and economics approach by Dixit (2004) and finally the transaction cost analysis[15]. Each of these contributes to understand both the origins of Sicilian Mafia in the XIX century and the migration of Mafia in the second half of the last century.

Skaperdas and Syropulos (1995) present the origins of organised crime as forming out of an anarchic[16] situation. The authors affirmed that Mafia[17] emerged in situations of power

[15] Also, we could have analysed it through other perspectives but we decided to consider the most significant ones. In chapter two and three we present extensive evidence of different theories on organised crime.
[16] As explained by Hausken (2006).
[17] They argued that the same applies to primitive states, i.e. "young" states where the role of law is weak. This is similar to the definition of natural states by North et al (2009).

vacuum due to the inability of the state to protect property rights. The reasons of such state failure[18] could be due to geographical, economic and social distance. The author developed an anarchic model similar to the one reviewed in section 1.2.4 by Hirshleifer (1989). There are two agents who can devote part of their resources for production and the remaining can be converted in guns, i.e. fighting effort. However, in this case all the resources produced are subject to predation, depending on each agent's probability to win. Those who contribute more to the total production, because they are harder workers or more technologically advanced will receive a smaller share of the total contested pie. "The incentives for productive innovation are few, if any, relative to ideal perfectly competitive economies where innovation is rewarded" (ibid., p.67). Instead, those who are unproductive but have a competitive advantage over violence will become predominant in the anarchic situation.

The view developed by Skaperdas and Syropulos pictures well what happened in Sicily after the end of feudalism and the Unification of Italy. In fact, the situation in the island at that time was similar to an anarchic one. The public authorities were not able to secure property rights and enforce contracts at all. As a consequence, banditry and violence became widespread. In such a scenario, Mafia could exploit its competitive advantage over violence[19] and emerged as a major social actor. As the insights of the model suggests, it formed a perverse equilibrium in which the most violent individuals could enjoy revenues even though they were less productive. In fact, Mafia did not contribute to the production process, rather it lived out of so called rent capitalism. It extorted money from landowners but also sustained emerging classes in their quest for power. For example, the *gabellotto*[20], which is a central figure of the Mafia, lived off sub-rents from peasants without investing at all in agrarian technology[21].

In the third chapter, we present a different context in which organised crime operates. We deal with Mafia transplantation from the Italian southern regions to the developed and industrialized central and northern ones. The scenario looks different from the anarchic one described in the model by Skaperdas and Syropoulos. However, even in highly developed

[18] As also explained in Skaperdas (2001).
[19] This advantage was due to the fact that it was composed of former private guards and bandits.
[20] See chapter two for a definition.
[21] The situation of Sicily at that time has been compared to the one of Russia in the aftermath of the communist era. In Varese (2005), the author argued that the state could not fully protect property rights and, so, private protection was necessary to survive in the transition to a market economy.

countries such as the USA, Canada or Australia Mafia could settle. The reason is probably that the state is not able to secure property rights in all markets, and Mafia exploits failures in such grey areas. A typical example is the one of illegal business. By law, the state does not interfere in such markets but only punishes traders in such activities. Still, even in the underground world there is a necessity for securing property rights. As a consequence, Mafia could step in and regulate such "anarchic" situation through its power. This is what happened in the central and northern regions in the post-war period with the flourishing drug market, or in the USA with prohibitionism. Mafia then expanded in legal sectors such as construction or hospitality and now it is supposed to be involved in almost all economic activities. Again, this reflects that there are grey areas even in the formal economy where the state is not able to impose its authority[22]. Mafia, with its competitive advantage over violence, can enforce contracts or secure property rights better than the state[23].The chronic deficiencies of the Italian judicial system do help Mafia in this respect.

The second contribution we consider is the one by Dixit (2004), which is complementary to the one presented above. As we have seen earlier, Dixit specifically considered a situation of lawlessness. In this scenario, the state is completely unable to secure property rights and alternative ordering emerges. Organised crime is the typical example of this. Dixit developed some interesting models which could be applied to organised crime and that are useful in our context. In particular, the author distinguished two functions of the Mafia: as a provider of information and as a contract enforcer. He modelled the problems faced by traders in such situations similar to a prisoner dilemma. Let us suppose we have two players, who repeat a single stage game where traders are matched at random each time[24]. The payoffs are:

[22] This happened in USA as well. In fact, Mafia was particularly active in legal sectors such as the carting one.
[23] Of course, pursuing its own interests.
[24] Of course, this is situation is different from that with the same actors repeating the same game. In this case, co-operation could be achieved by the Folk theorem if actors value future outcomes relatively high.

Table 1.1 Prisoner's dilemma

		Player 2	
		Comply	*Deviate*
Player 1	*Comply*	C,C	L,W
	Deviate	W, L	D,D

These satisfy the chain of inequalities: W>C>D>0>L. The players left to themselves always choose to deviate. In order to achieve better outcomes there is an intermediary (Mafia) who steps in and offer its services for profit to customers. Dixit considered two types of services separately: in the first, the Mafia sells information about trading history of traders to its customers for a fee. In the second, Mafia can also deter cheating by using violence, or the threat of it, charging again a fee. As in every repeated game, it is important the rate of discount of future outcomes. The ideal situation (equilibrium) is: everybody is a customer of the Mafia, the Mafia reveals the information truthfully and the customers follow the strategies proposed by the *mafioso*. However, in order to have an equilibrium fee (or a range of equilibrium fees) the author considers all the possible deviations from this equilibrium. The main findings of the models suggest that in the case both types of intermediations are possible, the fees (revenues) that an enforcer imposes are higher than the ones for the information intermediary. As a consequence, the profits are higher when Mafia is also an enforcer, which leads to higher violence.

The analysis by Dixit applies very well to the first paper as it describes a situation of complete state failure. Again, Mafia is a reaction to this situation and help achieve better outcomes than pure anarchy. The issue of information is central to the analysis of organised crime as expressed by Gambetta (1993)[25]. The enforcement role is also one of the key features of the Sicilian Mafia in the XIX century. As shown by Bandiera (2003), Mafia invested many resources in reputation, which is fundamental in scaring potential cheaters.

Mafia groups in the central and northern Italy have similar functions, although operate in a different context. Of course, the number of clients is much smaller than in the regions

[25] We review Gambetta (1993) analysis in chapter two.

were Mafia is dominant[26]. Still, in some situations Mafia have such functions. As we will see in detail in the third chapter, Mafia could develop because of the extensive migration networks created in the post war period. Inside such communities, it is likely that Mafia worked as guarantor of peoples' trustworthiness and, obviously, as an enforcer to contracts[27]. Indeed, even in such regions it could be applied to the concept of lawlessness in specific segments of economic activity.

The last contribution we consider is the one by Anderson (1995) who applied transaction cost analysis to contemporary Sicilian and American Mafia[28]. The author first addressed why Mafia should be considered as a governance structure rather than a firm. In particular, she emphasized how organised crime has governmental functions, such as law enforcement and justice, along being a key player in illegal businesses. Summarising, Anderson (ibid., p.40) said: "its governance hierarchy was thus not the same as its economic structure. It used violence and negotiations to monopolize a territory within which its members operated certain illegal enterprises (especially gambling), thus functioning as a government, albeit an incomplete government". She then provided evidence to show how the aim of minimizing transaction costs led Mafia to have such an organisational structure. First, the author affirmed that the family governance of most of southern based Italian Mafia is "suitable to low-trust environments "(ibid., p.43). Moreover, Mafia have always been centred on the male members of the nuclear family. Anderson then considered how disloyalty and cheating are particularly relevant and how they impose high costs to such organisations. In order to reduce these transaction costs, criminals prefer to have small organisations. In turn, this goes against the feasible economy of scale suitable to the illegal markets. Finally, she recognised that the *cupola* (body of leading members of Mafia families) might have helped to reduce internal warfare amongst criminals.

The transaction cost analysis employed by Anderson is easily applied to our case. This is despite the fact Anderson's analysis the focus was on contemporary Sicilian and American Mafia[29]. In fact, the organisation of Sicilian Mafia in the XIX century shares many traits with

[26] This is because Mafia in southern regions is more entrenched in the society compared to the one in the Centre and the North.
[27] There are cases where this happens also in non-traditional areas, although to a very small extent.
[28] Even Dick (1995) conducts a similar analysis. He affirmed that the mainstream view on organised crime as a monopoly does not match with the empirical evidences. Therefore, he proposes to use transaction costs analysis to explain the firm's choice of market supply or self- supply of illegal goods.
[29] The paper is of 1995 so does not consider the most recent evolutions of such organisations.

the one Anderson described. In particular, the low level of trust[30] and consequently the high risk of disloyalty played a major role in shaping the structure of Mafia. Moreover, there was a well-defined hierarchical structure and a governance structure which reflected the need of minimizing transaction costs.

Even in the contribution on Mafia migration, we see that transaction cost analysis is a powerful tool in explaining the organisation's features. These gangs present a structure which reflects the need of optimizing on transaction costs. In particular, family governance and the small size of the gangs are some of the main characteristics of the most powerful Mafia: the 'Ndrangheta. Many juridical reports (DNA, 2009) evidence how the main unit of such group, the so-called *'ndrina*, is the family. This works as a deterrent for whistleblowers who are discouraged from testifying against their own relatives[31].

The application of transaction costs to Mafia might be an interesting topic for future research. For example, it would be interesting to explain heterogeneity in organisational structures amongst the four major Italian Mafias[32]. Moreover, this could be linked to the differences between institutions and organisations proposed by North. In fact, in some parts of the south of Italy, Mafia acts as an institution and enjoys some sort of popular consent. On the other hand, in the North Mafia is more business orientated. So, it is closer to an organisation. These differences constitute an agenda for future investigation.

As we have seen, different approaches based on the NIE, are helpful and provide a theoretical framework for our analysis. In the next section, we argue that this is also the case for social capital in developing countries, as for those in the Caribbean.

1.4.2 Paper on trust and victimization in the Caribbean

In the first two papers, we have dealt with a possible alternative of securing property rights and enforcing contracts to the state: the Mafia. However, organised crime or private enforcement agencies are just one type of social arrangement which might deter crime. In the third paper, we take a step further in the analysis of institutions and deal with social capital. In particular, as we have seen in section 1.2 we study how trust, one of the main

[30] As highlighted also by Gambetta (1993).
[31] We know that the the Cosa Nostra, 'Ndrangheta , Camorra and Sacra Corona Unita have different structures. However, such an analysis is well beyond the scope of this introduction and thesis.
[32] As an example, the Neapolitan camorra has a more flexible structure compared to that of the 'Ndrangheta

aspects of social capital, affects victimization levels. This is an important example of how extra-legal arrangements might function as a deterrent for committing crime in developing countries.

In paper three, we will give a comprehensive overview of the definition of social capital and trust. For the moment, we employ Gambetta's (1988, p.217-8) definition:

> "there is a degree of convergence in the definition of trust which can be summarized as follows: trust is a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action. When we say we trust someone or that someone is trustworthy, we implicitly mean that the probability that he will perform an action that is beneficial or at least not detrimental to us is high enough for us to consider engaging in some form of cooperation with him".

Therefore, from an economic point of view, this view is similar to the risk approach used by Williamson (1993). In fact, this author considered trust as similar to risk because the lower the level of trust, the higher is the risk to engage in a relationship (transaction) with somebody.

The concept of social capital so far explained could easily fit the definition of informal arrangements which has been developed both by North and Williamson. The former places a great emphasis on their role and recognises its important position in the institutional framework. North (1990) said that formal rules represent just a small part in defining the constraints that influence choices. On the other hand, "the governing structure is overwhelmingly defined by codes of conduct, norms of behaviour and conventions" (ibid., p.36). From a theoretical point of view, such agreements could be thought of Nash equilibria of repeated games played where members of a society interacts continuously.

As discussed in section 1.2.2, Williamson (2000) puts the social embeddedness level at the top of his institutional ladder. In it, the author inserts informational institutions, customs, traditions, norm and religion. In particular, Williamson assigned a fundamental role to religion. The author believed that such institutions were taken for granted by economists. They change very slowly over time, in the order of century and millennia. Also,

Williamson believed that they originated spontaneously, "which is to say that deliberative choice of a calculative kind is minimally implicated" (ibid., p.597). However, Williamson seems to place less emphasis on their role compared to North[33].

What relationship is there between informal and formal institutions? North (1990) claims that good quality formal institutions encourage greater and better informal arrangements amongst citizens. However, in developed countries people think that formal rules are predominant, whereas in North's view, informal ones are at least as important. This approach is shared by other scholars who recognise how "social control" might be more effective than formal law to achieve positive socio-economic outcomes. For example, informal arrangements are important in lowering transaction costs and promoting welfare. In our paper, we argue that such beneficial effects might also be played in reducing crime. In fact, dense social capital networks and high levels of trust might provide efficient deterrents of crime and substitutes for legal forces, such as the police and the judicial system. This is particularly true, especially considering that we are dealing with developing countries as in the Caribbean. In fact, these are countries where the rule of law, or formal institutions, is also very weak[34]. As a result, informal agreements or social control might complement the role of the criminal law system. Interestingly, Ollson et al. (2009) in their study on the role of formal and informal institutions on growth, found that social capital exerts a bigger impact on growth at low levels of institutional development. On the other hand, its effect it is not that important when institutions become strong. Therefore, it is legit to think that social capital has a very important role in weak states where formal institutions are not really developed.

Our analysis confirms this, as we found a strong negative deterrent effect of trust on victimization. However, our result suggests that this works for property but not violent crimes.

1.5 Conclusions

This introductory chapter presents a framework which is helpful to contextualize the contributions made in the thesis. In particular, we argue that our research could be better

[33] In fact, Williamson (2000) said that NIE is mainly interested in levels two and three of his ladder.
[34] This is shown by various governance indicators, such as those of the World Bank.

understood applying the new institutional economic approach. In the neoclassical view, property rights and contracts are supposed to be perfectly secured and enforced. However, in reality, this does not happen and there will be thefts, violence and insecurity. NIE theory, and its extensions, shows how criminal behaviours can be taken into account in economics (Becker, 1968; Dixit, 2004; etc). Moreover, crime is generally a sign of the inability of states to protect property rights and enforce contracts. In such situations, societies develop alternative ways to provide security in economic transactions. In this thesis, we present two of them: organised crime and social capital. The former is a for profit private organisation that substituted for the state in some fundamental functions (Dixit, 2004). We consider Mafia in two different contexts: in the second chapter, we analyse the origins of the Sicilian Mafia in the XIX century. This is the typical example of how the inability of the state to secure property rights led to alternative ordering. Following North's (1990) definition, at that time Mafia could have been considered an institution, not only as an organisation[35]. In the third paper, we consider the factors that could explain the migration of Mafia from the south to the central and northern Italian regions. Again, the new institutional approach helps to understand their structure. It also contributes to our understanding of how such organisations could survive and prosper outside their original territories. We argue that even in developed contests, the state is not able to secure property rights in all markets. The fourth chapter takes a step further and investigates how informal rules might deter criminal behaviours. In fact, we consider how trust affects victimization in five selected Caribbean countries. This is particularly interesting as we are dealing with developing countries where the rule of law is absent or loosely enforced. Therefore, social control might become a good substitute to the criminal law system in increasing the costs of being criminals and, so, reduce crime.

Finally, in this first chapter we have proposed a common theoretical approach to better understand the thesis. However, each paper presents its own literature review which is specific to the topic treated. Therefore, this introduction should be seen as complementary to each contribution.

[35] As it is now in certain parts of the south of Italy.

Chapter 2: **Emerging classes and the fight for resources: an empirical investigation into the origins of the Sicilian Mafia**

2.1 Introduction and motivations

Mafia imposes serious socio-economic costs to societies (Pinotti, 2012). Despite this, the literature on organised crime is still scarce (Daniele, 2009; Skaperdas, 2011). In particular, there is no consensus on the factors which favoured the birth of such organisations. We decided to assess the origins of probably the most known Mafia, the Sicilian Cosa Nostra. The only paper to date which deals with this topic is that of Bandiera (2003). As her main theoretical background, Bandiera considers the work of Gambetta (1993), which focuses on the view of Mafia emerging as a protection agency, and Mafiosi being the entrepreneurs of the "good" protection. Based on this theoretical background, Bandiera developed a common agency model which predicts that Mafia is more likely to emerge where land is fragmented and has higher value. She then tested these findings empirically using data on 70 western councils which support this intuition.

Our paper considers a broader view of the origins of the Sicilian Mafia, closer to that by leading historians such as Lupo (2004) and Pezzino (1987, 1995a.b). Along with the protection view, these authors consider Mafia as the army employed by the emerging social classes to capture the lords' legacy against rival factions. This difference is not trivial. In fact considering Mafia only as a protection agency we would expect, as found by Bandiera, that Mafia is more likely to be present mainly in the proximity of the cities. This is where land was more fragmented and agriculture was richer. In contrast, we expect Mafia to be present where land income is higher but also, and mainly, in the countryside. This is because it was in such areas that the greatest opportunities emerged for new social actors to capture the lords' legacies[36].

In order to empirically verify this approach, we use a new measure of Mafia activity. The main reason for not relying exclusively on Jacini (Damiani, 1881-1886), the one employed by Bandiera, is that it could misrepresent the true Mafia presence, especially for the western section of the island. Therefore, we combined these data with those from the Bonfadini enquiry (Borsani and Bonfadini, 1968) in order to give a better "picture "of the phenomenon. We further consider two specifications: one with all the Sicilian provinces and the other with only the four western ones. Moreover, we include variables which have

[36] As we will review soon, by lords' legacy we mean all the economic and political powers which lords are slowly loosing after the institutional changes.

never been used before. The results are that Mafia seems to be present not only in councils with rich agriculture but also where there are large properties and cereal cultivation, with less density of population, where the 1860s[37] reform had more impact on the division of land and where there are fewer peasant owners of the land. In general, we find evidence to support the view of Mafia originating where the fight for resources by the emerging classes was greater. These results show that the market for protection is part of the story and that our approach seems to be more adequate in explaining the origins of the Sicilian Mafia.

Finally, in order to provide robustness to our analysis, we compared Sicily with Sardinia. We chose the latter because, as Sicily, it experienced very high crime rate after the end of feudalism[38]. Despite having favourable conditions for the creation of a market for protection, this did not lead to the birth of a Mafia-type organisation. The reasons for this might be that, amongst others, in Sardinia the end of feudalism did not lead to the competition of resources as in Sicily because of a different land system and labour market conditions and lower density of population.

The paper is organised as follows: section two reviews the relevant literature. In particular, it focuses on the end of feudalism and its consequences. The third section presents the data and explains the variables considered. Section four illustrates the econometric methodology and results. The fifth section concentrates on the comparison between Sardinia and Sicily. Section six concludes.

2.2 Historical background and literature review

The origins of the Sicilian Mafia cannot be traced to a particular date. As suggested by Marino (2007, p.20), it is generally agreed to be a "long period phenomenon". The first mention of the word Mafia was in the play *I mafiusi della Vicaria* in 1863[39]. From that year

[37] The reforms aimed at dismantling the large estates system and encouraging the creation of small and medium landowners. In the next section, we will revise in detail how these reforms intended to end feudalism.

[38] Feudalism was a typical form of political organisation in Europe in medieval time. It emerged because it was difficult to rule over large empires and, as a result, more power was given at the local level, particularly to the lords. These elites were assigned the control over some fiefs which comprised of villages, churches, granaries and various types of fields. The lords had jurisdictional, military and financial power over all the people and belongings in such area. Although feudalism was typical of the middle age, in some regions survived this period, as in Sicily. For more reference on feudalism, check Bloch (1989).

[39] In reality the first account of the Mafia is provided by the judge Pietro Cala' Ulloa in an 1838 document. However, he never mentioned the word Mafia and refers to generic brotherhood associations.

on, it was extensively used, even with inappropriate purposes (Falcone, 1981). For our analysis, it is important to note that our data refer to 1882, so we are not dealing with its origins, rather with its first development period[40].

As the emergence of the Mafia is a "long period phenomenon", it is useful to take a step back and explain the background in which it originated. In particular, we need to consider the pre-Unitarian situation under the Bourbonic Kingdom and how the end of feudalism links with the origins of the Mafia.

The 1812 constitution[41], which abolished feudalism, lead to two major changes in the status quo: the shift of the monopoly over violence from the lords'[42] hands to the state and the creation of an embryonic market for the land. As a consequence, the years after 1812 witnessed a substantial increase in banditry, and in particular armed gangs, as testified by Fiume (1984)[43]. In this section and for most of the paper we talk without distinction of bandits/Mafia. The reasons for doing so is that , especially until the 1861 unification of Italy, the phenomenon of organised banditry and Mafia cannot really be set apart as it would be possible to do it later[44].

We next consider in more detail the two major changes brought up by the 1812 constitution and how they are linked with the origins of the Mafia.

2.2.1 State failure

After the 1812 constitution, the state formally held the monopoly over violence but it was not able *de facto* to protect people and belongings, to secure property rights and enforce contracts. The reasons for this failure are various: lack of a good organisation,

[40] This is mainly due to the lack of organic data for the previous periods.

[41] It was the first in pre-Unitarian Italy. It also introduced a parliament with two chambers as the English one, it separated the legislative, executive and juridical powers, it created the new figures of judges and a new "militia". In general, it deceased many of the privileges that lords had enjoyed until then. Similar reforms had been adopted in 1791 in France and in 1815 in the Netherlands.

[42] In this work we refer indistinctly to lords, barons, nobles and aristocrats.

[43] Her work analysed the geographical presence of these gangs for the period 1819-1849, and it is surprising to note that their "action ground" is almost identical to the one of the Mafia in the years following the unification of Italy. Undoubtedly, it is plausible that armed gangs evolved into Mafia, and this phenomenon was accelerated by the newly born Italian state.

[44] The reason is that mafia is a long period process that gradually evolved from banditry to a more organised and sophisticated form as Mafia.

complicity between public officials and bandits and also complicity between the population and bandits. This was the case for both pre and post –Unitarian Sicily.

In terms of organisation, we can broadly divide law enforcers into two categories: the governmental forces, such as the gendarmes and the *carabinieri*, and, on the other side, the nongovernmental ones, such as the mounted militia[45] and field guards[46]. The former forces were composed of individuals from outside Sicily and were ineffective because they did not know the places, did not speak the same language as the Sicilians, and were ignorant of the culture and traditions of the island (Franchetti, 2006)[47].The problem of ignorance of the local traditions did not apply to the mounted militia and field guards, which were composed of the indigenous population[48]. Their task was to "maintain public order in the countryside and in the farm clusters" (Fiume, 1984, p.116)[49]. However, they mainly were composed of criminals or individuals with tight links with Mafia[50]. The success of the state was harmed by the limited co-operation that the population gave to the public forces to find the bandits. Often people offered the bandits protection and support[51]. Unfortunately, we do not have data on the presence of these forces at the council level in order to assess its real impact on the Mafia activity.

Whereas in other countries the increase in banditry followed by the end of feudalism was well repressed by the public authorities, in Sicily this did not happen. Instead they became "part of the society", an institution which it was necessary to deal with in all aspects

[45] They were introduced during Garibaldi's dictatorship. Before that, they were called Armed Companies.
[46] However, the same speech applies to highly ranked officials.
[47] Franchetti (2006, p. 53), referring to the *carabinieri*, says : "They live in the middle of the people a and are isolated as if they were in the desert; they see and hear without understanding, and they are like a statue of justice in the middle of a gang of bandits".
[48] Regarding the field guards Catanzaro (1992, p. 71) says: "the fields guards were private *campieri* who had been organised as municipial police in 1866. They were employed by the councils but received a salary which came from contributions by the landowners".
[49] Moreover, talking about the Armed Companies, Fiume added: "We can find them almost in all the important villages [..] the companies are directly supervised by the Ministry of the Interior. Their duties are to guarantee quick and efficient repressive actions" (Fiume, 1984, p. 116).
[50] Each company was composed by 12 individuals who were chosen directly by the captain of the company. The latter was responsible for any thefts which happened on his district and was obliged to refund the victims with his own salary whenever stolen properties had not been recovered. This rule was an incentive for captains to hire mainly individuals who had strong connections with criminals. Often they hired the criminals themselves, in order to recover the highest number of stolen properties. Moreover, the rule favoured the creation of strong links between criminals and law enforcers which lead to "disastrous consequences to the public order" (Franchetti, 2006, p. 53)
[51] Franchetti (2006, p.113) argues that: "In Sicily [...], or at least in the areas where the offences are most frequent, the details of each crime are known by the entire village's population. However, people are not willing to help the public authorities neither directly nor indirectly, leaving open space for those who are interested in leading them on the wrong way"

of private and public affairs[52]. As the model by Skaperdas and Syropoulos (1995) showed, it created a perverse equilibrium where the state was not able to secure property rights and enforce contracts. As a consequence, those who had a competitive advantage over violence could benefit even though they were less productive or completely unproductive. For example, if two people wanted to buy the same piece of land, often the one who was backed by the most violent bandits would get it (Lupo, 2004). As the Mafia was tacitly recognised by all social groups as a necessary instrument they had to deal with, it is not surprising that all groups asked for its services and, voluntarily or not, supported it. This is the crucial element that distinguishes Sicilian Mafia from common criminality. The former lords required the services of this "industry of violence" to protect their properties that the same bandits would attack if the lord did not support them. Moreover, Mafia was important for the nobles to keep some of their powers, threatened by the institutional changes. The middle class was deeply involved with Mafia as we will discuss below. For the moment it is important to say this class used the bandits to "obtain richness, or achieves his desires and ambitions" (Bonfadini and Borsani, 1968, p.30). However, it not only used it but also belonged to it. In fact, many prominent Mafiosi, especially of the high Mafia[53], belonged to this class. Finally, the lower classes, which represented the large majority of the population at that time, were more likely to be the army of the Mafia. In particular, in the spirit of Ehrlich (1973), the harsh living conditions of this class provided an incentive to join Mafia. In fact, for the most violent individuals, the opportunity cost of staying at work was too high.

2.2.2 The creation of the land market

So far, we have examined how state failure led to the emergence of Mafia and how all social classes used it, even if with different purposes. Next we seek to link its presence with the creation of the market for the land, and its role in the emergence of the Mafia. As mentioned earlier, the end of feudalism created the conditions for a market of the land which did not exist before 1812. The large estates which belonged to the lords were slowly split up and could be sold to not aristocrats. This principle was reaffirmed by the newly born

[52] Franchetti (2006, p. 83) further notes that "banditry is [...] a regular and recognised institution, more or less voluntarily depending on the situations, but always taken into account"
[53] As defined by Marino (2007).

Italian state (1861), with the sales of the properties of the church and communes[54]. The aim of the state was to dismantle the economic system based on large estates and to create a numerous class of middle and small landowners, as it happened before throughout Europe. However, these land reforms did not yield the expected results. Even though many former lords' fiefs disappeared, this did not mean that the large properties and the *latifundia*[55] did too (Catanzaro, 1992). On the contrary, the few members of the middle class that had enough capital to buy these lands reinforced the existence of large and medium properties. The peasants were excluded from these auctions because of their inadequate capital and the frequent corrupt practices the higher classes engaged in to win the auctions, often with the use of Mafia (Lupo, 2004). Thus, after the reforms, the total land cultivated with cereals, a synonym for *latifundia*, did not change greatly (Marino, 2007)[56]. Still, these reforms, especially the ones after the unification, brought a substantial increase in the number of new landowners and gave new opportunities to an emerging bourgeoisie to improve their wealth and power. The link between these emerging classes and Mafia is critical in understanding the origins of the Sicilian Mafia.

Except for a few examples (Romeo, 1950; Prestianni, 1947), there are not many works which provide good quality data to evaluate the impact of these reforms. Table 2.1 below shows the results of the survey made by Rizza (1981) which refers to the 160'000 hectares of estates forcibly sold to creditors under the terms of the 1824 law[57].

Table 2. 1 Percentage of hectares sold and bought by different social actors after the 1824 laws

	Sellers	*Buyers*
High nobility	93,5	58,3
Low and rural nobility	5,3	13
University	0,5	0
Church	0,4	18,1
Bourgeoisie	0,3	10,5

[54] Marino (2007) said that following the 1862 and 1867 laws, about 250,000 hectares of land were set to be distributed to privates. However, in 1882 only 50'283 hectares were actually sold.
[55] Large landowners' estates.
[56] At page 215, he affirmed that at the beginning of the 1880s the total area cultivated with cereals was 663,308 hectares and at the beginning of the XX century it was between 700'000- 750'000.
[57] This law obliged indebted landowners to sell part of their properties to pay back their debts. Since most of the landowners were nobles, it is not surprising that these were the ones mostly affected by the law.

Note: [1] Source: Cancila (1990) [2] The table shows evidence of the effects of the 1824 law which forced indebted land owners to sell part of their properties to raise money.

As we can see, it was mainly the nobility who took advantage of the land reforms of the Bourbons. However, even if the share of the bourgeoisie is limited, its meaning "goes beyond the nude value of the properties assigned" (Cancila, 1990, p.221). They were finally able to access the land market whereas peasants were completely cut off from land property. The importance for our analysis is twofold: a real middle class did not formed[58], and these emerging classes joined the nobility as the dominant class. Moreover, as already mentioned, the relationship between this emerging classes and organised bandits[59] is a key element in understanding the origins of the Mafia. We can broadly divide this middle class into an agrarian and urban one. The former is mainly composed of *borgesi*[60] and a few middle to small landowners who existed before the end of feudalism. The latter is composed of city traders, intermediaries and public administration employees. These individuals competed to buy the land, made possible by the land reforms. However, these emerging classes also started to compete amongst themselves not only in land but also in other markets, such as the very profitable one of *gabelle*[61] and for other key private and public roles. For example, they would compete for the administration of the sulphur mines or to become (or impose) guardians of the profitable citrus gardens in the surroundings of Palermo and Trapani. They also competed for the public roles that the newly Italian state

[58] By this concept, we mean that the size of the middle class was very small compared to other European countries.
[59] When we talk about organised banditry, we refer to the embryonic Mafia. Of course, this does not have to be confused with petty criminals who lived in Sicily at that time.
[60] The peasants who held just a portion of land.
[61] The *gabellotto* would rent one or more fiefs and then would divide it and sub rent to peasants, mainly to villains. He would not make any investment on the land and would only profit by the difference between the money, or grain, paid by the peasants and the rent paid to the owner of the land.

had opened up, especially in the rural areas[62]. The success in this competition depended on the possibility to dispose of Mafia or being themselves part of it[63].

Briefly summarising, the creation of a market for the land did not achieve its aim of creating a class of small landowners. However, it certainly opened up new opportunities for a limited number of the bourgeoisie, who began to compete for predominance. This competition happened both in the areas surrounding the cities but especially in the countryside where many opportunities[64] had opened up. In the absence of a strong state, the necessary condition to exploit these opportunities was to be backed by Mafia or to be directly involved in it. In turn, these associations of bandits would control the market for the land (both sales and rent), but also other markets such as the labour one (imposing guardians to owners) or the strategic water one. This paper follows exactly this approach: we consider whether Mafia was more likely to be active where the opportunities for the emerging bourgeoisie were greater.

2.2.3 The eastern provinces

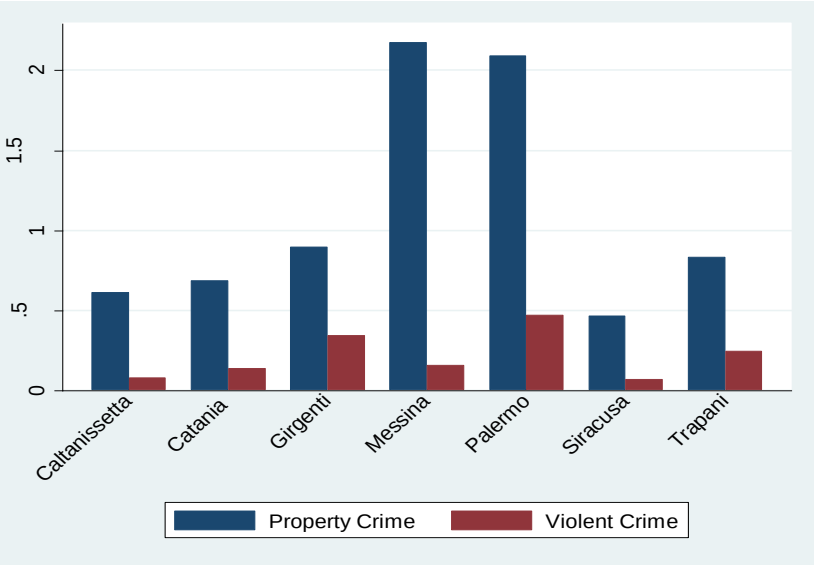
The scenario so far described is typical of the western provinces of Sicily, i.e. Palermo, Girgenti, Caltanissetta and Trapani even though to different extents. The other three eastern provinces were, in fact, less touched by this phenomenon. However, the laws that ended feudalism were exactly the same as in the western section. In addition, the number of crimes did not differ greatly amongst the two areas, which meant that the State failed to have the monopoly over violence throughout Sicily. This can be seen in Figure 2.1.

[62] Fiume (1984, p. 39) argued: "It has been claimed that the phenomenon of banditry emerges [...], as an essential feature of the political fights that the feudal elites conducted for the conquest, enlargement and conservation of their power. These fights (were) set against peerages and family groups for the supremacy over strategic geographical areas, for the control over the produced resources or for their transit towards points of trade or for the military control; for the assignation of the highest public roles of the reign and of the key jobs in the most prestigious public and public institutions, which all ended to increase the family assets".

[63] As we noted in the introduction when we proposed the model by Dixit (2004), Mafia plays a major role as a contract enforcer. In the XIX century Sicily, this aspect was particularly relevant. In fact, the use of violence (or its threat) scared off all potential cheaters in the transactions where Mafia was involved (directly or indirectly).

[64] Both for business and political power.

Figure 2.1 Crimes by province per 1'000 inhabitants in 1881

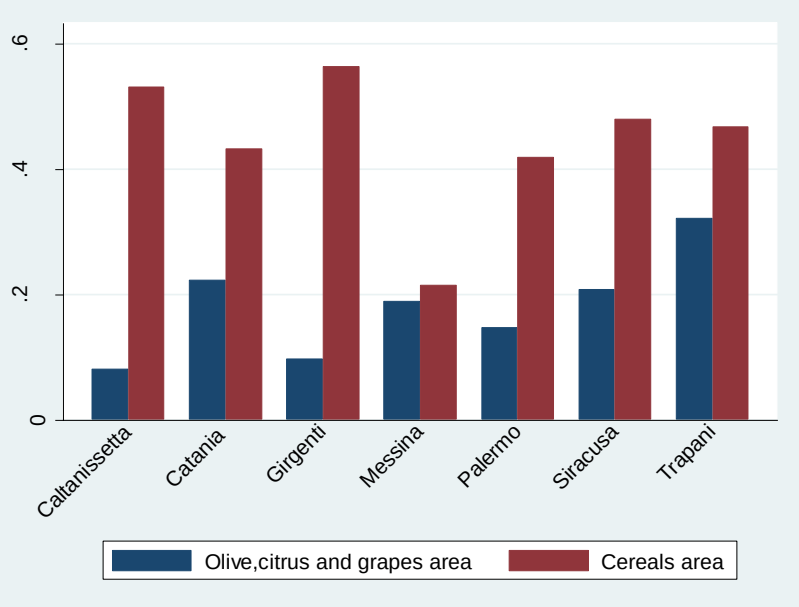


Note: Data are personal elaborations based on Jacini (Damiani, 1881-1886).

What are, then, the differences that might explain the presence of these powerful associations of criminals in one specific part of Sicily? Many scholars have tried to offer explanations. For example, Franchetti (1996) argues that in the east "the upper class has managed to preserve the monopoly over force and has so far prevented villains rising from the lower classes from sharing it" (ibid., p.55). By contrast, Lupo claimed that "it does not seem that here (east) the landowners show a greater military attitude than those of the surroundings of Palermo" (Lupo, 2004, p.90). A convincing explanation is offered by the economist Sylos Labini (2003, p.246) who argued that in "eastern Sicily the feudal system began its crisis and started to transform by an inner process various centuries before than in western Sicily. Especially, because of its more abundance of water and the possibility of making cultivation more intensive, it emerged earlier an agrarian middle class that started to "crumble the fief". The formation of this middle class led to a first organisation of the public thing, a diffusion of the so-called sense of justice" (ibid., p.252). By contrast, in western Sicily the feudal system lasted longer: "the classical Mafia stays always linked with the fief" (ibid., 2003, p.253). Indeed, there are some economic differences between the two areas. In the eastern part, the land is more divided and profitable than the west because of more citrus and vineyards. On the other hand, in the west, except for the coastal area or in the areas surrounding the city, cereal cultivation dominated. This can be seen in Figure 2.2. At that time and for many years to come the east was more developed and richer than the other part. For example, the east had a greater production of wine and olive oil but also

higher level of exports, compared to the west which was specialized mainly in citrus and sulphur.

Figure 2.2 Cereals vs. rich agriculture cultivation in the seven Sicilian provinces in 1881



Note: Data are personal elaborations based on Jacini (Damiani, 1881-1886).

Since Mafia emerged in the poorer of the two sections, it suggests that it is not the presence of wealthy markets which explains that emergence. Mafia emerged mainly where the fight amongst the middle classes was greatest, and was undoubtedly the result of the "backwardness" of the western part compared to the eastern one. However, this fight had economic determinants, but not only in terms of protection of valuable lands; rather Mafia is more likely to emerge where the rents stemming from the institutional changes were higher. Or to quote Marino, the fight for *gabelle* was made in order to get a "highly remunerative job" for the emerging classes, but the grain in itself was the less remunerative agricultural good (Marino, 2007, p.214) [65].

2.2.4 Related literature

The view on the origins of mafia that has been so far discussed, is close to the interpretations of Lupo (2004) and Pezzino (1989). However, the already mentioned work by Bandiera focuses mainly on the view developed by Gambetta (1993), who identified the end

[65] Moreover, large farms were not very profitable.

of feudalism as a crucial determinant in the origins of the Sicilian Mafia. Gambetta considers Mafia as a protection agency and Mafiosi as "entrepreneurs in one particular commodity-protection" (ibid., p.19). With the abolition of feudalism, supply and demand for protection "intersected and flourished" (ibid., p.19). In particular, there was a breed of potential suppliers of protection which became autonomous, such as "vigilantes, former soldiers, private guards, bandits, and prison inmates" (ibid., p.79). On the other hand, the end of feudalism, which formally introduced private properties in Sicily, increased the number of potential customers that required the service of these entrepreneurs in order to protect their properties from thieves that populated Sicily at that time. Moreover, Gambetta affirmed that the origins of the Mafia do not need to be necessarily associated with *latifundia* (as historians usually do), because the view of "the Mafia as originating in prosperous agricultural areas, in lively commercial environments, and among a variety of traders is not only empirically founded but theoretically convincing, since healthy markets are naturally associated with opportunities for commerce in many commodities, including protection" (ibid., p.89).

On this basis, Bandiera (2003) used a two-stage common agency model with landowners and Mafia as players. In the first stage, identical landowners decide the money they are willing to give to Mafia for each combination of protected/unprotected landowners. If the landowner is unprotected, he has 100% of probability that his land will be stolen. On the other hand, if he is protected, he has a probability of his land being stolen inversely related to the number of landowners protected. Obviously, landowners are more willing to pay if they are the only ones protected or if few landowners are protected. Therefore, they compete for protection, because each new "protected" landowner increases the probability of land being attacked by thieves. In the second stage, the Mafia looks at what the preferences of the landowners are and decides on the number of customers to serve in order to maximize its utility function. In equilibrium, the increase in the number of landowners, which in turn increases competition for protection, and the increase in land income lead to an increase in Mafia payoff and, consequently, Mafia activity. The author tested this model using data on 70 towns in western Sicily, taken from

Jacini (Damiani, 1881-1886). She found evidence that Mafia activity i.e., higher payoffs, is greater where the land is more fragmented and where the land income is greater[66].

The natural conclusion of Bandiera's work is that Mafia is mainly active in the outskirts of the cities because it is there that land is more fragmented and rich (Sonnino, 1996). Although we agree that mafia offered a crucial protection function, we believe that our approach, which focuses on the competition over resources, which took place in the countryside, is more able to explain mafia presence.

In order to empirically verify this proposition, we use a new measure of Mafia activity and new variables. The following section presents the data employed and the results obtained.

2.3 Data and results

2.3.1 Mafia measure

The empirical analysis presented in this paper is based on the creation of a new dataset incorporating information from a variety of previously under exploited primary source materials. Unification prompted a number of enquiries into socio-economic conditions within the new nation. A particular concern was to explore the reasons for Italy's economic backwardness compared to the more developed European countries[67]. The enquiries and their findings provide invaluable information on a range of social and economic indicators pertinent to this research. One such enquiry, which yielded important data, was the Parliamentary enquiry into the conditions of the rural classes in Italy (Damiani, 1881-1886). Another such enquiry which provided important information were the Bonfadini (Bonfadini and Borsani, 1968), Lorenzoni (1904) and, for Sardinia, the Pais Serra (1894) one. In addition to the public enquiries, there were a number of private enquiries most importantly that of Franchetti and Sonnino (Franchetti, 1996; Sonnino, 1996).

However, the main data sources are those of Jacini and Bonfadini. The former lasted around five years and was concluded in 1882. Its aim was to identify the state of agriculture and the living conditions of the peasants. The enquiry had an official status, with responsible

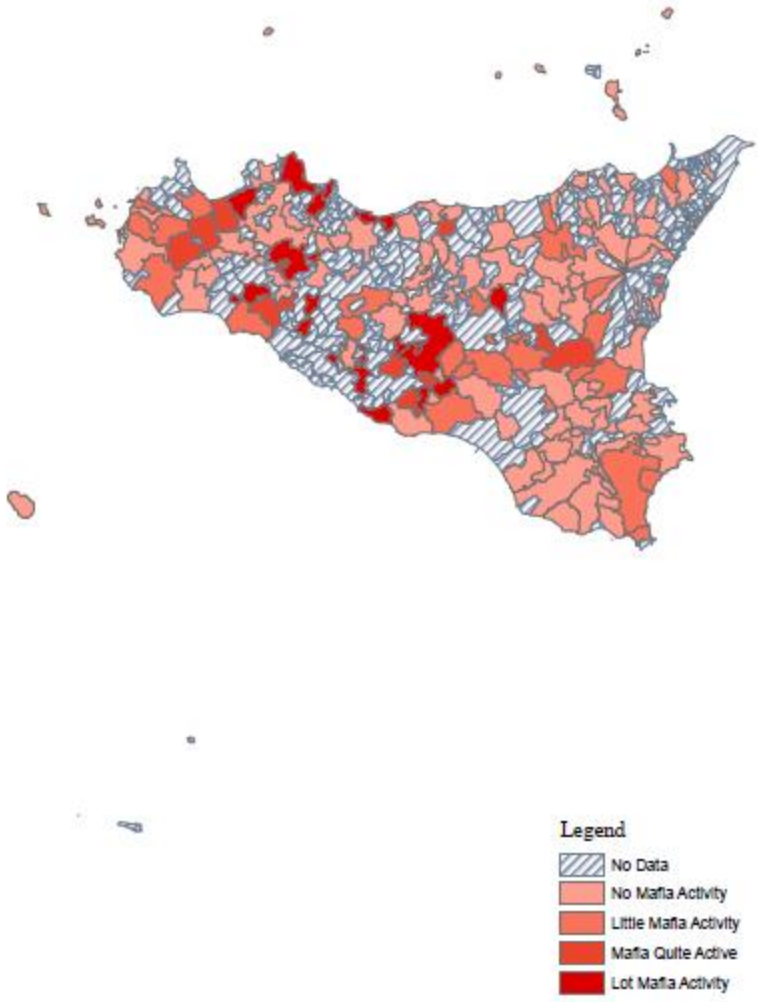
[66] She uses the ratio of vineyards on the total area cultivated.
[67] Parliamentary enquiries had been extensively used by more developed countries as England and France.

officials in charge of the research. For Sicily, it was Damiani. In this paper, we refer to it as Jacini or Damiani survey. The Jacini enquiry was made by accessing a range of contemporary source materials. The sources can be divided between "official" and "unofficial". The statistics derived from contemporary ministries, notably those relating to Agriculture, Industry, Business and Public Works. The General Bureau of Statistics also provided data[68]. The crucial unofficial sources are two monographs on the Sicilian provinces. One examined the conditions in the provinces of Palermo, Trapani, Caltanisetta and Girgenti. The other considered the provinces of Catania, Messina and Siracusa. The final source of information is that of questionnaires, sent to public authorities and people with deep knowledge of the Island[69]. In some instances, the questionnaires invited open answers, as we will see in the case of Mafia; in other instances, possible answers were suggested. The results of the questionnaires provide a useful complement to the data encompassed in the official and unofficial enquires noted above. Together these sources provide information from which we can compile a comprehensive picture of the reality of the agriculture and the conditions of peasants in the late nineteenth century Italy[70].

Based on the data available, a database was constructed using both the quantitative and qualitative information available in the above sources. We have hence extracted data on Mafia from questionnaires sent to the chief prosecutors of the towns. The prosecutors were asked to comment, inter alia, on whether Mafia was active in their town and, if so, to what extent. Based on the information provided by the prosecutors, we coded them into four categories, where 0 is "no Mafia activity" and 3 means that "Mafia is very active"[71]. The following figure shows the geographical distribution and intensity of the phenomenon according to this codification[72].

[68] Not to be confused with the modern Italian national bureau of Statistics (ISTAT), created in 1926.
[69] The methodology consisted in sending questionnaires to people with a deep knowledge of the public and private affairs in Sicily such as the majors of councils, chief prosecutors, magistrates, etc. They were also sent to fourteen privileged observers such as university professors, lawyers, politicians and entrepreneurs.
[70] Often the "official" data were integrated, sometimes even corrected, by those in charge of summarising the statistics. This was done in order to have the required level of disaggregation (in fact we have data on a town, district and regional basis).
[71] For example, in some councils they reported that "Mafia rules as a king" while in others "Mafia exists but to a limited extent". The first towns would get 3 while the latter 1.
[72] For a descriptive analysis see the appendix in 2.7.

Figure 2.3 Mafia presence using only Jacini



Note: This map shows the data on Mafia activity using only the Jacini survey. Categories range from 0 (no Mafia activity) to 3 (lots of Mafia activity).

Figure 2.3 and the Table 2.2 in the appendix show how the highest presence of Mafia was located in the western part of Sicily. Amongst the provinces, Girgenti is the one with the highest number of "threes". However, there are issues relating to the reliability of these data. Many commentators have suggested that the findings may be flawed insofar as many chief prosecutors, especially in areas with high density of Mafia, might have had an interest in understating the phenomenon. In some councils, concerns to avoid retaliation from the Mafiosi could have led to biased responses and the tendency to classify Mafia as a "normal"

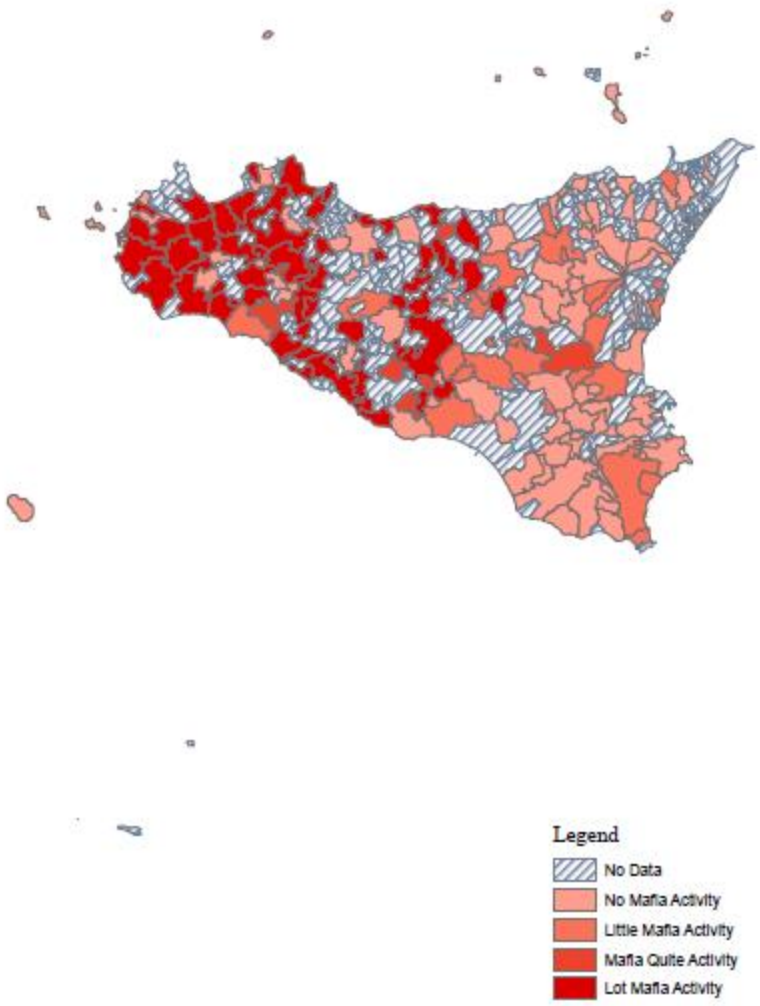
criminal problem[73]. In particular, it seems that the results for the province of Palermo look unrealistic for councils like the Petralie or even Caccamo which do not figure as having Mafia presence. Girgenti has the highest concentration and this could be a confirmation of the tendency of associating Mafia with normal criminality. Moreover, it is interesting to note the great number of councils with no data on Mafia, which per se would be worth analysing.

The data on mafia presence taken by Jacini are those employed by Bandiera(2003). Given such a low-level picture and the evident biases of the chief prosecutors' answers, we feel the need to improve such measure. In fact, the overall results found in Bandiera(2003 might be driven by large measurement errors. In order to do so, data from the Jacini survey were combined with those collected in another parliamentary survey, the so-called Bonfadini enquiry (Bonfadini and Borsani, 1968). As with the Jacini enquiry, it was based on both official and unofficial sources. In particular, it accessed information derived from more than 1000 interrogations to a number of local authorities[74]. The data on Mafia are taken from these reports. For example, the prefect of the province of Trapani says: "The town in which Mafia mostly manifests are: Mazzara, Castelvetrano, etc" (Bonfadini and Borsani, 1968, p.36). For the former, the Jacini enquiry reported that Mafia was not active, (0 in the ranking), while in the latter report, the information is that Mafia was quite active, which means a value of two. For the purposes of this research, I changed their previous values with three, which represents the highest level of Mafia activity. We should comment that even the analysis of Mafia in this enquiry has been criticised[75]. However, the reports show a deeper and more articulated study of the phenomenon, which helps us to get a better view. One problem with this enquiry is that it did not list the villages with Mafia and the ones without, but it just mentioned the ones with a high density of Mafia activity. Therefore, it could have not been possible to completely substitute the data from Jacini with the latter ones; hence we combined the information from the two surveys. Another problem in using this source could be the lag period between the two surveys. The Jacini survey was published in 1882, whereas Bonfadini in 1876. Therefore, there is a temporal gap where we cannot quantify the evolution of Mafia. However, it is reasonable to believe that Mafia

[73] This is mainly the critic by Pezzino (1987).
[74] For a complete list of the people, and their profiles, see Iacchello (1987, p. 30).
[75] For example, Iacchello (1987, p. 60) says that Mafia has been considered as a sect, similar to the camorra in Naples, or the *squadracce* (gangs) of Bologna and Ravenna.

increased its geographical influence rather than reduced it over this period. Figure 2.4 shows the geographical concentration of Mafia using this new database:

Figure 2.4 Mafia presence including Bonfadini data



Note: This map shows the data on Mafia activity combining Jacini (Damiani, 1881-1886) and Bonfadini and Borsani (1968). Categories range from 0 (no Mafia activity) to 3 (lots of Mafia activity).

The eastern regions have similar values as before, except that for four towns now listed with a value of one, whereas previously they were classified as without Mafia activity. Indeed, the major changes resulted in the western part and, in particular, for the provinces

of Palermo and Trapani. It is now clear where the Mafia was more active and the geographical continuity between councils with high levels of Mafia activity. Table 2.2 and 2.3 report some statistics regarding the distribution of our Mafia data.

Table 2. 2 Data on Mafia activity based on the Jacini (Damiani 1881-1886) enquiry

	Total number of towns in Sicily	Towns with Mafia data	3= a lot of Mafia activity	2=Mafia is quite active	1= little Mafia activity	0= not Mafia activity
Sicily	359	149	17	11	25	96
4 Western Provinces	166	75	16	10	12	37
3 Eastern Provinces	193	74	1	1	13	59
By Province						
Trapani	20	15	0	3	3	9
Girgenti	41	16	7	4	3	2
Siracusa	32	22	0	0	4	18
Messina	98	25	0	0	5	20
Caltanissetta	*28*	16	3	1	6	6
Catania	63	27	1	1	4	21
Palermo	77	28	6	2	0	20

Table 2. 3 Data on Mafia activity combining Jacini (Damiani, 1881-1886) with Bersani and Bonfadini (1968) parliamentary enquiry

	Total number of Towns in Sicily	Towns with Mafia Data	3= a lot of Mafia activity	2=Mafia is quite active	1= little Mafia activity	0= not Mafia activity
Sicily	359	160	48	8	25	79
4 Western Provinces	166	86	47	7	8	24
3 Eastern Provinces	193	74	1	1	17	55
By Province						
Trapani	20	15	9	0	0	6
Girgenti	41	22	14	4	2	2
Siracusa	32	22	0	0	4	18
Messina	98	24	0	0	5	19
Caltanissetta	28	16	4	1	6	5
Catania	63	28	1	1	8	18
Palermo	77	33	20	2	0	11

The new ordinal variable we created has been labelled as *Mafia Index.* In the empirical analysis we also considered a binary variable named *Mafia Binary,* which is one if there is any sign of Mafia activity.

2.3.2 Independent variables

Our aim is to verify whether there was more Mafia where the competition over resources by new actors was greatest. Unfortunately, there is not a proxy which would capture such competition. We know that the countryside is where the end of the feudal system opened up the biggest opportunities for new actors. Therefore, as a main explanatory variable we consider whether in the towns (and surroundings) big properties dominated. We constructed a dummy variable, *Large properties,* which takes value 1 if the majors of the town answered that the land was dominated by large properties and 0 otherwise. As argued in the theoretical part, the various reforms failed to create a class of small and middle owners. On the contrary, they reinforced the system of large estates and *latifundia*, with the difference being that a small number of actors could now exploit these opportunities. In large estates, the intervention of Mafia was particularly needed, because these new owners[76] needed Mafia to win over rival social actors[77]. This is because of the presence of a profitable market to buy and rent land. Also, because the loss of power of the nobility and the creation of the new Italian state created opportunities to compete for political power.

As an additional proxy for opportunities in the countryside, we also consider the proportion of the total area cultivated with cereals to the total cultivated area, which we call *Cereals*. Again, higher values could be associated with more competition in the market for the land and, so, competition for control over resources.

We also include a proxy for land income, *Rich Agriculture*. This represents the total proportion of the area cultivated with citrus trees, olive trees, vineyards to the total cultivated area. Mafia is likely to be more active there because the competition to get

[76] But also some sections of the nobility.

[77] We are aware that this is not the perfect proxy for the presence of opportunities (and conflicts) to exploit but we are constrained by the limited number of variables in the survey.

guardians[78] jobs was very high. In fact, in that period the citrus market (Dickie, 2004) was booming and Mafia imposed their men as guardians of these gardens. This is in line with the view by Bandiera which suggested that where land income was higher, Mafia presence was greater.

Continuing, we included *Density of population*. Since the competition for resources is especially harsh in the countryside, we expect a negative relation with the presence of Mafia. We also included *Little influence of reforms*. Majors were asked in which way the 1860s sales of church and state estates affected the division of land. We created a dummy with value equal to one if the answer "none" and "a little". We do not expect any sign a priori, since if these reforms had a positive impact on the fragmentation of the land this could have increased tensions as reported by Lupo (2004). In turn, this might have called for Mafia intervention in land disputes. On the other hand, a little or no influence could mean that Mafia might have played a role in the auction and favoured the large landowners. However, it is worth keeping in mind that we are not referring to the first set of laws which ended feudalism, but to subsequent reforms. The last variable we include is *Few peasants landowners*. Respondents to the questionnaires were asked whether in the councils there were none, very few, few, many, and very much peasant owners of the land. A dummy variable has been created using 1 for the first two categories. We expect a positive sign because the key social actor was the emerging middle class. Therefore, we would expect that peasants did not use Mafia as an instrument to achieve their aims[79]. Summary statistics are reported in Table 2.4.

[78] Guardians refer to the employees that patrolled and protected rich agriculture fields such as citrus gardens and wine yards.

[79] However, this does not mean that peasants were not involved in Mafia. In fact, they were enrolled as gunmen.

Table 2. 4 Summary statistics

	Observations	*Mean*	*Standard Deviation*	*Min*	*Max*
Mafia Index	160	1.156	1.315	0	3
Mafia Binary	160	0.5	0.502	0	1
Large Properties	136	0.213	0.411	0	1
Cereals	159	0.577	0.292	0	1
Rich Agriculture	159	0.287	0.26	0	1
Density of Population	160	1.746	2.527	0.13	18.2
Little Influence of Reforms	118	0.602	0.492	0	1
Few Peasants Landowners	137	0.409	0.493	0	1

The independent variables are taken from the Jacini enquiry (Damiani, 1881-1886). In the absence of an institute of statistics, these are the best possible data for this period of time.

2.3.3 Comparison with Bandiera (2003)

We first re-estimated the same model that Bandiera (2003) tested in her work[80] to verify the goodness of our data.

The author ran regressions on the presence of the mafia considering only the western part of the island. This comprises four provinces: Palermo, Girgenti, Trapani and Calatnissetta. The author considered two explanatory variables: *land fragmentation*, which is the proxy for the presence of small properties; and *vines* which represents the proportion of land cultivated with vineyards. As dependent variable, the author used an ordinal measure which takes value 0 if there is not mafia presence and three if there is lot of mafia presence. Again, data are at the council level and are taken exclusively by the Jacini's enquiry which is also the same source of the agricultural data. Table 2.5 reports the results of this exercise. In column two, we find that the coefficient for land fragmentation is not that different from the one Bandiera obtained. However, there is a major difference regarding the coefficient of vineyards. As a further robustness check, we substituted it with *rich agriculture* and its value is much similar to the one found by Bandiera. It is important to

[80] Unfortunately, we did not access those data.

note that there is a difference of 7 observations which in such kind of historical database could have an important impact on the results. Also, there could be heterogeneity in the codification of the discrete variables. Finally, the author does not specify which provinces represent the dummies *prov1*, *prov2* and *prov3*. This could providw another explanation of our different results.

Table 2. 5 Comparison Bandiera's results with my data

	[1]Bandiera	[2]Mine	[3]Mine
Land Fragmenation	0.59*	0.4	0.24
	[0.3]	[0.27]	[0.27]
Vines	1.56	0.45	
	[1.12]	[0.85]	
Rich Agriculture			1.22*
			[0.62]
Prov 1	-0.33	-0.21	-0.35
	[0.33]	[0.34]	[0.37]
Prov 2	-0.49	0.93	-0.9
	[0.36]	[0.43]	[0.39]
Prov 3	-0.55	-.05**	-.08**
	[0.39]	[0.87]	[0.35]
Observations	70	63	63
R squared	0.17	0.13	0.19

Note: [1] For each regression, robust standard errors are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] Column 1 reports the results from Bandiera (2003). Column 2 is the replication of the model 1 with my data. Column 3 substitutes *Vineyards* with *Rich Agriculture*.

We next analyse the econometric challenges in our empirical analysis. Indeed, we expect different results from the ones obtained by Bandiera. The reason is that we will employ a different measure of mafia activity.

2.4. Econometric specifications and results

2.4.1 Econometric techniques

Our aim is to evaluate the factors that are most likely to determine Mafia presence at the council level. Our basic model is

$$Mafia\ Presence_i^* = x_i'\beta + \varepsilon_i$$

Mafia Presence is a continuous variable that reflects the level of activity of Mafia. x_i' is a set of variables, which explains the dependent variable and β a vector of coefficients associated with them. ε_i is a normally distributed error term. Unfortunately, we do not observe the true presence of Mafia in a given village, but we can only infer it through the prosecutors' analysis, which we coded into 4 categories.

Mafia Index =

$$\begin{cases} 0\ if\ Mafia\ Presence_i^* \leq 0 \ \text{(Mafia is not active)} \\ 1\ if\ \ 0 < Mafia\ Presence_i^* \leq \alpha_1\ (Mafia\ is\ a\ bit\ active) \\ 2\ if\ \ \alpha_1 < Mafia\ Presence_i^* \leq \alpha_2\ (Mafia\ is\ quite\ active) \\ 3\ if\ \alpha_2 < Mafia\ Presence_i^* \leq \alpha_3\ (Mafia\ is\ very\ active) \end{cases}$$

α_i represents the threshold parameters. Given that *Mafia Index* is an ordinal multinomial variable, our primarily estimation technique is ordered probit[81]. The interpretation of the maximum likelihood results is troublesome and, so, we consider the marginal effects. However, the overall effects might a bit misleading because we do not know what happens at the extreme categories (0 and 3 in our case). Therefore, we consider the category specific marginal effects (Cameron and Trivedi, 2005; Greene, 2005). These are simply the derivative of each category probability with respect to the x variables:

$$\vartheta Prob\left[\frac{Mafia\ Index = 0}{\vartheta x_i}\right] = -\phi(x'\beta)\,\beta$$

$$\vartheta Prob\left[\frac{Mafia\ Index = 1}{\vartheta x_i}\right] = [\phi(x'\beta) - \phi(\alpha_1 - x'\beta)]\beta$$

[81] Bandiera (2003) uses OLS because in case of omitted variables the linear model is inconsistent only if the omitted variable is correlated with the included one. In contrast, a nonlinear model gives inconsistent estimators if the omitted variable is not correlated with the included ones. Moreover, hetersoskedasticity might be an issue with the nonlinear model since it leads to inconsistent estimators. However, we tried to regress also with OLS and the results do not change greatly.

$$\vartheta Prob\left[\frac{Mafia\ Index = 2}{\vartheta x_i}\right] = [\phi(\alpha_1 - x'\beta) - \phi(\alpha_2 - x'\beta)]\beta$$

$$\vartheta Prob\left[\frac{Mafia\ Index = 3}{\vartheta x_i}\right] = [\phi(\alpha_3 - x'\beta)]\beta$$

ϕ is the cumulative standard normal distribution function.

2.4.2 Specifications

We first estimate our model including *Large Properties* as the only independent variable. As a robustness check, we also consider a specification with *Cereals* as only explanatory variable. The reason is that the land cultivated with cereals was a synonym of the presence of the market for the land and, so, possibility of conflict[82]. Taking into consideration the measurement problems associated with the definition of large properties, *Cereals* could reflect a more "objective" measure of large estates. Again, we expect a different sign than the one obtained by Bandiera because we feel that her measure of mafia was flawed. We then include all the control variables, having the following model:

$$Mafia\ Index_i = Large\ Properties_i + Rich\ Agriculture + Density\ of\ Population_i + Little\ Influence\ of\ Reforms_i + Few\ Peasants\ landowners_i + \varepsilon_i$$

Again, we also estimate this model substituting *Cereals* for *Large Properties*. Moreover, we propose two different geographical specifications. In the first, we consider all the Sicilian councils, whereas in the second we just include those in the four western provinces: Girgenti, Palermo, Caltanissetta and Trapani. As we saw in section two, Mafia is mainly present in the western section of the island. However, the east also experienced high levels of crime after the Unification of Italy. Considering both specifications will allow us to evaluate the Mafia driving forces, both at the regional and sub-regional level.

Ordered probit is our preferred model. However, as a robustness econometric test, we also regress the models with a linear probability model (LPM). The main issue with this

[82] Surprisingly, the correlation between the two variables is not very high. This is due to the fact that there was not a defined size of a big property in different councils.

technique is that does not consider the categorical nature of our data (Cameron and Trivedi, 2005). Since the Bonfadini enquiry lists only the councils with a considerable Mafia presence, we decided to employ also a probit analysis. The reason is that we assigned 3 (highest level) to all councils mentioned in that enquiry. In the case that their "true" value was two, we would have measurement error problems with the ordered probit analysis. However, it is almost impossible that the same council did not have Mafia activity and, so, the probit results would still be indicative.

2.4.3 Econometric concerns

The nature of the dataset we are using poses inevitable econometric concerns. As Table 2.2 and 2.3 illustrate we have data on the presence of Mafia for less than half of the total number of Sicilian councils. This might lead to problems of representativeness.

Another important problem could be that of measurement error. In case that the error is in the Mafia measure the consequences are that it only weakens the model but it does not lead to bias in the coefficients (Wooldridge, 2002). In the case there are measurement errors in the explanatory variables this could lead to serious biases. This would be the case if the measurement error in the dependent variable were linked with the one in the control variables. However, Bandiera (2003, p.21) says that it is "hard to find a reason as to why the bias should go in a particular direction".

Moreover, the analysis could be harmed by the exclusion of important control variables, which might be important in explaining the presence of Mafia. Again, this would lead to biased estimators. For example, it might have been interesting to employ social capital variables (Putnam et al., 1993) or some deterrence ones (Levitt, 1996). In the case of the former, it seems that explanations based on socio-cultural traits are very important in explaining Mafia presence. Mafia is not a "normal" criminal phenomenon, rather the results of a perverse social structure. A way to partially address the omitted variable bias is to include provincial dummies, which take into account provincial heterogeneity. Given that the omitted variable bias might be quite relevant using ordered probit, we also regressed by

OLS (Keele and Park, 2006)[83]. Since Mafia activity is likely to be correlated amongst neighbour councils, we considered robust clustered standard errors at the province level.

2.4.4 Results

For ease of interpretation, we report the most interesting results in a table. This includes the marginal effects for the highest (3) and lowest (0) category of Mafia presence, both employing *Large Properties* (*Maf Ind 3* and *Maf Ind 0*, respectively) and also with *Cereals* (*Maf Ind 3-Cer* and *Maf Ind 0-Cer*). Moreover we report the linear probability model's results (LPM) and the marginal effects with probit. The last two refer to the specification with *Large Properties* in all the cases except for the one with all the control variables for the western section. In this case, we report the LPM for *Cereals (LPM-Cer)*.

Table 2.6 displays the results for all the Sicilian provinces only for the main explanatory variables. The first thing to note is that the marginal effects for *Mafia Ind* 3 and 0 have the expected sign and are statistically significant. In particular, the councils where the land is predominantly large are 12% more likely to have a very strong Mafia, all other variables held constant. On the other hand, councils where the small and middle estate dominates, have 12.3% lower probabilities of having Mafia presence. Again, these results support the view that Mafia is more likely to have originated where there were opportunities for competition amongst classes, especially emerging ones, which used Mafia as an instrument to control. Moreover, we showed that the results obtained by Bandiera (2003) were flawed as they considered a misrepresentation measure of Mafia presence. This result is consistent both with probit and LPM. The result with probit is especially important because of issues with our new measurement of Mafia activity. In particular, if in a town, large estates dominate, we have a probability of having Mafia 20.5% higher than in the rest of the councils. This is a significant effect. The last two columns report the results for the highest and lowest Mafia ranking values employing *Cereals*. Even though the signs are according to the predictions, none is significant. Moreover, the dummy provinces are generally positive and significant for the provinces with more Mafia activity.

[83] At page 3, they show that in an ordered probit model, omitted variables could lead to biased estimators even if they are not correlated with the included explanatory variables.

Table 2. 6 All Sicily including only *Large Properties* and Cereals

	Maf Ind 3	*Maf Ind 0*	*LPM*	*Probit*	*Maf Ind 3-Cer*	*Maf Ind 0-Cer*
Large Properties	0.120***	-0.123***	0.315*	0.205**		
	[0.043]	[0.041]	[0.171]	[0.086]		
Cereals					0.029	-0.031
					[0.066]	[0.072]
Dummy Catania	0.196**	-0.196**	0.361**	0.328*	0.134	-0.14
	[0.097]	[0.09]	[0.138]	[0.18]	[0.087]	[0.084]
Dummy Trapani	0.509***	-0.461***	1.675***	0.463***	0.459***	-0.423***
	[0.134]	[0.077]	[0.48]	[0.136]	[0.153]	[0.093]
Dummy Girgenti	0.653***	-0.543***	2.257***	0.618***	0.613***	-0.527***
	[0.064]	[0.036]	[0.149]	[0.065]	[0.064]	[0.04]
Dummy Messina	0.128	-0.129	0.135	0.217	0.0336	-0.036
	[0.124]	[0.116]	[0.157]	[0.23]	[0.124]	[0.13]
Dummy Palermo	0.547***	-0.532***	10.804***	0.528***	0.498***	-0.495***
	[0.097]	[0.06]	[0.178]	[0.133]	[0.097]	[0.064]
Dummy Caltanissetta	0.356*** [0.11]	-0.340*** [0.084]	0.859** [0.338]	0.442*** [0.125]	0.339*** [0.112]	-0.334*** [0.089]
Observations	136	136	136	136	159	159
(Pseudo) R squared	0.1962	0.1962	0.424	0.215	0.184	0.184
Log Likelihood	-123.775	-123.775		-74.046	-149.5	-149.5

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 3 (a lot of Mafia activity). In the second we report the marginal effects for no Mafia activity (0). The results for the other categories could be found in the following tables. LPM are the OLS results. The column *Probit* reports the marginal effects using *Mafia Binary* as dependent variable. The last two columns are the corresponding for the first two, using *Cereals* as explanatory variable. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated. [4] All regressions include provincial fixed effects.

Table 2. 7 Four Western provinces including only *Large Properties* and *Cereals*

	Maf Ind 3	*Maf Ind 0*	*LPM*	*Probit*	*Maf Ind 3– Cer*	*Maf Ind 3- Cer*
Large Properties	0.152**	-0.119**	0.383	0.152		
	[0.074]	[0.054]	[0.286]	[0.106]		
Cereals					0.046	-0.054
					[0.076]	[0.089]
Dummy Trapani	0.191	-0.156	0.819	0.022	-0.111	0.138
	[0.142]	[0.098]	[0.584]	[0.152]	[0.131]	[0.183]
Dummy Girgenti	0.350***	-0.271***	1.385***	0.333***	-0.237***	0.307***
	[0.072]	[0.047]	[0.360]	[0.061]	[0.054]	[0.085]
Dummy Palermo	0.234***	-0.201***	0.948**	0.070	-0.149**	0.178*
	[0.076]	[0.056]	[0.357]	[0.087]	[0.075]	[0.104]
Observations	73	73	73	73	86	86
(Pseudo) R squared	0.047	0.047	.124	0.106	0.028	0.028
Log Likelihood	-75.802	-75.802		-39.956	-92.943	-92.943

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 3 (a lot of Mafia activity). In the second we report the marginal effects for no Mafia activity (0). The results for the other categories could be found in the following tables. LPM are the OLS results. The column *Probit* reports the marginal effects using *Mafia Binary* as dependent variable. The last two columns are the corresponding for the first two, using *Cereals* as explanatory variable. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated. [4] All regressions include provincial fixed effects.

Table 2.8 shows the results for the same specification but including only the four western provinces. There are some differences between the two. As before, we find that the marginal coefficient for the top and bottom category are significant and with the "correct" sign. The effect of the former on Mafia presence is somewhat higher than in the previous specification. This result is important because even if we exclude the control region (the east) we still find support for our view. On the other hand, the effect on councils with no Mafia activity is very similar to the previous one. In this specification, we do not find significant results for the LPM and probit models.

It is important to note that the coefficients for the dummy provinces are now smaller than before which means that we are dealing with more "homogenous" provinces. Finally, the goodness of fit measure is encouraging.

If we include the control variables, we get interesting results as demonstrated in Table 2.7 and Table 2.9.

Table 2. 8 All Sicily with the additional controls

	Maf Ind 3	*Maf Ind 0*	*LPM*	*Probit*	*Maf Ind 3-Cer*	*Maf Ind 0-Cer*
Large Properties	0.083**	-0.090**	0.263	0.119		
	[.038]	[.038]	[0.172]	[0.114]		
Cereals					0.121	-0.136
					[0.136]	[0.151]
Rich Agriculture	0.240**	0.274**	0.864*	00.27	0.327**	-0.368**
	[0.010]	[0.111]	[0.495]	[0.242]	[0.166]	[0.184]
Density of Population	-0.018*	0.020*	-0.064	-0.034	-0.014	0.016
	[0.010]	[0.012]	[0.046]	[0.036]	[0.011]	[0.013]
Little influence	-0.07	0.084	-0.3	-0.07	-0.069	0.083
of reforms	[0.051]	[0.065]	[0.292]	[0.147]	[0.053]	[0.067]
Few peasants	0.131**	-0.137***	0.337	0.188*	0.156***	-0.157***
Landowners	[0.041]	[0.383]	[0.214]	[0.111]	[0.046]	[0.041]
Dummy Trapani	0.209**	-0.212**	0.464	0.35	0.204**	-0.204**
	[0.093]	[0.086]	[0.212]	[0.21]	[0.09]	[0.082]
Dummy Girgenti	0.521***	-0.477	1.695***	0.471**	0.515***	0.471***
	[0.118]	[0.065]	[0.438]	[0.16]	[0.122]	[0.067]
Dummy Messina	0.113	-0.118	0.1	0.195	0.131	-0.132
	[0.107]	[0.103]	[0.197]	[0.251]	[0.113]	[0.104]
Dummy Palermo	0.514***	-0.490***	1.711***	0.500**	0.526***	-0.498***
	[0.091]	[0.058]	[0.284]	[0.151]	[0.089]	[0.056]
Dummy Caltanissetta	0.373***	-0.361***	1.002**	0.444**	-0.136	-0.383***
	[0.108]	[0.081]	[0.486]	[0.148]	[0.151]	[0.074]
Observations	110	110	110	110	114	114
(Pseudo) R squared	0.227	0.227	0.124	0.252	0.252	0.252
Log Likelihood	-97.522	-97.522		-57.045	-102.147	-102.147

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 3 (a lot of Mafia activity). In the second we report the marginal effects for no Mafia activity (0). The results for the other categories could be found in the following tables. LPM are the OLS results. The column *Probit*

reports the marginal effects using *Mafia Binary* as dependent variable. The last two columns are the corresponding for the first two, using *Cereals* as explanatory variable. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated. [4] The definitions of the other variables are in the appendix. [5] All regressions include provincial fixed effects.

Table 2. 9 Four Western provinces with the additional controls

	Maf Ind 3	*Maf Ind 0*	*LPM*	*Probit*	*LPM Cer*	*Maf Ind 3-Cer*	*Maf Ind 0-Cer*
Large Properties	0.122**	-0.097**	0.391				
	[0.054]	[0.038]	[0.256]				
Cereals				1.131***	2.657**	0.925***	-0.775***
				[0.295]	[0.921]	[0.231]	[0.188]
Rich Agriculture	0.732***	-0.624***	2.09***	1.771***	4.505***	1.584***	-1.327***
	[0.146]	[0.157]	[0.627]	[0.446]	[1.131]	[0.283]	[0.261]
Density of Population	-0.063***	0.054***	-0.184***	-0.095***	-0.148**	-0.048***	0.040***
	[0.014]	[0.011]	[0.053]	[0.016]	[0.065]	[0.014]	[0.012]
Little influence of reforms	-0.227***	0.226**	-0.621	-0.089	-0.621**	-0.245***	0.247***
	[0.084]	[0.098]	[0.468]	[0.119]	[0.423]	[0.076]	[0.093]
Few peasants landowners	0.191***	-0.143***	0.561	0.155	0.693**	0.235***	-0.166***
	[0.059]	[0.041]	[0.319]	[0.133]	[0.299]	[0.052]	[0.031]
Dummy Trapani	0.099	-0.081	.482**	-0.055	0.279	0.044	-0.036
	[0.127]	[0.096]	[0.702]	[0.406]	[0.69]	[0.139]	[0.11]
Dummy Girgenti	0.338***	-0.262***	1.377	0.406***	1.338**	0.330***	-0.252***
	[0.086]	[0.045]	[0.547]	[0.06]	[0.564]	[0.092]	[0.044]
Dummy Palermo	0.168*	-0.139**	0.683	0.101	0.798	0.214***	-0.171***
	[0.099]	[0.069]	[0.582]	[0.071]	[0.474]	[0.08]	[0.049]
Observations	57	57	57	57	59	59	59
(Pseudo) R squared	0.176	0.176	0.501	0.345	0.465	0.191	0.191
Log Likelihood	-53.476	-53.476		-22.739		-55.026	-55.026

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 3 (a lot of Mafia activity). In the second we report the marginal effects for no Mafia activity (0). The results for the other categories could be found in the following tables. LPM are the OLS results. The column *Probit* reports the marginal effects using *Mafia Binary* as dependent variable. The last two columns are the corresponding for the first two, using *Cereals* as explanatory variable. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated. [4] The definitions of the other variables are in the appendix. [5] All regressions include provincial fixed effects.

Large properties for all the Sicilian provinces is still positive and significant only for the ordered probit specification. Moreover, its effect is somewhat smaller (about 4%) compared to the previous specification. In the previous model, the coefficient of the explanatory variable might have captured the indirect effects of some excluded variables. We do not find *Large Properties* to be significant in any other specification, although the signs are in line with theory. *Cereals* is positive but not significant. If we consider only the four western provinces, the marginal effects for the top and last category are more positive (negative) than the specification with all councils. Again, LPM and probit specification present insignificant coefficients. *Cereals* is strongly significant and with the expected sign with all the estimation techniques. Moreover, the magnitude of this effect is much higher than in the previous case. For example, towns where large estates are more present have an almost double likelihood of having Mafia in their territory. As previously argued, cereals seem to be a more objective measure of large properties/ low values of the land. Cereal cultivation was not very profitable in general terms (Marino, 2007), although it was very profitable for those who wanted to rent it.

Rich Agriculture is positive and significant for most of the specifications, both at a regional and sub-regional level. In particular, if we consider the marginal effects for *Mafia Index* level 3 for all Sicily, an increase of one per cent of the rate of valuable land increase the probability of having the highest Mafia activity by 24%, all other variables held constant. The coefficient for the western section is higher, which reflects the strong interest of the developing Mafia in "rich areas". High valuable lands are associated with better jobs for the emerging classes. It also meant greater opportunities not only to control such profitable markets but also to offer protection, as suggested by Gambetta (1993). The fact that we find Mafia activity linked both with large estates and profitable land is not contradictory and confirms that we need to analyse this phenomenon in a broader perspective compared to the existing literature. Indeed, Mafia had also protection function although the main

emphasis, from our point of view, is on Mafia being an instrument of social struggles occurring at that time. As expected, *Density of Population* is negative. In the specification with all Sicilian councils, we do find this to be significant only with *Mafia Index 3* and *0*. On the other hand, if we restrict our attention to the western section we find it to be always significant[84] and with a stronger negative effect. This confirms the view that the fight for resources was especially harsh in the countryside where the aristocrats were slowly but inexorably losing their socio-economic powers and the Mafia became an instrument to acquire it. The variable *Little Influence of Reforms* is negative and significant only for the western provinces of the island. This could mean that where the 1860s sales of church and state property had more impact on the division of the land, Mafia could have played a role. In fact, as suggested by Lupo (2004), it was especially in such councils that Mafia could have been employed to "settle" the frequent conflicts that arose. It is worth keeping in mind two issues: first, we are not dealing with the first reforms that are likely to have created the basis for Mafia emergence. Secondly, the fact that Mafia is more likely, at least in the western part, to be active in councils where these reforms had greater impact on the division of land does not imply that properties were mainly fragmented in those councils. In our view, it is best looking at this variable as a proxy for opportunities to fight rather than giving it other meanings.

Few peasants landowners is highly significant and positive for almost all the specifications[85]. For example, if we consider the western section, those councils with few peasants who owned the land are 19% more likely not to have the highest levels of Mafia activity. The results are similar to the specification with *Cereals.* This could mean that Mafia was most likely to be present where land was less fragmented. In addition, according to previous reasoning, Mafia's services were not acquired by peasants and, so, the sign of the

[84] We refer to the preferred specifications in Table 2.9.

[85] One might argue that "Large properties" and "Few peasants landowners" might be strongly correlated. At the end, in large properties it is almost impossible to have peasants who are landowners. Despite this logical argument, the correlation coefficient between these two variables is not very high, about 0.29. Moreover, there are two more hints that could show this. First, when we include both variables, as in Table 2.8 or 2.9, the coefficients are not very high. Secondly, if we compare the coefficient of "Large properties" in table 2.7 And 2.9, we note that the coefficient moves from 0.152 to 0.22 and are equally significant.
On the other side, there is a problem of multicollinearity between "rich agriculture" and "cereals". They both represent the rate of use of plantation of such agricultural goods on the total land. In fact, the correlation between the two variables is - 0.791. Moreover, we see that the coefficient of rich agriculture becomes much larger once we consider the specification with cereals. Indeed, it would be ideal to use another proxy for one of the two variables but our historical database did not allow us to do so.

coefficient is reasonable. The province dummies are mostly significant which means that there are other variables, which we do not have data on and that explain the presence of Mafia. It is worth noting that, especially for the western section, most of the variables employed are significant which means that they are useful to predict Mafia presence. Finally, the R squared for the LPM specification is quite high.

The tables with the additional results can be found from 2.10 through 2.13.

Table 2. 10 All Sicily including only *Large Properties* and *Cereals* (second part)

	Maf Ind 1	*Maf Ind 2*	*Maf Ind 2 Cer*	*Maf Ind 1 Cer*	*Probit Cer*	*LPM Cer*
Large Properties	0.000	0.003				
	[0.005]	[0.002]				
Cereals			0.001	0.002	0.120	0.063
			[0.003]	[0.004]	[0.115]	[0.166]
Dummy Catania	-0.002	0.002	0.000	0.003	0.224	0.292**
	[0.008]	[0.002]	[0.005]	[0.002]	[0.149]	[0.121]
Dummy Trapani	-0.048	-0.009	-0.038	0.002	0.393***	1.619***
	[0.05]	[0.011]	[0.05]	[0.014]	[0.137]	[0.484]
Dummy Girgenti	-0.099***	-0.012	-0.078**	-0.008	0.584***	2.176***
	[0.038]	[0.009]	[0.034]	[0.001]	[0.066]	[0.107]
Dummy Messina	-0.002	0.003	0.000	0.002	0.074	0.049
	[0.009]	[0.002]	[0.002]	[0.005]	[0.217]	[0.162]
Dummy Palermo	-0.024	0.010	-0.018	0.015	0.464***	1.760***
	[0.034]	[0.01]	[0.031]	[0.010]	[0.115]	[0.183]
Dummy Caltanissetta	-0.019	0.003	-0.011	0.006	0.402***	1.061**
	[0.024]	[0.005]	[0.021]	[0.005]	[0.116]	[0.393]
Observations	136	136	159	159	159	159
(Pseudo) R squared	0.20	0.20	0.18	0.18	0.19	0.124
Log Likelihood	-123.77	-123.77	-149.50	-149.50	-88.82	

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 1(little Mafia activity). In the second we report the marginal effects for some Mafia activity (2). In column three and four we report respectively the marginal effects for category 2 and 1 using *Cereals* as explanatory variable. The column *Probit Cer* reports the marginal effects using *Mafia Binary* as dependent variable with *Cereals* as explanatory variable. The last column reports the results for the linear probability model using *Mafia Index* as dependent variable for *Cereals*. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated. [4] All regressions include provincial fixed effects.

Table 2. 11 All Sicily with the additional controls (second part)

	Maf Ind 1	*Maf Ind 2*	*Maf Ind 2 –Cer*	*Maf Ind 1- Cer*	*Probit Cer*	*LPM Cer*
Large Properties	0.002	0.004**				
	[0.003]	[0.002]				
Cereals			0.007	0.008	0.189	0.189
			[0.007]	[0.010]	[0.404]	[0.404]
Rich Agriculture	0.018	0.0151**	0.018	0.023*	0.403	0.403
	[0.013]	[0.007]	[0.015]	[0.013]	[0.438]	[0.438]
Density of Population	.001	0.001	0.001	0.001	0.029	0.029
	[0.001]	[0.001]	[0.001]	[0.001]	[0.037]	[0.037]
Little influence	0.009	0.006	0.007	0.006	0.070	0.070
of reforms	[0.010]	[0.005]	[0.009]	[0.006]	[0.151]	[0.151]
Few peasants	0.000	0.005**	-0.004	0.005*	0.207*	0.207*
landowners	[0.005]	[0.002]	[0.006]	[0.003]	[0.113]	[0.113]
Dummy Catania	-0.001	0.004	-0.003	0.003	0.341*	0.341*
	[0.007]	[0.003]	[0.007]	[0.003]	[0.198]	[0.198]
Dummy Trapani	-0.048	0.004	-0.047	0.003	0.468***	0.468***
	[0.044]	[0.013]	[0.044]	[0.015]	[0.153]	[0.153]
Dummy Girgenti	-0.093***	-0.009	-0.093***	-0.013	0.638***	0.638***
	[0.027]	[0.011]	[0.025]	[0.011]	[0.076]	[0.076]
Dummy Messina	0.001	0.004*	-0.002	0.004*	0.227	0.227
	[0.006]	[0.002]	[0.009]	[0.002]	[0.239]	[0.239]
Dummy Palermo	-0.033	0.008	-0.034	0.007	0.527***	0.527***
	[0.029]	[0.009]	[0.027]	[0.010]	[0.135]	[0.135]
Dummy Caltanissetta	-0.018	0.006	-0.022	0.006	0.464***	0.464***
	[0.024]	[0.006]	[0.023]	[0.007]	[0.132]	[0.132]
Observations	110	110	114	114	114	114
(Pseudo) R squared	0.23	0.23	0.468	0.25	0.25	0.464
Log Likelihood	-97.52	-97.52	-57.04	-57.04	-59.11	

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 1(little Mafia activity). In the second we report the marginal effects for some Mafia activity (2). In column three and four we report respectively the marginal effects for category 2 and 1 using *Cereals* as explanatory variable. The column *Probit Cer* reports the marginal effects using *Mafia Binary* as dependent variable with *Cereals* as explanatory variable. The last column reports the results for the linear probability model using *Mafia Index* as dependent variable for *Cereals*. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated.[4] The other variables are defined in the text and in the appendix. [5] All regressions include provincial fixed effects.

Table 2. 12 Four Western provinces including only *Large Properties* and *Cereals* (second part)

	Maf Ind 1	*Maf Ind 2*	*Maf Ind 2-Cer*	*Maf Ind 1-Cer*	*Probit Cer*	*LPM Cer*
Large Properties	-0.025	-0.008				
	[0.020]	[0.008]				
Cereals			0.006	0.003	0.063	-0.142
			[0.009]	[0.005]	[0.076]	[0.234]
Dummy Trapani	-0.027	-0.008	-0.018	-0.009	-0.014	0.533
	[0.035]	[0.013]	[0.035]	[0.020]	[0.162]	[0.629]
Dummy Girgenti	-0.058	-0.021	-0.044	-0.0260**	0.278***	1.110**
	[0.042]	[0.013]	[0.039]	[0.013]	[0.079]	[0.392]
Dummy Palermo	-0.027	-0.007	-0.020	-0.009	0.046	0.668
	[0.023]	[0.007]	[0.024]	[0.011]	[0.096]	[0.426]
Observations	73	73	86	86	86	86
(Pseudo) R squared	0.047	0.047	0.028	0.028	0.068	0.079
Log Likelihood	-75.802	-75.802	-92.943	-92.943	-48.330	

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 1(little Mafia activity). In the second we report the marginal effects for some Mafia activity (2). In column three and four we report respectively the marginal effects for category 2 and 1 using *Cereals* as explanatory variable. The column *Probit Cer* reports the marginal effects using *Mafia Binary* as dependent variable with *Cereals* as explanatory variable. The last column reports the results for the linear probability model using *Mafia Index* as dependent variable for *Cereals*. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated. [4] All regressions include provincial fixed effects.

Table 2. 13 Four Western provinces with the additional controls (second part)

	Maf Ind 1	*Maf Ind 2*	*Maf Ind 2- Cer*	*Maf Ind 1- Cer*	*Probit*
Large Properties	-0.020	-0.006			-0.011
	[0.014]	[0.006]			[0.092]
Cereals			-0.122**	-0.028	
			[0.062]	[0.022]	
Rich Agriculture	-0.090***	-0.018	-0.209**	-0.048	0.634**
	[0.032]	[0.016]	[0.086]	[0.037]	[0.277]
Density of Population	0.007*	0.002	0.006**	0.001	-0.112***
	[0.004]	[0.001]	[0.003]	[0.001]	[0.022]
Little influence	0.008	-0.006	0.008	-0.010	-0.078
of reforms	[0.011]	[0.009]	[0.011]	[0.011]	[0.115]
Few peasants	-0.034**	-0.013	-0.047**	-0.021*	0.163
landowners	[0.017]	[0.010]	[0.020]	[0.013]	[0.125]
Dummy Trapani	-0.014	-0.004	-0.006	-0.002	-0.008
	[0.024]	[0.008]	[0.023]	[0.007]	[0.141]
Dummy Palermo	-0.058	-0.019	-0.057	-0.022	0.408***
	[0.039]	[0.015]	[0.039]	[0.018]	[0.079]
Dummy Caltanissetta	-0.023	-0.006	-0.032	-0.011	0.055
	[0.024]	[0.009]	[0.026]	[0.010]	[0.089]
Observations	57	57	59	59	57
(Pseudo) R squared	0.176	0.176	0.191	0.191	0.106
Log Likelihood	-53.476	-53.476	-55.026	-55.026	-39.956

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 1(little Mafia activity). In the second we report the marginal effects for some Mafia activity (2). In column three and four we report respectively the marginal effects for category 2 and 1 using *Cereals* as explanatory variable. The column *Probit* reports the marginal effects using *Mafia Binary* as dependent variable. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big" . *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated. [4] The other variables are defined in the text and in the appendix. [5] All regressions include provincial fixed effects.

2.5. Sicily and Sardinia: a comparison.

The last section seeks to analyse the origins of the Sicilian Mafia through a comparative approach. The institutional changes did not happen only in Sicily but also in many other Italian and European regions. It was not only in Sicily that the state failed to exercise its legitimate monopoly over violence with a consequent escalation in banditry[86]. Moreover, also in other regions landownership increased due to the end of feudalism[87]. So, why did Mafia originate in Sicily, and few other southern Italian regions, and not elsewhere which experienced similar characteristics?

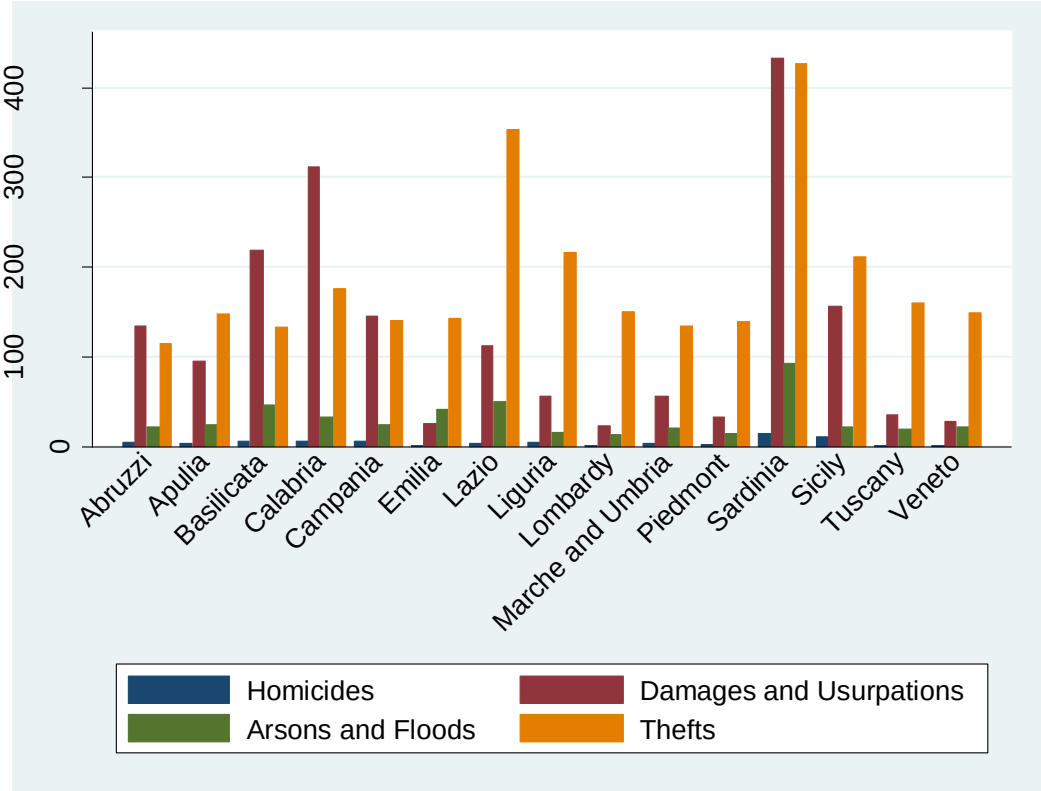
A useful way to attempt to answer such a difficult question is to compare Sicily with another Italian region, Sardinia, which experienced the end of feudalism and a possible market for protection but it did not develop Mafia.

We begin by considering the similarities between them[88]. They are the two largest islands in the Mediterranean Sea, with Sicily being 2'571 square km whereas Sardinia 2'409. Both are peripheral[89] with all its implications, well explained by Skaperdas (2001). In 1891 the GDP per capita in Sicily and Sardinia was not that different, with the former at 0.982 of the mean Italian GDP per capita, whereas the latter was 0.973 (Daniele and Melanima,2007). Moreover, according to some time series reconstructions, in the previous thirty years the values were similar (Daniele and Melanima, 2007). Undoubtedly, they were not the poorest regions at that time. These were Calabria, Basilicata and Abruzzo. Both regions were at some point ruled by the Spaniards which left them inefficient administrations and a deep feeling of mistrust towards the state and the public authorities[90]. The end of feudalism happened in both islands in a later stage compared to

[86] Also in France crime increased after the institutional changes but was well repressed by the state.
[87] For example in the Italian northern regions.
[88] Obviously we are going to focus on the most relevant ones and we do not pretend to treat them exhaustively.
[89] Which means far from the centres of power.
[90] This point is also central in the analysis of Gambetta (2000). The author considered distrust as one of the major factors in explaining the origin of the Sicilian Mafia. Pirastru (1973, p. 15), referring on Sardinia, argued that the economic oppresstion and the excessive taxation "determined that deep feeling of distrust and of hostility against the authority [..] that characterize(d) the relations between the state and the citizens [..] until our days".

the continental South[91] and the following period saw a substantial increase in banditry and violence. In fact, they were the only two regions for which the parliament created ad hoc parliamentary surveys designed to public security[92]. Figure 2.5 below reports the crime rate for the period 1890-3, which shows that Sardinia was the Italian region with the highest crime rates and Sicily not far behind. In this respect, the 1896 parliamentary enquiry Pais Serra (1896, p.48) claimed that "the conditions (of public security) in the island, compared to ones of the other Italian regions, and under some aspects even compared to Sicily, are abnormal. This is an incontestable thing".

Figure 2.5 Number of crimes per 100'000 inhabitants in the period 1890-93



Note: Data are personal elaborations based on Lei-Spano(1975)

It is interesting to note that the problems of public security in Sardinia seem to have similar features to those in Sicily. The law enforcers failed to protect people and belonging because of the lack of good organisation and also because of the complicity between bandits and population. As in Sicily, public forces were divided into the public and the semi-public ones. The former were inefficient because unaware of the local conditions, whereas

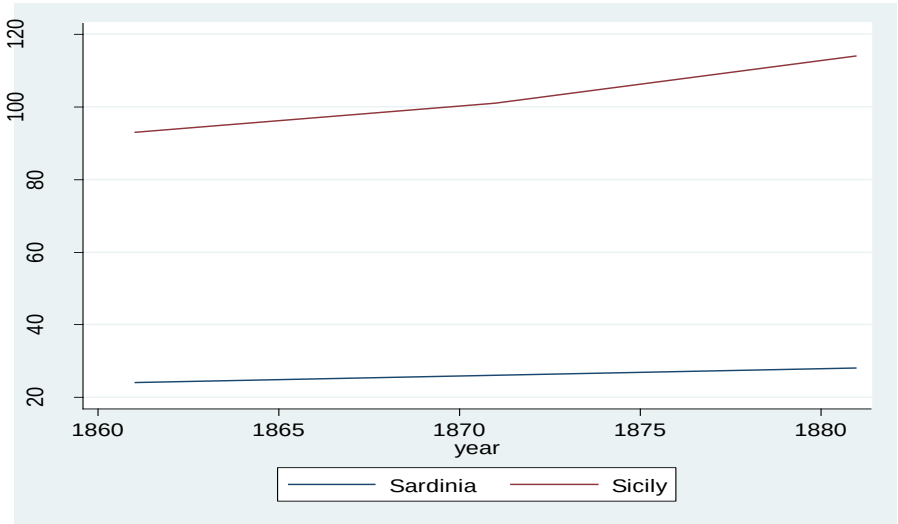
[91] As we said earlier in Sicily in 1812 whereas in Sardinia in the 1830s.
[92] Pais -Serra (1896) and the ones mentioned for Sicily.

the latter, the so called *Baracelli*, were formed by people that used to steal in the same properties they had to protect. Most of the time, they went unpunished because they also had public and administrative roles in the villages[93].

Indeed, in both islands the state failed to impose its legitimate monopoly over violence and to secure property rights. Also, as a consequence of the end of feudalism, land ownership greatly increased. In particular, in Sardinia these reforms took away the land from the lords and many tiny plots were created. For example, Amat di San Filippo (1902), talking about the division of land in Sardinia said that there were around 208'706 owners and a total of 1'267'071 of holdings. This means that more than a third of the population were landowners, a figure much higher than in Sicily (Zamagni, 1990). Therefore, if we consider the market for protection, Sardinia exhibited a potential higher demand and supply forces. However, except for some types of gangs, it never witnessed the development of a sophisticated organisation such as the Sicilian Mafia. The reasons may be various[94], but here we just concentrate on some that might be interesting for the comparison with Sicily.

The first main difference is that Sardinia was much less populated compared to Sicily. Figure 2.6 below shows the density of population from the 1861 until the 1881 in the two regions. As we can see, Sardinia had values around a fourth of Sicily and it kept a stable trend over the two following decades, whereas in Sicily it greatly increased.

Figure 2.6 Density of population in 1861, 1871 and 1881 in Sicily and Sardinia



Note: Data are personal elaborations based on Coda (1977)

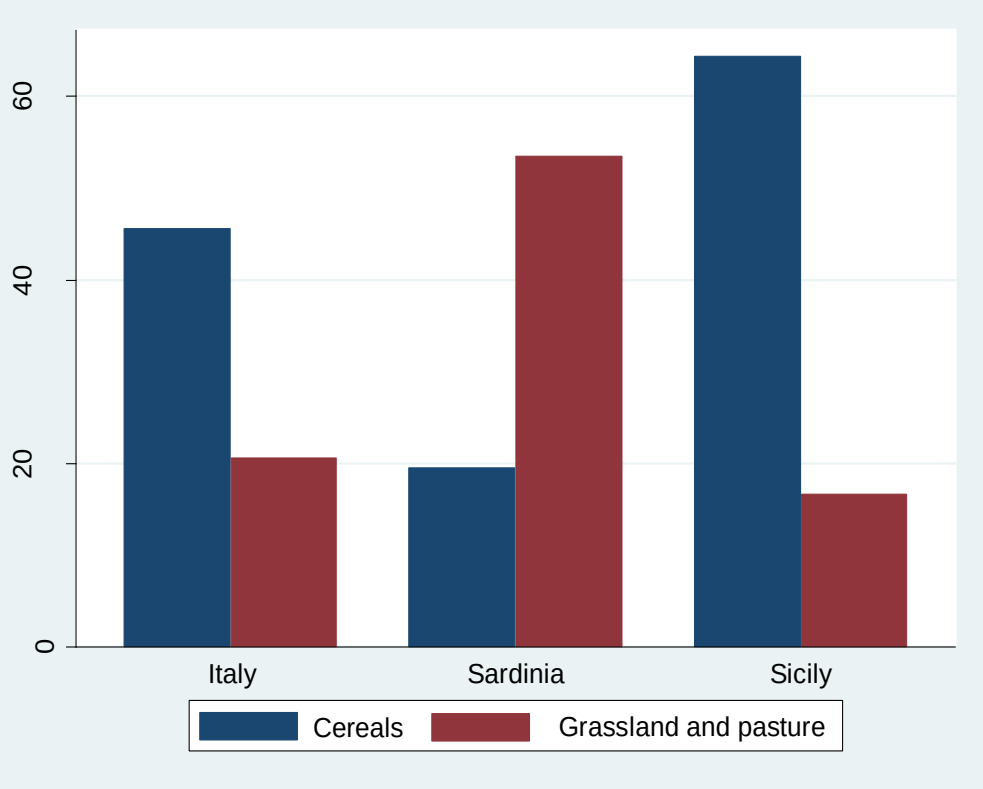
[93]Lei-Spano (1975) explained that *Barecellato* [...] is an "ancient institution which originated in Sardinia with the aim of protecting rural properties and policing the countryside" (p. 128). This type of private police stole and damaged the same properties which they should have been protecting.

[94] Except for the economical ones, there are many others such as cultural and historical ones. However, we are not going to consider them.

Undoubtedly, a higher density of population meant a greater competition for resources. This aspect does not contradict what we found in the empirical section about Sicily, since Mafia was more likely to emerge in areas with lower density of population but in a context of absolute higher population[95].

Moreover, because of its orographical conditions and low density of population, agriculture has never been the major economic sector in Sardinia. For example, as Figure 2.7 shows, in 1861, well after the end of feudalism, less than 20% of the total agrarian area was devoted to cereal cultivation, compared to almost two thirds in Sicily.

Figure 2.7 Area devoted to cereals cultivation vs. pasture in the two islands in 1861



Note: Data are personal elaborations based on Svimez (1961)

In contrast, most of the land in Sardinia was devoted to pasture. Sheep breeding was the most important economic activity (Coda, 2007)[96]. The prevalence of the sheep breeding in agriculture in Sardinia was the exact opposite of what happened in Sicily where "sheep

[95] In Sardinia there has always been abundance of land for all the population.
[96] As Coda (2007, p. 139), amongst the others.

breeding activity was defeated by the large landed estate and the cereal cultivation since the 19th century" (Arlacchi, 2007, p.36). As a consequence, the land system and the market for the land in Sardinia were very different from that in Sicily. If in Sicily the majority of land was in private hands, in Sardinia four fifths of the total area were common or public land, suitable for the sheep breeding activity (Arlacchi, 2007). Therefore, in Sardinia there were neither the large farms nor the possibility of renting them as the *gabellotti* did in Sicily. The end of feudalism did not lead to a competition over resources similar to that in Sicily because of the lower density of population. The abolition of feudalism in Sardinia, decreed between 1835 and 1838, was mainly aimed to diminish the role of sheep breeding and increase that of agriculture, whereas in Sicily was to fractionise the large estates.

In fact, the shepherds were the ones who opposed the reforms[97] and who committed most of the crimes. Rather than having new social classes who wanted to emerge, there was the established ruling class of shepherds who wanted to preserve its power. However, by its nature the shepherds' mentality was indeed more individualistic and did not lead to the creation of a highly sophisticated organisation as Mafia[98].

Another major difference between the two islands might have been the role of the landowners. In Sardinia, landowners were more present in the countryside compared to the Sicilian ones (Arlacchi, 2007)[99]. They had a different type of relationship with their employee too[100].There was a direct relationship between the owner and the peasants and , although, often the owner did not work on the land, he was still involved in its management. In contrast, in Sicily the Mafia was usually associated with absenteeism landowners who left the *gabellotto* and the *campiere*[101] to rule their farms.

Moreover, there were many differences in the economic structure between the two islands, especially in the labour force. This might have played a role in the development of the Mafia in Sicily and not in Sardinia. In fact, in the latter there was a much higher number

[97] Pirastu (1973) well described such tensions.
[98] In this respect shepherds might be considered as small entrepreneur who look after their capital, i.e. sheep. The high number of such professional figure might have had an impact on Sardinia culture.
[99] Arlacchi (2007, p. 44): "in Sicily and in the continental South the lord does not work and does not depend on anyone. In a society in which the majority of the population is forced to work hard daily, the free consumption of his/her own time is the utmost example of status and power".
[100] According to Arlacchi (2007) stressed that there are not major differences between landownders or shepherds and their employees. "When they live together in the countryside, servant and lord will eat the same food while sitting one next to the other" (ibid, p.44).
[101] The private guard in large estates.

of self-employed such as shepherds and small landowners in Sardinia compared to Sicily. "Forty years after the law of chiudende[102], the census of the population showed a social structure in Sardinia not polarized at all. Shepherds, (structured) peasants and similar workers constituted 76.5 % of the active workforce in the rural sector, as against 33.1% in Sicily. The rural proletarian, daily labourers were three times more numerous in Sicily than in Sardinia" Arlacchi (2007, p.45)[103]. Even the distribution of wealth was different, with Sicily having a greater degree of inequality[104]. As a result the opportunity costs of joining Mafia were higher[105].

Finally, if we consider Mafia as an organisation, it is more likely to have emerged in a context where the labour market facilitates interactions between workers[106]. In this respect, Mafia might have had more chances of emerging in a region like Sicily, which had a higher propensity of associations compared to Sardinia[107]. A good proxy for evaluating such propensity is to look at the co-operative movement, which was rapidly evolving in those years[108]. Despite the small proportion of co-operatives in the southern regions, Sicily had the highest number. According to Cancila (1993, p.9), in 1873 "the island could count on 82 mutual aid societies with 9'392 effective members and 649 honorary (Italy had 1'447 society, 21'906 effective members, 2'409 honorary), which gave it the lead amongst all the southern regions, even if it was still behind from the northern regions' level (Piedmont 362, Lombardy 203, Veneto 144, Liguria 139, Emilia 121 societies)". In 1878, there were 117 societies, which put Sicily in eighth place in Italy. In 1880-1885 Sicily had 287 societies and ranked sixth in terms of number of societies, after Piedmont (706), Lombardy (533), Tuscany

[102] This law offered the opportunity to fence the communal land.

[103] By peasant the author means those who regularly work in the field under a landowner. This is opposed to daily labourers who work only when their services are requested. The latter were earning much less compared to the regular workers.

[104] The high number of daily workers and the presence of lords made Sicily more unequal than Sardinia. As we have seen, in Sardinia the economic structure was much more levelled.

[105] The higher crime rate in Sardinia cannot be analyzed in the light of the economics of crime approach as the criminals were mainly shepherds who opposed the reforms.

[106] By interactions we mean the repeated possibility of encounters between workers.

[107] The use of cooperatives as a proxy for the level of associations should be considered as providing some simple evidence. Indeed, such comparisons would require much more attention and deeper analysis which are far beyond the level of this section. This concept is similar to the one of perverse social capital in Rubio (1997).

[108] As it is well known, a cooperative is an association where people voluntary aggregate for socio and economic reasons. The main feature is that it is legally owned by all its members. It is inspired by values as self-responsibility, democracy and equality. Therefore, these characteristics make it a good proxy for the level of associations in an area.

(343), Emilia (318) and Veneto (297). Despite being an urban phenomenon at the beginning, the agrarian crisis led to its development in the rural areas too.

In Sicily, it seems to be two kinds of associations: one for the élites, the big owners which wanted to protect themselves and be represented with the governments at all level. For example, the agrarian committees were associations of owners, which aimed at lobbying with the government in the members' interest (Lupo, 2004, p.85). Another example, still quoted by Cancila (1993), is the creation of the Anglo-Sicilian sulphur company which was a joint venture of French and English capitals which sustained the Sicilian mineral sector in an economic depression period. On the other hand, the peasants (and low social classes) created cooperatives too. This was favoured and encouraged by the church and the socialists, even though in different manners. As in the northern regions, the church was a central force which helped the creation of the agricultural credit bank (*casse rurali*)[109] which had to prevent peasants from turning to usury to get capital. This phenomenon grew so strongly during the end of the XIX and the beginning of the XX century that, just before the First World War, Sicily had 360 rural banks, the second highest number in Italy, after Veneto, and it was first for number of deposits.

As Coda (1977, p.140) interestingly pointed out "more than two thirds of them (cooperatives) were located in the provinces of Palermo, Girgenti and Caltanissetta "as a confirmation that the zone with prevalent extensive cereal cultivation seems to be the most adequate to the development of the agricultural cooperation". Those provinces were also the ones where Mafia was most active, along with Trapani. Of course, there is not any correlation between Mafia and cooperative movement. We rather want to stress that Mafia, being an organisation, was more likely to emerge in a context of a high propensity of association and this could be one of the reasons of why it did emerge in Sicily (in the west) and not Sardinia.

On the other hand, the situation is Sardinia looked very different. The socio-economic structure had a little role played by the agriculture in comparison to the one of sheep breeding. As consequence, this led to a lower development of the cooperative movement in

[109]Cancila (1993, p. 14) said "The *casse rurali* (rural banks) were the instrument used by the catholic forces during the crucial years of the agrarian crisis [...] to organise the rural masses". Or Li Vecchi (1993) said that Sicilian cooperativism was not composed by popular banks, nor by the urban cooperative initiatives, but by agrarian credit banks. These institutions obtained collective rents and promoted other forms of rural cooperation. This was mainly done thanks to the support of the catholics and socialists in order to emancipate the peasants from the semi feudal structure of agriculture.

the same period. According to Zangheri et al. (1987), Sardinia was in the last place amongst the Italian regions for the number of cooperatives. Coda (1977) highlights that the isolation worked on the island in two distinct directions: it favoured individualism and the development of forms of autonomous cohabitation inside the Sardinian society. This explains the lack, until almost the end of the XIX century, of cooperatives or any kind of activities which required a certain communion of interests and capitals. Therefore, in such a context it was less likely for an organisation as the Sicilian Mafia to emerge.

2.6. Conclusions

This paper analysed an underexplored field of research such as the origins of the Sicilian Mafia. So far, the only empirical paper which deals with this topic is the one of Bandiera (2003). This author focused on the market for protection and provided evidence that in the western regions Mafia was more likely to be active where land was more fragmented and with higher value. Our work takes a different approach closer to the view proposed by historians as Lupo (2004) and Pezzino (1987). Rather than considering Mafia only as a protection industry, they stress its role as the *manu militari* in the fights of emerging classes that wanted to capture the lords' legacy. In fact, the end of feudalism and the newly born state opened up new commercial and political opportunities. In order to succeed in exploiting them, it was necessary the use of violence. This was the result of the inability of the state to maintain public order. As we noted in the introduction, this situation resembled an anarchic one (Skaperdas and Syropoulos, 1995). The *vacuum* created by the inefficacy of the state was filled by those individuals who had a competitive advantage over violence, i.e. Mafia. In turn, they could enjoy some wealth even though they were not productive at all. Moreover, they were better off than peasants who were the ones who actually cultivated the land.

The biggest opportunities, opened up after the institutional changes, were in the inner part of the island and in the surroundings of the city. However, they were more acute in the former because it was there that the lords were losing much of their powers. The typical contests were in the market for the land, either to rent or buy it. In order to empirically verify this, we use a newly built database that overcome previous issues with Mafia

measurement. Moreover, we extended the analysis to all Sicilian provinces and we also included new variables that have never been used before. The results support our theoretical approach. In particular, we find that Mafia is present in councils where the land income is higher but especially where there are large properties, cereals cultivation, less density of population and with few peasants owners of the land. These findings suggest that Mafia origins cannot be understood only as a protection agency (Gambetta, 1993). In fact, our approach seems to be more adequate in explaining this phenomenon.

In order to give robustness to our analysis we compared Sicily with Sardinia, another Italian region. The former had similar features with Sicily: they are both islands that experienced high level of crimes after the end of feudalism. However in Sardinia did not originate Mafia as in Sicily. From our basic analysis, it seems that even in Sardinia there was a potential market for protection because of the high rate of criminality and the extreme fractionalisation of the land. However, on the contrary to Sicily, it did not have the large farm system and the market for land did not lead to the fierce competition for resources. Moreover, there were more self-employed in Sardinia and a general lower degree of inequality which diminished the opportunity cost of joining the Mafia. Finally, it is plausible to think that because of the prevalence of sheep breeding over agriculture, the absence of large farms and the lower density of population, there was a lower propensity to associate compared to Sicily. Eventually this might have played a role in the origins of an association like the Mafia.

2.7 Appendix

2.7.1 Description of the variables

Mafia Index: In the Jacini survey (Damiani 1881-1886), prosecutors were asked whether Mafia was active in their town and, if so, to what extent. Based on this we created four ordered categories: 0 that stands for no Mafia activity; 1 if Mafia shows little activity; 2 if organised crime is quite active and, finally, 3 whether Mafia is very active. For the reasons explained in the text we merged these data with the ones taken from Bonfadini and Borsani (1968). The authors just mention the towns where Mafia is most active. We then assigned the value three to all the councils listed.

Mafia Binary: Based on *Mafia Index*, we assign 1 to all the values between one and three and 0 otherwise.

Large properties: It was asked to describe the main condition of the land, choosing among big, medium and big, medium, medium and small, small. I created a dummy variable with value one if the answer was big or "medium and big properties". It is important to note that there was not a unique measure of large estates. In some councils a large property would be of 100 hectares, whereas in others 200. Source: Damiani (1881-1886).

Cereals: It is a continuous variable that expresses the ratio of land cultivated with cereals on the total cultivated area. Source: Damiani (1881-1886).

Rich Agriculture: It is a continuous variable that expresses the ratio of land cultivated with olives, citrus and grapes on the total cultivated area. Source: Damiani (1881-1886).

Little influence of reforms: It was asked how the sales of the state and church owned properties influenced the division of the land in their territory. The possible answers were: none, a little, positive, and a lot and there a no such kind of properties. On the basis of their answers a dummy variable has been created with value one if the answer was one of the first two categories. Source: Damiani (1881-1886).

Few peasants landowners: In the survey, it was asked to describe the level of peasants' landownership. The possible answers were: none, very few, few, many, and very much peasants own of the land. I created a dummy variable with value equal one if the

respondents chose one of the first two categories: none and very few. Source: Damiani (1881-1886).

2.7.2 Tables

Table 2. 14 All Sicily including only *Large Properties* and Cereals without provincial dummies

	Maf Ind 3	*Maf Ind 0*	*LPM*	*Probit*	*Maf Ind 3-Cer*	*Maf Ind 0-Cer*
Large Properties	0.146**	-0.167**	0.427	0.197**		
	[0.069]	[0.080]	[0.253]	[0.088]		
Cereals					0.224*	-0.256*
					[0.118]	[0.141]
Observations	136	136	136	136	159	159
[Pseudo] R squared	0.010	0.010	0.018	0.0192	0.011	0.011
Log Likelihood	-152.398	-152.398		-92.470	-181.121	-181.121

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 3(a lot of Mafia activity). In the second we report the marginal effects for no Mafia activity (0). In column three we report the ols result. The column *Probit* reports the marginal effects using *Mafia Binary* as dependent variable. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big" . *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated.

Table 2. 15 Four western provinces including only *Large Properties* and Cereals without provincial dummies

	Maf Ind 3	*Maf Ind 0*	*LPM*	*Probit*	*Maf Ind 3-Cer*	*Maf Ind 0-Cer*
Large Properties	0.170*	-0.147*	0.409	0.176		
	[0.094]	[0.082]	[0.264]	[0.117]		
Cereals					-0.067	0.057
					[0.083]	[0.070]
Observations	73	73	73	73	86	86
[Pseudo] R squared	0.011	0.011	0.017	0.012	0.001	0.001
Log Likelihood	-78.680	-78.680		-43.793	-95.527.	-95.527.

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 3(a lot of Mafia activity). In the second we report the marginal effects for no Mafia activity (0). In column three we report the ols result. The column *Probit* reports the marginal effects using *Mafia Binary* as dependent variable. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big" . *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated.

Table 2. 16 All Sicily with the additional controls without provincial dummies

	Maf Ind 3	*Maf Ind 0*	*LPM*	*Probit*	*Maf Ind 3-Cer*	*Maf Ind 0-Cer*
Large Properties	0.122*	-0.144**	0.378*	0.136		
	[0.067]	[0.071]	[0.192]	[0.117]		
Cereals	0.075	-0.088	0.265	-0.028	0.367	-0.432
	[0.258]	[0.294]	[0.827]	[0.264]	[0.435]	[0.456]
Rich Agriculture	-0.024	0.028*	-0.069	-0.022	-0.016	0.019
	[0.018]	[0.017]	[0.044]	[0.022]	[0.016]	[0.015]
Density of Population	-0.073	0.087	-0.282	-0.045	-0.061	0.072
	[0.136]	[0.153]	[0.458]	[0.130]	[0.128]	[0.145]
Little influence of reforms	0.133*	-0.157**	0.416	0.161*	0.161***	-0.190***
	[0.068]	[0.071]	[0.218]	[0.091]	[0.060]	[0.058]
Few peasants Landowners					0.355	-0.419*
					[0.232]	[0.217]
Observations	110	110	110	110	114	114
[Pseudo] R squared	0.040	0.040	0.078	0.055	0.040	0.040
Log Likelihood	-121.184	-121.184		-72.060	-126.551	-126.551

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 3(a lot of Mafia activity). In the second we report the marginal effects for no Mafia activity (0). In column three we report the ols result. The column *Probit* reports the marginal effects using *Mafia Binary* as dependent variable. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated. [4] The other variable are explained in the text or appendix.

Table 2. 17 Four Western provinces with the additional controls without provincial dummies

	Maf Ind 3	*Maf Ind 0*	*LPM*	*Probit*	*Maf Ind 3-Cer*	*Maf Ind 0-Cer*
Large Properties	0.174*	-0.149**	0.479	0.126		
	[0.092]	[0.075]	[0.270]	[0.104]		
Cereals	0.721***	-0.618***	1.928***	0.478**	1.420***	-1.194***
	[0.192]	[0.213]	[0.567]	[0.233]	[0.448]	[0.431]
Rich Agriculture	-0.049**	0.042*	-0.120*	-0.067**	-0.038*	0.032*
	[0.024]	[0.022]	[0.059]	[0.028]	[0.021]	[0.019]
Density of Population	-0.247*	0.212*	-0.659	-0.135	-0.244**	0.206**
	[0.131]	[0.117]	[0.400]	[0.129]	[0.110]	[0.100]
Little influence of reforms	0.171	-0.147	0.505	0.132	0.221**	-0.186**
	[0.107]	[0.093]	[0.319]	[0.128]	[0.105]	[0.086]
Few peasants landowners					0.781**	-0.657**
					[0.330]	[0.286]
Observations	57	57	57	57	59	59
[Pseudo] R squared	0.128	0.128	0.233	0.144	0.135	0.135
Log Likelihood	-56.609	-56.609		-29.731	-58.890	-58.890

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] In the first column we report the marginal effects for the Mafia level 3(a lot of Mafia activity). In the second we report the marginal effects for no Mafia activity (0). In column three we report the ols result. The column *Probit* reports the marginal effects using *Mafia Binary* as dependent variable. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". *Cereals* is the proportion of the land cultivated with cereals to the total area cultivated. [4] The other variable are explained in the text or appendix.

Table 2. 18 Order probit results for each variable with and without provincial dummies for All Sicily

	Mafia Index	*Mafia Index*	*Mafia Index*	*Mafia Index*	*Mafia Index*	*Mafia Index*	*Mafia Index*	*Mafia Index*
Large Properties	0.478**	0.364*	0.441**	0.414**	0.373	0.445**	0.338*	0.410**
	(0.212)	(0.206)	(0.192)	(0.207)	(0.235)	(0.221)	(0.181)	(0.193)
Rich Agriculture	0.225	-0.388						
	(0.390)	(0.484)						
Density of Population			-0.004	-0.016				
			(0.035)	(0.039)				
Little influence of reforms					-0.191	-0.089		
					(0.361)	(0.295)		
Few peasants Landowners							0.311	0.215
							(0.196)	(0.146)
Dummy Caltanissetta	1.421***		1.384***		1.451**		1.370**	
	(0.541)		(0.532)		(0.597)		(0.537)	
Dummy Palermo	2.130***		2.112***		2.131***		2.046***	
	(0.505)		(0.504)		(0.518)		(0.523)	
Dummy Messina	0.491		0.494		0.510		0.435	
	(0.563)		(0.551)		(0.556)		(0.559)	
Dummy Girgenti	2.587***		2.547***		2.440***		2.571***	
	(0.506)		(0.499)		(0.489)		(0.511)	
Dummy Trapani	1.983***		1.978***		2.053***		1.995***	
	(0.689)		(0.676)		(0.615)		(0.723)	
Dummy Catania	0.799		0.809*		0.752		0.852*	
	(0.491)		(0.485)		(0.495)		(0.498)	
Observations	136	136	136	136	113		132	132
Pseudo R-squared	0.197	0.0135	0.196	0.0109	0.199		0.200	0.0164
Log- Likelihood	-123.644	-151.903	-123.771	-152.310	-104.040	-128.351	-118.832	-146.094

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] For each explanatory variable, we report the results with and without provincial dummies. The coefficient are the standard ordered probit ones. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". [4] The other variables are explained in the text or appendix.

Table 2. 19 Order probit results for each variable with and without provincial dummies for the four western provinces

	Mafia Index	*Mafia Index*	*Mafia Index*	*Mafia Index*	*Mafia Index*	*Mafia Index*	*Mafia Index*	*Mafia Index*
Large Properties	0.542*	0.544*	0.430	0.449*	0.431	0.420	0.382*	0.425**
	(0.313)	(0.297)	(0.282)	(0.250)	(0.342)	(0.304)	(0.216)	(0.198)
Rich Agriculture	0.958**	0.840						
	(0.475)	(0.525)						
Density of Population			-0.001	0.016				
			(0.053)	(0.044)				
Little influence of reforms					-0.551	-0.531		
					(0.572)	(0.488)		
Few peasants Landowners							0.275	0.198
							(0.261)	(0.235)
Dummy Palermo	0.610**		0.670**		0.662*		0.624**	
	(0.311)		(0.287)		(0.376)		(0.295)	
Dummy Girgenti	1.063***		1.033***		0.874**		1.073***	
	(0.332)		(0.325)		(0.378)		(0.280)	
Dummy Trapani	0.420		0.553		0.466		0.586	
	(0.550)		(0.519)		(0.534)		(0.560)	
Observations	73	73	73	73	60	60	70	70
Pseudo R-squared	0.0621	0.0235	0.0469	0.0112	0.0556	0.0275	0.0556	0.0170
Log- Likelihood	-74.593	-77.663	-75.802	-78.644	-63.038	-64.915	-73.353	-76.354

Note: [1] For each regression, robust standard errors clustered at the province level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [2] For each explanatory variable, we report the results with and without provincial dummies. The coefficient are the standard ordered probit ones. [3] *Large Properties* is a dummy with value 1 if estates were big or "medium and big". [4] The other variables are explained in the text or appendix.

Chapter 3: **Migrating Mafia**

3.1 Introduction and motivations

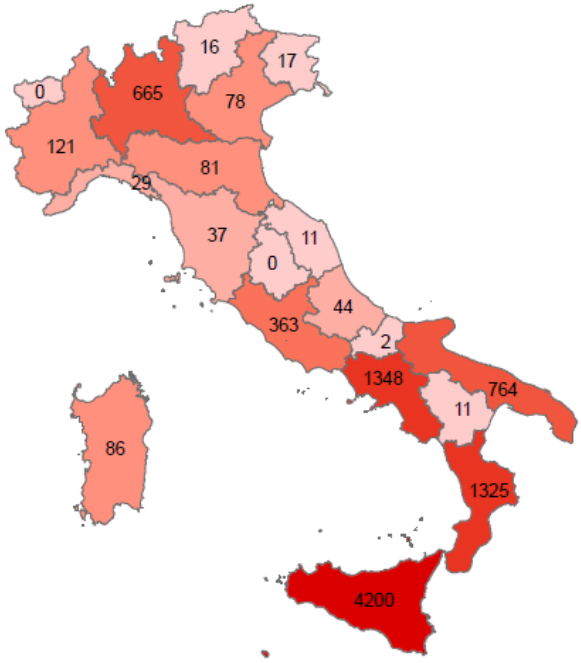
Duisburg, 15th of July 2007. In front of the Pizzeria "Da Bruno", six people belonging to the Calabrian Mafia 'Ndrangheta were killed. They were shot by some members of a rival family in San Luca, one of the headquarters of this Italian organised group. This manslaughter caused quite a stir all over the word because it was one of the few cases of *vendetta* (vengeance) of Mafia gangs outside their traditional territories. The killings revealed how these groups are extremely able to spread to regions very different from their original ones.

Recent academic evidence showed how such a feature of organised crime groups is rapidly growing. For example, in a recent work, Forgione (2009) analysed how Italian Mafias expanded to northern Italy and abroad. Moreover, the migration of the Sicilian Mafia to the USA in the first half of the previous century is well documented. However, Italian Mafias are not the only groups who managed to transplant successfully to other regions. For example, Glenny (2008) showed the expansions of international cartels, such as the ones from post-communist countries. This phenomenon has been studied by Varese (2011) who labelled it the Mafia transplantation.

In this paper, we contribute to the literature by focusing on the migration of southern Italian based Mafia groups to the central-northern Italian regions. This is an important issue as testified by recent judicial evidence[110]. Figure 3.1 and 3.2 below show the absolute number of real estates and firms confiscated to criminal organisations in all the Italian regions until the end of 2009[111]. Although the majority is in the southern Mafia-dominated regions, the central and northern regions have relatively high levels too. This gives an idea of the seriousness of the problem.

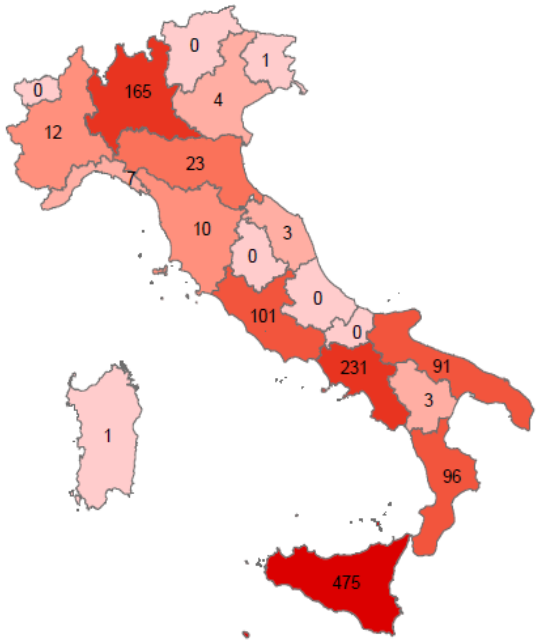
[110] For example, at the end of 2011, hundreds of people who belonged to 'Ndrangheta were arrested in Milan.
[111] The 1982 law (the so called "La Torre-Rognoni"), which introduced the Mafia- type association crime also prescribes that all the property belonging to Mafia groups should be seized.

Figure 3.1. Real estates confiscated



Note: This map represents the total cumulative number of real estate properties confiscated by the judicial authority to Mafia-type organised crime groups up to the end of 2009. Data are taken from the Italian Ministry of Interior (2012).

Figure 3.2 Firms confiscated



Note: This map represents the total cumulative number of firms confiscated by the judicial authority to Mafia-type organised crime groups up to the end of 2009. Data are taken from the Italian Ministry of Interior (2012).

As many past reports have shown (CPA, 1976), the presence of southern Mafias in the Centre-North regions is not a new phenomenon. As we will see in the next section, it started in the 1960s but fully developed only from the mid 1970s onwards. Mafia cartels initially

controlled illegal sectors such as the drug one but moved on to being major actors also in legitimate industries. Moreover, they increased their influence on the local political forces. What are the factors which caused this Mafia transplantation to the central and northern Italian regions? The literature seems to have reached a consensus on the most important causes (CPA, 1976; Dalla Chiesa, 2010; Sciarrone, 2009). The first one is the massive migration of southern people to the Centre-North. The second is the implementation of the so-called *soggiorno obbligato* (forced re-settlement), which sent Mafia members to other regions in order to set them apart from their original background. The third is the rise of Mafia wars or police repressions that led to some Mafia members moving north (Varese, 2006). The last explanation refers to the opening up of new opportunities in the destination provinces, especially in the profitable drug market.

Despite the reasonable amount of historical literature on this topic (Ciconte, 2010), no one has ever quantitatively tested these hypothesis empirically. In fact, there are no economic works on the transplantation of the Mafias. The first and foremost contribution of this paper is to redress this omission in the literature. We concentrate on the role of migration and forced re-settlement. Our empirical analysis is based on a newly built database that uses previously unexplored data. We have data on Mafia presence from 1983, the first year in which Mafia-type crimes are recorded, until 2008. In addition, we create three innovative indices of Mafia activity that aim at avoiding typical problems in the economics of crime literature. We further collected new data on intra province migration from the South to the rest of Italy, from 1955. The data on forced re-settlement are taken from the 1976 parliamentary anti-Mafia Commission (CPA, 1976). Our results suggest that migration of southerners is by far the most important variable explaining Mafia presence in the central-northern regions; in particular, the one from the Mafia-infested regions. The forced re-settlement variable is often insignificant and with negligible coefficients. These results are robust to different specifications.

The paper is organised as follows: section two reviews the literature and provides the theoretical background. Section three presents our new data and section four discusses the identification and econometric concerns. Section five presents the main results, robustness and sensitivity analysis. Section six concludes.

3.2 Literature review

3.2.1 Definition of organised crime

There is no consensus amongst scholars on the definition of organised crime[112]. One of the earliest contributions is that by Thomas Schelling (1971) that identifies two main roles of organised crime: as a monopolist or as a government of the underworld. The difference depends on the characteristics of the illegal markets. In particular, organised crime will be a monopolist in those markets that can be monopolised. Schelling argued that some activities are easier to monopolize than others. On the other hand, it will act as a government of the underworld in those markets where it is not possible to impose a monopoly. The reason is that illegal firms cannot appeal to the law to solve their controversies and, therefore, they need protection by the criminal organizations[113].

Fiorentini and Pelzman (1995) produced an interesting synthesis of this concept. They say that organised crime could be seen in two perspectives: as a governance structure that imposes regulations and supplies public goods to independent illegal firms and, the other, as a firm which deals in the illegal markets[114]. Regarding the first view, they stress the control of the turf: "once the monopoly over coercion has been acquired by a criminal organization, the latter can perform inside its territory those activities that typically characterize a collective decision-makers intervention on the economy: levying of taxes, coercive provision of public goods, and regulation of private agents through not fiscal tools" (ibid., p.14)[115]. Therefore, organised crime behaves as a state in the state. Regarding the second view, the scholars stressed the importance of its competitive advantage in the use of violence to create monopolies and enforce cartel agreements[116]. The former perspective is generally

[112] For an interesting review on the definition of organised crime, see Becchi (2000).

[113] This analysis is similar to the view of organised crime we reviewed in the introductory chapter.

[114] However, in a subsequent paper, Fiorentini (2000) seems to make more distinctively the difference between illegal firms and governance structure. This last feature is the one considered as typical of organised crime. Fiorentini (2000, p. 438): "the idea that organised crime does not only supply illegal goods to final customers and that behind extortion one can see implicit contracts with illegal firms is coherent with the available evidence on its internal organisation".

[115] They also add, in the same page: "The control over the territory – be it geographical or functional- is a necessary condition for criminal organizations to carry out their activities".

[116] At page 13 they add: "Even if a significant part of organised criminal activities cannot take place but inside local monopolies, there are illegal goods and services that can be produced and marketed efficiently only above a relatively large scale of operations (money laundering, manipulation of large scale public

referred to as power syndicate, whereas the latter as enterprise syndicate. Moreover, the authors highlighted the links between organised crime and authorities: "there is a further aspect of the relationship between organised crime and governmental bodies which is not usually investigated by the economist supporting one or the other approach to the analysis of the organised crime but is central to the analysis of many sociologists working in the field. This aspect involves the collusive relations between criminal organizations on the one hand and politicians and bureaucrats on the other" (ibid., p.7).

3.2.2 Mafias

Varese (2006) went further and argued that not all criminal groups are the same and only some share the characteristics that classify them as Mafia. The author argued that "several recent studies have established that a number of criminal organisation – the Sicilian Mafia, the Hong Kong Triads, the Russian Mafia and the Japanese Jakuza- are part of the same species, collectively referred to as "Mafias" [...] this body of research has shown that Mafias emerge in modernizing societies that are undergoing economic expansion, but lack a legal structure that reliably protects property rights or settles business disputes" (ibid., p.5)[117] . Therefore, one of the key elements of Mafia groups is that they deal with protection to the legal and illegal sector.

A formalisation of the industry of protection has been given by Gambetta (1993), although he focuses specifically on the Sicilian Cosa Nostra[118]. Gambetta claims that protection is the main good provided by the Mafia. This is what distinguishes a *mafioso* (Mafia member) from a normal entrepreneur. It does not matter what type of illegal goods he deals with. "What does make him a *mafioso* is the fact that he is capable of protecting himself as well as others against cheats and competitors. […]" (ibid., p.19). Mafia will then

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interventions). In these cases criminal organizations often enter directly into the production and marketing stages to prevent some illegal firms under their control from acquiring sufficient financial means to contest their monopoly over coercion. Moreover, to prevent the competition for larger market shares from carrying over to an open conflict with the criminal organization managing the nearest local monopoly, each criminal organization tries to define collusive agreements for the collective management of the supply of such goods and services".

[117] This is the case of the Italian Mafias, and in particular, the Cosa Nostra (Gambetta 1993 and 1995). Moreover, even the Russian Mafia presents similar features. In fact, it originated from the collapse of the Soviet Union (Varese, 2001). Yakuza (Hill, 2006) and some triads share similar characteristics too.

[118] Indeed, he is also very much influenced by the works by Schelling.

be present every time the supply and demand of protection meets. In particular, it steps in when there is a government failure and the basic property rights are not protected. In this particular market, supply is represented by all those thugs who are capable and willing to use violence to protect property rights. Demand is represented by those individuals who cannot rely on to the state and prefer to pay some money to see their rights protected[119].

Given our focus on Italian Mafias, let us briefly see what the main southern-based groups are.

3.2.3 The Italian Mafias

Italian Mafias are long lasting organizations which trace their roots way back in the past. Therefore, history plays a crucial part in explaining the actual spread of organised crime, especially in the south of Italy. At the current time, there are four major Mafia-type organizations[120]: the Cosa Nostra in Sicily, 'Ndrangheta in Calabria, Camorra in Campania and the Sacra Corona Unita in Apulia. As we will see, the first three originated at the beginning of the XIX century[121] but became crucial social actors after the 1861 Unification of Italy[122]. The latter formed in a subsequent period, and, in particular, in the 1980s. They all emerged in different socio-economic contexts, each with specific features.

[119] At page 19, Gambetta says that it is typical "given that the Mafia arises in a power vacuum to exercise the use of violence in place of the government, it stands to reason that Mafias are less likely to develop in countries that are strong, stable democracies with robust institutions and a vibrant civil society".

[120] There are some minor ones as basilischi in Basilicata region. Moreover, there is a group in Sicily called Stidda.

[121] Although there were other forms of criminal organization in the previous centuries, for as the *picciotteria* in Calabria.

[122] The kingdom of the two Sicilies started in 1816 and comprised all the southern regions including Abruzzo and Molise. Before 1816, there were essentially two kingdoms: the Neapolitan and the Sicilian one which were ruled by different foreign kings. In particular, the Spanish had a long standing presence in these territories.

Figure 3.3 Map of origins' regions of Italian Mafias

The first time we hear about the Sicilian Mafia is in the 1863 play "I mafiusi della Vicaria". However the origins can be traced to the pre Unitarian period. It emerged in the western provinces and its headquarters was Palermo. There is no consensus on the reasons of its emergence (Bandiera, 2003; Lupo, 2004). However, as we argued in the previous chapter, it seems that it was the result of the violence used by emerging classes who wanted to capture the barons' power at the end of feudalism.

If the Sicilian Mafia was deeply rooted in the countryside, where there was mainly grain cultivation, in Calabria we find that 'Ndrangheta emerged in a different context. In fact, "'ndrangheta settled mainly in those areas characterized by fast processes of economic development and transformation" (Ciconte, 1992, p.152). It firstly emerged in the southern part of the region. In particular, it did so in Reggio Calabria (an area with prosperous citrus tree cultivation), Cosenza and Catanzaro.

The Camorra presents another peculiar history. It emerged in the jails of Naples in the first half of the XIX century[123]. This environment offered criminals the opportunities to bond

[123] Although the first time we hear about the term Camorra is in a 1735 official document**,** Marc Monnier is the first scholar who studied it in 1863.

and create alliances. Following an administrative division of Naples into twelve neighbourhoods[124], it rapidly spread all over the city. However, it exploded after the unification of Italy because the then Ministry of Interior, Liborio Romano, entrusted the public security to organised crime's bosses. It did so because of the state's inability to secure public order. The headquarters has always been Naples and its hinterland: it expanded in the entire region only in the following years.

Finally, the most recent Mafia is the Apulean Sacra Corona Unita. In the 1980s, the boss of the NCO (newly organised camorra) wanted to create a similar organization in the Apulian area to exploit illegal markets. However, the local criminals opposed this project because they wanted to run the illegal activities by themselves. Brindisi and Lecce were the most "active" cities. It was not until the 1990s that these gangs became known to the local authorities.

As mentioned earlier, all these organisations are similar in the sense that in their territories they want to rule as the state does. "In Sicily and in other Italian regions, the control over the territory involves all the citizens and institutions, it affects everybody's life" (Becchi, 2000, p.79).

More recently, these Mafias started expanding outside their original territories. They managed to settle in various parts of the world. This phenomenon is called Mafia transplantation (Varese, 2006).

3.2.4 Mafia transplantation: theory

We generally refer to Mafia migrating and settling in regions far from their original ones as transplantation. This phenomenon has been studied by Varese (2006, 2011) who claimed that it "mean[s] the ability of a Mafia group to offer criminal protection over a sustained period of time outside its region of origin and routine operation" (Varese ,2006, p.414). Moreover, he refers to "made "members: "in other words, they are bona fide Mafiosi who have gone through an initiation ritual in the territory of origin. As transplantation succeeds, such rituals may then be performed in the new locale and recognised by the group of origin" (ibid., p.414). Therefore, all transnational crimes committed occasionally are excluded from

[124] Decided by Murat.

this definition. In this respect, Varese notes: "the above definition helps distinguish transplantation proper from several phenomena that are often lumped together in the category of transnational organised crime. Criminal crossing of a border (physically or virtually, as in case of internet frauds) with an illicit good or a person do not automatically qualify as either Mafia or transplantation but rather as a form of illegal trade, and need to be placed in a conceptual box that differs from attempts to control markets or territories abroad do not constitute transplantation of the group, nor do conspiracies between Mafiosi and foreign criminals to smuggle workers, drugs, weapons, and other illegal commodities either into or out of their country" (ibid., p.415)[125].

There are many examples of Mafia migration. The most well-known case is the one of the Sicilian Cosa Nostra to the USA (Lupo, 2008). It occurred in the first decades of the XX century when gangs controlled strategic sectors in the illegal world, alcohol during prohibition, and legal ones such as carting. Moreover, Italian Mafias are thought to have been present in countries as diverse as Canada and Australia. Also, other criminal groups managed successfully to settle abroad. For example, Yakuza groups are active in the Philippines. Varese (2011) provides a detailed analysis of how the Taiwanese and Hong Kong triad managed to transplant to mainland China. Moreover, many Russian groups managed to expand in former Soviet states, such as in Romania. Our focus is on the movement of southern Italian based criminal groups to the central and northern Italian regions.

3.2.5 Mafia transplantation in Italy: a brief review

Given the secrecy of the Mafia, it is difficult to be precise on when Mafia groups started operating outside their original territories. It seems that the first signs of Mafia activity can be traced back to the sixties in Milan[126]. However, it was not until the second half of the 1970s that it fully developed.

Gangs started controlling profitable illegal markets, such as drugs, kidnapping[127] and gambling. In particular, the former was facilitated by the increased supply of hashish,

[125] In his work on Sicily, Gambetta talks about Mafia transplantation and describes the conditions that need to be met in order for it to happen. The author argues that Mafia "is a difficult industry to export. Not unlike mining, it is heavily dependent on local environment" (1993, p. 249).
[126] Some people refer to 1958 when the Italian- American boss Joe Adonis moved to Milan.
[127] Between the period 1968 and 1998, Lombardy was the region with the highest number of kidnappings.

cocaine and heroin at the international level[128]. As we have seen in chapter one, illegal markets offer an ideal situation for an organisation as the Mafia to develop. In fact, the state is not involved in such markets. However, firms and agents dealing in such contests need their property rights to be secured and contracts to be enforced. Therefore, Mafia can exploit its competitive advantage in "fighting technologies" and function as a kind of state of the underworld.

The first Mafia organisation that settled in the central and northern regions was the Sicilian La Cosa Nostra. For example, Milan hosted some of the most fearful bosses, such as Luciano Leggio, Gaetano Badalamenti, Giuseppe Calderone, Tommaso Buscetta and Salvatore Greco. In this initial period, Mafia presence concentrated on the northern western part of Italy, especially Piedmont, Lombardy and Liguria. It later expanded to the central and north-eastern part of the country.

From the end of the 1970s, Mafia groups started becoming more entrenched in legal sectors of the economy (Dalla Chiesa, 2010). In particular, construction has always been considered one of the most profitable businesses for Mafia-type organisations. The reason is that they could influence the labour market which was composed mainly of migrants. Slowly, the Mafia extended its interests to vast sections of the legal sector. It chose to get involved in those sectors where it had better knowledge, i.e. those that controlled/influenced back in the southern regions. Amongst them, the most important ones were hospitality, retail, commerce, transport and entertainment[129]. For example, they started running night clubs, shops and many firms involved in earth moving practices. The Mafia could enter legal sectors because it had a large amount of capital coming from the illegal businesses which needed to be reinvested[130]. Moreover, it exploited its natural competitive advantage on the use of violence that "facilitates" economic transactions[131]. As it happened in the South, Mafias controlled the firms directly or indirectly through the

[128] For example, the Sicilians were managing this market together with the Corsican Mafia which was operating in Marseille.

[129] Various DIA reports show this. For example the 2009 one.

[130] It is well established that 'ndrangheta "took off" thanks to money raised through kidnapping, especially in the North.

[131] Again, this is in line with what we have said in 1.4.1. Even legal transactions in the central and northern regions might have been subject to some degree of uncertainty. For example, some firms might not have completely fulfilled their duties toward their trading partners. Moreover, the Italian judicial system is notoriously very slow. As a consequence, Mafia-related firms can resort to the use (or the threat) of violence to have their contracts rapidly enforced. This analysis is similar to the one proposed by Dixit (2004).

imposition of labour force and goods. This phenomenon was facilitated by the connivance of some local entrepreneurs who preferred to collude instead of fighting. Moreover, Mafia took advantage of the greater sophistication of financial sector of the northern regions compared to the South. For example, in Milan, Sicilian Mafia members created strong links with some actors in the financial system[132]. In fact, the first Mafia related murder was that in 1979 when the lawyer Ambrosoli was killed. He was the liquidator of the Banca Privata Italiana that belonged to the Sicilian banker Sindona. The latter was thought to have laundered money on behalf of Mafia.

Even the political system is not immune from its influence. This is particularly true in small towns where it is not only easier to get to know local representatives but also to be able to influence the elections (Dalla Chiesa, 2010). For example, in 1995 the Bardonecchia council, a small town in the Susa valley, was dismissed for Mafia-type infiltration. Until recently, it was the only council dismissed for Mafia infiltration. However, in 2012 the Ventimiglia council was also dismissed. Indeed the interest of Mafia in public contracting got stronger over the years. Many judicial reports show how gangs are continuously looking after public money. It is not surprising that the (public) works for the Expo to be held in Milan in 2015 are constantly monitored for fear of Mafia infiltration.

In the last decades, there has been an even stronger ramification of Mafias outside their original territories. In particular, they managed to penetrate the rich business of toxic waste and, also, health care. Moreover, they created strong links with foreign criminal organisations, whilst still keeping the predominance role.

Indeed, the Sicilian Mafia is no longer the strongest Mafia in these regions. From the 1980s onward the Calabrian 'Ndrangheta assumed this role (Ciconte, 2010). This is particularly true for central and northern western Italy. In contrast, in the northern eastern part, the Neapolitan Camorra seems to be stronger.

3.2.6 Factors that fostered Mafia transplantation

What are the factors that caused Mafia transplantation to the Italian central-northern regions? The literature seems to have reached a consensus, at least on the most important

[132]Mafia groups in the North seem to be very flexible and adaptable to the new environments. This reflects the need to incorporate transaction costs in their governance structures.

ones. We consider the reasons identified by the Anti Mafia commission (CPA, 1976) because they express the mainstream views. These are: 1) the improvident use of the so-called *soggiorno obbligato* (forced re-settlement); 2) the escape of Mafia members from original territories to avoid retaliation after Mafia wars; 3) migrant movements from the South to the North and 4) the attractive opportunities offered by the province destination: in particular, the flourishing drug market. Similar analyses have been proposed by other authors such as Della Chiesa (2010) and Varese (2011), although with different emphasis[133].

Although all are supposedly important causes of this expansion, in our empirical analysis we focus only on migration and *soggiorno obbligato*. The reasons for not considering the drug market is that there are not enough statistics on the consumption of drugs, or on the size of drug market, for the period of our analysis[134]. Secondly, we consider migration and forced re-settlement until the beginning of the 1970s. The opening up of drug traffic businesses fully developed only from the 1970s onwards. Therefore, these two sets of explanations refer to two different periods which would cause identification problems. Also, we could not find precise data on Mafia wars, as it is quite complicate to get the number of Mafia members who "escaped" due to these conflicts.

Having said this, let us proceed in analysing migration and forced re-settlement in more detail and to see why they might be relevant in explaining Mafia transplantation to the central-northern regions.

3.2.7 Migration

Italy has been characterized by a massive migration outflows in the period roughly comprised between the Italian unification in 1861 and the Italian economic miracle in the 1960s. The so-called Italian *diaspora* concerned nearly 25 million Italians and it is considered one of the biggest mass migrations of contemporary times.

The turning point in Italian economic history has been represented by the so-called economic miracle (*miracolo economico*) between the late 1950s and the early 1970s. In the

[133]Varese focused on the supply and demand of protection in new territories. In the former, the author included migration, forced re-settlement and fear of punishment. As demand, Varese mentioned the inability of the state to protect property rights, the level of trust, the presence of illegal markets and the characteristics of the legal markets.

[134] Still, we also consider the GDP per capita.

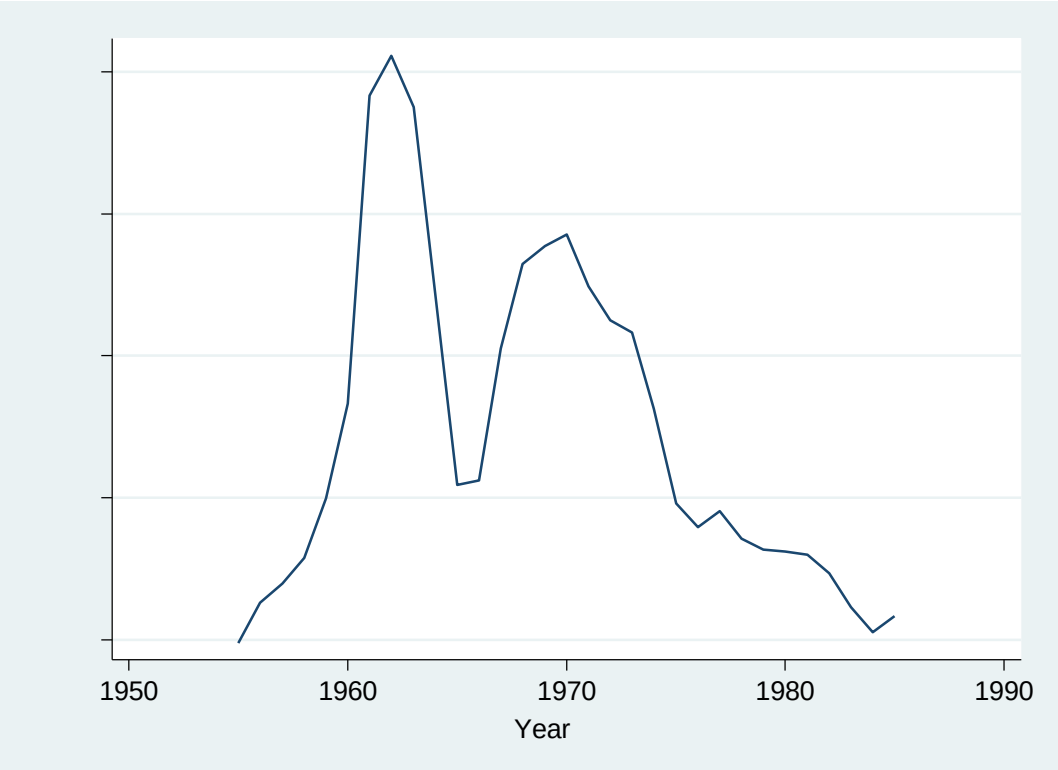
post-war period, Italy experienced a rapid industrialisation in many strategic industrial sectors such as automobiles, textiles, chemistry and electric appliances. The positive fact was that it has been a rapid growth, along with a contained inflation and a massive creation of new jobs. In particular, it is thought that growth was mainly driven by big firms (Sapelli, 1997). At the same time, this attracted the creation of small and medium enterprises which provided goods and services to the larger ones. This led to a rapid increase of real GDP and to a transition from agriculture based economy to an industrialised one. The peak was reached in the period 1958 – 1963 when GDP grew at more than 7 % at constant prices.

Despite a general increase in economic and living conditions, the economic miracle had the effect of exacerbating the dualism between the North and the South of the country. The economic growth remained predominantly confined to northern and central regions. At first, it happened in the industrial triangle formed by the cities of Milan, Turin and Genoa. This is where most of the factories and technological improvements happened. This development soon after involved the north east and centre[135].

Meanwhile, southern Italy remained impoverished. As a result, the post-war period led to a massive increase of Italian internal migration from the south to the rest of Italy. Migrants provided a necessary workforce in a rapidly industrialising Italy. Overall, from the late 1950s to the early 1970s roughly 4 million people migrated from the southern regions (Bonaguidi, 1985). The pattern of this migration flows is not constant as it can be seen in the figure below. We can distinguish a first jump which leads to the absolute peak in the early 1960s. Thereafter, there was a slump that is followed by another jump until the early 1970s. From this second peak onwards, there was a slow but constant decrease in the number of southerners moving to the central-northern regions.

[135] This gap still persists, as the GDP per capita in Agrigento, the poorest province, is still less than half the one in Milan, the richest.

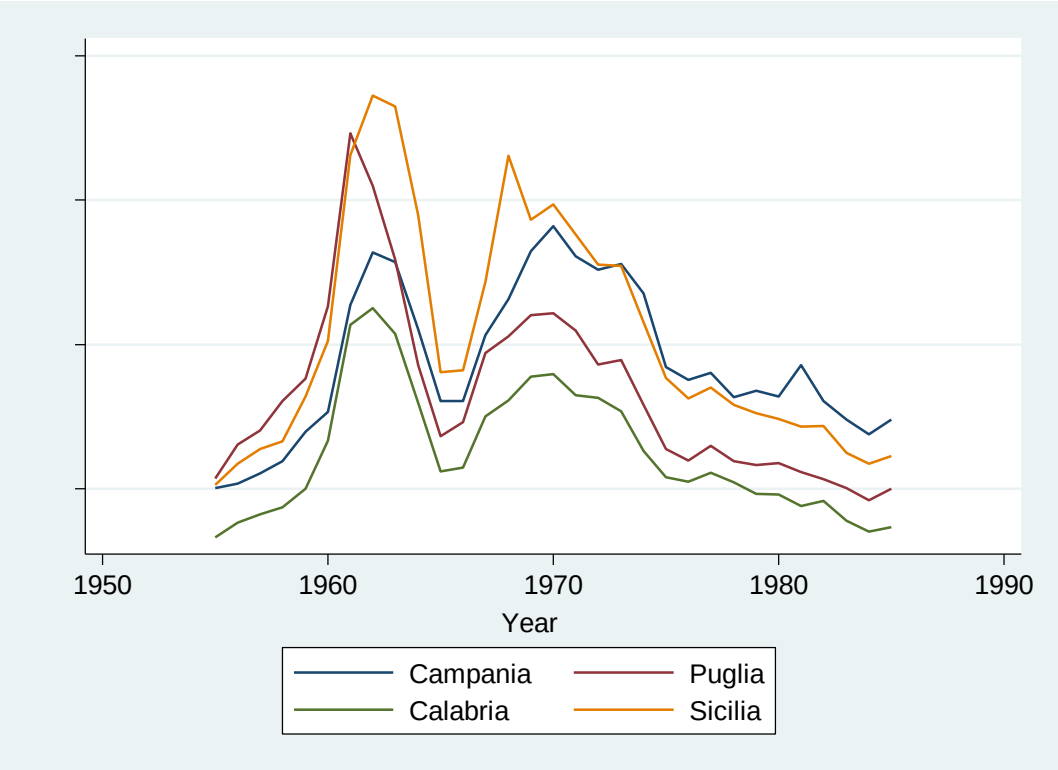
Figure 3.4 Total number of migrants from the South to the Centre- North



Source: IRPPS.

If we break down the national data into regional data, we have the graphs below. For ease of analysis, we report first the four regions with a strong presence of organised crime: Sicily, Campania, Calabria and Apulia. As we can see, Apulia is the region that, on average, sent the highest number of migrants to the central-northern area. It was closely followed by Sicily. Campania shows a particular pattern: until the 1970s it was well below the other two, whereas afterwards it had even higher values.

Figure 3.5 Migrants to the Centre- North from Mafia-infested regions



Source: IRPPS.

The massive internal and interregional migration flows significantly affected the demographic composition in the hosting provinces and regions. As shown in Figure 3.6, considering the period 1955-1985, Milan, Turin and Rome hosted roughly 1 million immigrants each[136], while smaller provinces such as Genoa and Varese received more than 200'000 immigrants. The huge share of migrants moved from the Apulia, Campania, Sicily and Calabria regions, which are Mafia strongholds.

As usual, it is misleading to apply a unique theoretical framework to understand this massive internal migration (De Haas, 2008). Indeed, these migration flows were consistent with the standard neoclassical framework proposed, amongst the others, by Todaro (1969; Harris and Todaro, 1970). This view stressed the geographic differences of supply and demand of labour between two areas. People move from the one with surplus of labour to the other one. Individuals will consider whether the wage differentials are positive and will move according to a cost benefit analysis. Workers also consider other factors such as likelihood of unemployment, costs of travel etc. This is consistent with the evidence which showed that the unemployment rate in southern Italy was near to 50%, while the North was

[136] All immigrants were Italian.

experiencing a dramatic economic boom. It is also consistent with the rural-urban migration theory proposed by these authors. In fact, the South was still largely agricultural and most of the migrants were moving from the countryside to the big industrial cities. Migration affected the hosting provinces' development outcomes (Taylor, 1999). As discussed in Varese (2006), the demographic composition in the destination provinces experienced a dramatic change. For instance, the percentage of residents living in the cities of Turin born in Sicily, Calabria or Campania grew from 2.4% in 1951 to 12.2% in 1971, while it grew from 2.2% in 1951 to 8.8% in 1971 in the city of Milan.

However, critics of this view (De Haas, 2008) stressed the fact that the neo classical view cannot explain alone the causes of migration. For example, it does not explain why migrants have favourite destination areas, despite the fact that the cost benefit analysis would suggest differently. In order to explain such incongruence, several explanations have been proposed[137]. A major role is played by social capital that is also central in chapter five of this thesis. In particular, community networks played a crucial role in affecting migrants' choice (Bauer and Zimmermann, 1997; Moretti, 1999; Munshi, 2001; Vergalli, 2008). Arango et al. (1998, p.448) defined networks as "a set of interpersonal ties that connect migrants, former migrants, and nonmigrants in origin and destination areas through bonds of kinship, friendship, and shared community". Former migrants influence new ones in determining destination choices. Moretti (1999) provided evidence that both the timing and the destination of Italian immigration at the end of the XIX century were consistent with the presence of social networks in the host country. The author showed how migration to the USA and Brazil at the beginning of the last century could be explained by path dependency. Munshi (2003) analysed how community networks might lead to improvements in job market opportunities for new Mexican emigrants in the USA. The same has been done by Epstein and Gang (2006). More importantly, in an uncertain environment, migration networks provide support for labour market searches or housing, as well as, under network-externalities, reduce the costs of relocation to a different and foreign country (Carrington et al., 1996; Gottlieb, 1987; Chiswick and Miller, 1996). New immigrants aim to integrate in the destination country and this may be facilitated through existing community networks. As stressed in Vergalli (2008, p.548): "integration is the process by which immigrants become

[137] However, along with the two views of migration we present, many others have been suggested. For example, the push-pull and Marxist view. For a review on the theory of migration see De Haas (2008)

accepted into society, both as individuals and as groups. Therefore, the process of integration is not only taking place- as is often supposed- with individual immigrants, but also at the collective level of the immigrant group. In fact, when an immigrant enters a new society, he/she begins to build a group of people (or enters a group if it is already exists), based on affinities, religion, and a similar way of life: this group is generally called a 'community' ".

This view seems to apply to the Italian post-war migration case because community networks were particularly strong. In fact, the southerners who were living in the central-northern regions tended to recreate, totally or partially, the social norms, habits and customs of the provinces of origin. This strong community feeling was partially a consequence of the problematic integration of migrants with the locals. In this respect, the 1976 Anti-Mafia commission says: "they (the migrants) often felt not really welcomed, if not rejected, by the local communities" (CPA, 1976, p.291). Although they belonged to the same country, there were still many social and cultural barriers between the southern and the northern peoples that affected integration.

In this perspective, these migrants' communities, which back home used to live in Mafia-dominated societies, might have provided a neutral environment for Mafia groups to settle. This is not to say at all that southern migrants provided favourable grounds for Mafia to develop. Rather it is more likely that Mafia-type groups settled where people were accustomed to the presence of such organisations. On the other hand, societies that never experienced such gangs are more reluctant to come to terms with such kind of organisations. As shown in many works, from the 1970s onwards, the Mafia started to influence the formal economy and, in particular, sectors as the construction one. As a consequence, it also started exploiting cheap labour forces, such as the poor migrants from the southern regions. It seems logical to expect that Mafia presence might have developed in migrant–rich areas. Indeed, Mafia transplantation in the USA, Canada or Australia was accompanied by large flows of southern Italian migrants[138]. Some criminals were hidden amongst the large mass of migrants. As Varese (2006, p.416) puts it: "assuming that

[138] In this case, the analysis provided by Dixit (2004) and explained in chapter one seems to be particularly relevant. In fact, in these migrants' networks, information was a valuable good and Mafia could have worked as an information provider. Moreover, it could have also performed contract enforcement roles.

criminals make up a certain proportion of a given population, the greater the movement of individuals, the larger the influx of criminals to a new territory".

3.2.8 *Confino* (Forced re-settlement)

The other major factor that recurs as a main cause of Mafia transplantation is the so-called *confino*, *i.e.* forced re-settlement. The law that established it in the post-war period[139] dates from 1956[140]. It required dangerous convicted criminals to relocate in provinces far from their original one for a period between three to five years. In particular, it was a measure used against people belonging to southern Italian criminal organisations, especially the Sicilian Cosa Nostra and Calabrian 'Ndrangheta[141]. The main idea was to remove these people from the "infected" background of origins. Those convicted were sent to "uncontaminated" and social capital rich areas that it was hoped would eventually prevent them from committing crimes. Moreover, it aimed at redeeming the criminals if possible. The majority of law breakers were sent to the central-northern provinces, although some were sent to Campania[142], Apulia and Sardinia. Moreover, these Mafia members were generally settled in small towns with no more than 5,000 inhabitants, far from big cities and means of transportation[143]. In this way, it was believed that public officials could better control their everyday activities and their movements[144]. Many prominent members of criminal organisations were relocated through this measure. For example, the well known bosses Toto' Riina and Stefano Bontade[145] .

Considering the period 1961 – 1972, on which there is data availability, we have a total number of 2360 forced re-settlers: 2088 were sent to the central-northern regions. In

[139] A measure of forced re-settlement was present also in the XIX century, and it was implemented right after the Unification of Italy.
[140] The law is the n. 1423, L27-12-1956. In 1965 it was revised.
[141] In fact the Neapolitan Camorra was still in an embryonic phase and it fully developed with the 1980 earthquake. We find only one member of the Neapolitan Mafia who was sent to the North with this measure. The Apulian Sacra Corona Unita was yet to be created. This happened only in the 1980s under the influx of the Calabrian 'Ndrangheta.
[142] Many historians believe that this led to the creation of solid links between the Sicilian and the local criminal organisations (Varese, 2006).
[143] At least this is what the law stated. In reality, many times criminals were sent to towns close to cities, as in the case of Buccinasco, in the outskirts of Milan.
[144] A Mafia member had to give notice to local authorities of every journey outside the towns of residence.
[145] Riina has been the head of La Cosa Nostra for many years and ordered the killings of the judges Falcone and Borsellino in 1992. Bontade has been the head of the Mafia in Palermo until 1981 when he was killed on Riina's order.

particular, amongst this macro area, the four regions which hosted the highest number of *soggiornanti*[146] were: Lombardy with 22.2% of the total number, followed by Emilia Romagna with 14.7%, Tuscany with 13.6% and Piedmont with 12.4 %. Amongst the provinces, Bergamo was the first with a total number of 63 re-settlers[147].

This policy has been thought of as a major facilitator of Mafia transplantation for a number of reasons. First of all "it happened that these Mafia members, forced to settle in the North or in the continental regions, were not isolated at all and were not able to receive a beneficial influence from a different social and cultural environment "(CPA, 1976, p.291). Even though they could not move from the town where they were assigned, nobody prevented relatives and friends from visiting them[148]. It was wrong to believe that sending them that far would have prevented criminals from keeping contacts back home. In fact, the post war period saw a dramatic improvement in the means of transportation and the systems of communication. In particular, there has been a dramatic increase in the diffusion of the telephone. Also, other means of communication became available, such as the telegram and the fax machine. In this period, there were also changes in means of transport by air, sea or land, notably the availability of the civil aviation. In addition, the mass production of cars, mainly due to FIAT, and the improvement in railway technologies reduced the distance between places and costs. As a consequence, the policy of the forced re-settlement (that did not consider such changes), wrongly assumed that Mafia members were isolated. Not surprisingly, it is alleged that Mafia boss could easily rule their gangs from the northern provinces as well (Tuscany Region, 2012). Finally, Dalla Chiesa (2011) reported that the re-settlers managed to corrupt some police officers who were in charge of their surveillance. Also, as already mentioned earlier, it is supposed that the exploitation of southern workers was a key driver in Mafia transplantation.

Some authors are sceptical in identifying this law as a major determinant in Mafia development. In particular, Sciarrone (2004) argues that "the only presence of Mafiosi sent to *confino* cannot be considered as a sufficient cause for the diffusion of Mafia-type criminal organisations in not traditional area, nor it can be considered as necessary cause" (ibid., p.

[146] Re-settlers.

[147] We need report a problem with these data. In the anti-Mafia commission report the total number for Piedmont is 288. However, summing up the results for all single provinces gives us a total of 207. Therefore, there might have been some issues in reporting the data.

[148] There is evidence of initiation rituals in the central and northern regions as well. Moreover, there are also documented meetings taking place in these regions (Forgione, 2009)

5). This author claimed that whilst this measure was wrong, it does not automatically imply it was a "vehicle of Mafia diffusion". This is because he believed that the major factors were the creation of a large drug market and the development of a strong economic and financial system in the North.

3.3. Descriptive statistics

3.3.1 Crime data issues

Crime statistics present several problems. The most important one is that there is generally under-reporting. In fact, police recorded crimes are just a fraction of the true number of committed offences, as many victimization surveys have showed (Soares, 2004). This *dark number* might be more or less large depending on many factors, such as development, trust in the authorities, and the efficiency of the judicial system[149]. Along with these typical issues associated with crime statistics, there are specific ones related to the measurement of organised crime. Just to mention the most relevant ones: the dark number of organised crime statistics might be larger than normal crime since victims might be more fearful of retaliation by criminal organisations compared to single criminals. Moreover, criminal organisations are very complex structures that operate both in the legal and illegal sectors (DNA, 2009). Additionally, we are dealing with organised groups operating in a diverse environment compared to the original one. Therefore, a measure of crime activity needs to take into consideration very diverse issues. Standard crimes such as robbery, burglary, and physical assaults are more easily defined even though they still incur under-reporting. Finally, we cannot rely on victimization surveys as for standard crimes[150] and so, our main sources are recorded crimes[151].

So far, the scarce economic literature on organised crime did not employ a unique measure of Mafia activity. The majority of studies used the number of murders. For example

[149] For example, Soares (2004) compared reporting crimes' attitude amongst a large number of countries. He found that reporting rates are much higher in richer countries.

[150] To our knowledge, the only victimization report which includes some Mafia– related questions is the 2008 Italian Business Crime Survey by the Italian Ministry of Interior and Transcrime. However, it is just for one year and it is at a regional level.

[151] In particular, we use the data published by the Italian National institute of Statistics (ISTAT). These crimes are reported by the police to the judiciary authority. All crimes are expressed per 100'000 inhabitants.

Peri (2004) and Quarella and Tullio (1999) use it as a regressor in their growth studies[152]. The reason for using such a variable is that in Italy there are few street homicides and, so, killings are generally associated with criminal organisations. Moreover, it is very unlikely that a murder goes unreported, making it a quite reliable measure. Daniele and Mariani (2011), in their work on incoming FDI, constructed a provincial index for the period 2002-2006, summing the crime rates of extortions, criminal associations, bomb attacks and arsons.

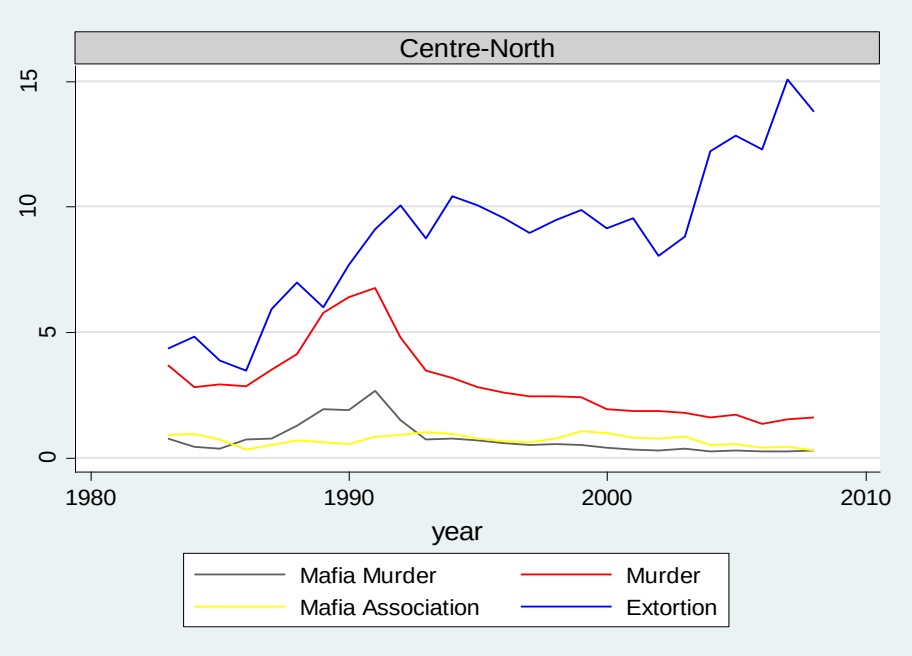
In order to improve the measurement of organised crime, we propose an alternative approach based mainly on the work carried out by the AntiMafia Investigation Department (*Direzione Investigativa AntiMafia*- D.I.A)[153]. This body has the task of investigating exclusively organised crime related offences. This makes it a perfect reference point for identifying the crimes which best represent Mafia presence. Every semester it publishes a report in which it assesses the trends of the major criminal organisations in Italy. Based on these reports we divided crimes in *Mafia-Specific* and "Mafia presence revealing" (*Mafia–Spy* henceforth) ones. The former are represented by those crimes that the penal code defines as committed by Mafia members. In particular, we consider organised crime related murders and Mafia-type associations[154]. We would have liked to use data on seized goods to criminal organisations. However, we could not get them at a provincial level and for long periods of time[155]. We did not use the number of councils dismissed for Mafia presence either. The reason is that outside the southern Mafia infested regions we do not have many cases. For example, in the north of Italy we just had two cases since the law was introduced in 1991. Along with organised crime related murders and Mafia-type association, we include extortions and standard murders[156]. Although these are not listed as Mafia-type offences, we consider them because these are typical features of Mafia criminal activity in the

[152] Also Del Bianco (2009) used murders as proxy for the presence of criminal organisations.
[153] This department is also involved in the collection of data on organised crime.
[154] Mafia-type criminal associations are defined by the art. 416 bis of the penal code: "A Mafia-type organisation is an organisation whose members use the power of intimidation deriving from the bonds of membership and the atmosphere of coercion and conspiracy of silence that it engenders to commit offences, to acquire direct or indirect control of economic activities, licences, authorisation, public procurement contracts and services or to obtain unjustified profits or advantages for itself or others, or to prevent or obstruct the free exercise of the right to vote, or to procure votes for itself or others at elections" (Lewis et al ,2005, p. 84)
[155] Actually there are only cumulative data until the end of 2009. We tried contacting the relevant authorities but we could not get these data.
[156] All recorded murders minus the mafia- type ones.

North[157]. As we can see, there are striking differences between these crimes' intensity. Both types of murders and Mafia-type associations have very small values compared to extortions which happen much more often[158].

The trend and magnitude of these crimes can be seen in Figure 3.7. We consider the period 1983 – 2008. In fact, 1983 is the first year that Mafia related crimes were recorded. All the data are at the provincial level. We report only the situation in the Centre- Northern regions.

Figure 3.6 *Mafia-Specific* crimes in the Centre- North.



Note: crime rates (per 100'000 inhabitants) based on data from ISTAT.

Mafia-type related murders and associations are pretty steady except at the beginning of the 1990s, where we have a spike for both crimes. In particular, Mafia- Murders exhibit such increase some time before than for associations. This is understandable as it takes longer to charge a person of mafia-type associations whereas murders are recorded

[157] Another reason to do so is that our analysis is on the centre northern provinces where the extent of the first two Mafia-specific crimes is very limited. Therefore, the use of extortion helps us to give more provincial variability in Mafia measurement.

[158] We feel to exclude the hypothesis that mafia related crimes might be underreported due to corruption by gangs' members. In the main text we already argued about the impossibility of underreporting murders which neutralize possible corruption practices. Regarding the other crimes considered, to our knowledge, there have not been cases of public officials that did not report mafia related crimes intentionally. Moreover, it is compulsory to report a crime in the statistics once a victim has reported it. Therefore, we believe that it would be unlikely for mafia in the central-northern regions to corrupt officials at the police station. Nevertheless, we should not confuse such issue, with the role of mafias in reducing the report rates of fearful citizens.

immediately. Not surprisingly, general murders have a similar trend than the crimes just mentioned. The main explanation of such spikes is that the ongoing mafia wars in Calabria (Forgione, 2009) extended also to the North. After its conclusion, the murder rates slowly decreased. Even during conflicts, the rates in the Centre-North are much lower compared to the south. This further indicates the more business orientated *modus operandi* of gangs outside their original territories.

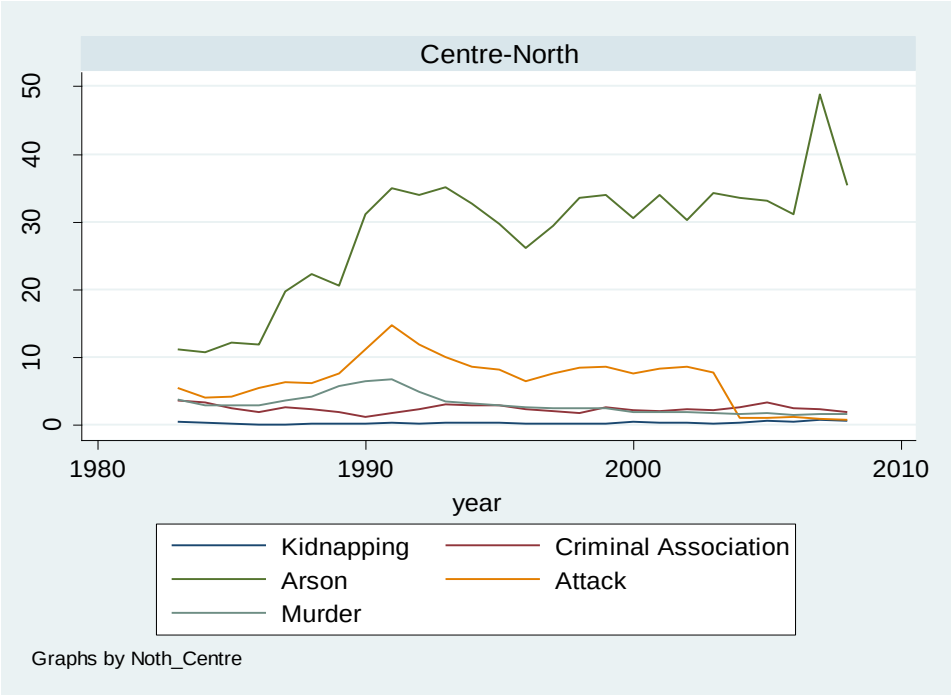
Extortions are by far the most frequent crime rates with rates that peaked almost a value of 15 in the last observed years. This exceptionally high volume of crimes could be explained in two ways. Firstly, extortion is one of the preferred methods by which Mafia controls the territory and ensure itself a constant flux of income (Varese, 2006). Secondly, it is worth to remind that there are a variety of actors, other than gangs that can perpetuate such crime. This is particularly true in wealthy area as the north of Italy where there is a high number of property crimes.

The *Mafia-Spy* offences are those crimes that the penal system does not configure as specific of Mafia-type criminal organisations, but that are surely linked with their presence. Therefore, a higher occurrence of these crimes might be a symptom of the activity of a Mafia-type group. As for *Mafia-Specific* we follow the classification by the DIA. Unfortunately, we could not include all the data suggested by the reports because of their limited time span or unavailability[159]. Therefore the crimes we consider are: general criminal associations, bomb or fire attacks and arsons. Along with these offences we consider kidnapping with extortionist purposes. Moreover, we reconsider "general" murders[160]. Looking at Figure 3.8 we see that there are differences between these offences.

[159] Attacks, robberies, usury, general conspiracy crimes, money laundering, arsons, damages, damages followed by arsons, associations for the productions of drugs, associations for drug trafficking, exploitation of prostitution and child pornography, brands and industrial products counterfeiting.

[160] Kidnapping with extortionist purpose is another typical crime committed by Mafias.

Figure 3.7 *Mafia-Spy* crimes in the Centre- North.



Note: crime rates (per 100'000 inhabitants) based on data from ISTAT.

Arson is by far the most recurrent crime followed by attacks and criminal associations. We have a sudden increase in the crime rates at the beginning of the 1990s, followed by an increasing stable trend, at least until 2008. This last drop could be due by strong campaigns against arsonists. *Criminal association* has very low value and is quite stable over all the considered period. Its trend is almost identical to the mafia-type criminal association in Figure 3.7. Kidnapping with extortionist purpose has the lowest mean. Unfortunately, we do not have data for the 1970s where most of kidnappings by mafias took place. 'Ndrangheta was the most active criminal organisations from this point of view (Forgione, 2009). Attacks show a notable increase in the early 1990s as for most of mafia- specific crimes. It followed a relative stable trend until 2003 when there is a sudden decrease which lasted until 2008.

As we have seen from the analysis of the data, there are crimes which occur much more often compared to others. These differences are striking for the Mafia specific crimes. For example, there are roughly 20 times more extortions compared to mafia murder. However, a single murder might reveal much more about Mafia presence in a province than a single extortion case[161]. Despite this, the indexes used in the literature assign the same weight to a

[161] Except during mafia wars, it is not very likely to register very high volumes of murders.

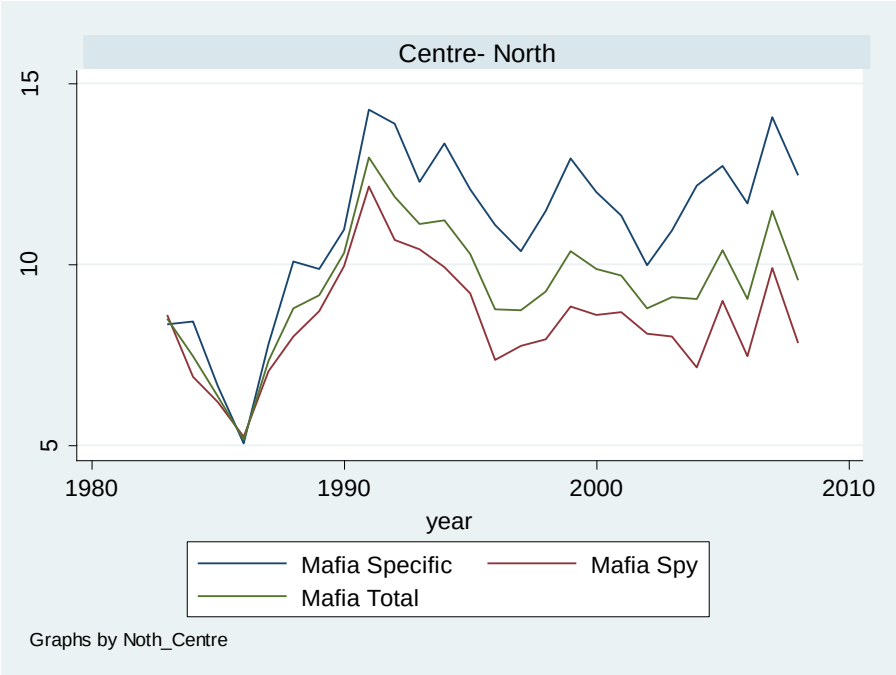
murder and an extortion case. By construction, they simply sum up all the crime rates (Daniele and Mariani, 2011). The result is that the most frequent crime category will have a disproportionate role/weight in the index. In our case, we would have provinces with relatively a high number of extortion cases but zero or none murders might show a higher ranking in a mafia index. In order to overcome such issues, we propose a Mafia index where each crime represents the same weights in the index, irrespectively of its frequencies[162]. Of course, we judge them equally revealing in term of Mafia presence. In order to do so, for each offence, we create a variable comprised between 0 and 1 where every crime rate is proportional to the maximum value that is set at 1. For example, supposing that in Naples' province we have the highest extortion rate at 5 per 100'000 inhabitants. Moreover, in Rome it is 1 per 100,000, so, we will have a Mafia measure equal to one in Naples and 0.2 in Rome. If we call α the rescaled variable, *i* the type of crime and N the number of crime rates we are considering, this measure is given by:

$$Mafia\ Index = (\frac{\sum \alpha_i}{N}) * 100$$

We created three different indices: one with the Mafia specific crimes (*Mafia-Specific*), one with the Mafia-revealing offences (*Mafia-Spy*) and one that sums all the offences in both indices. This last index is called *Mafia-Total*. Indeed, the one we are mostly interested in is *Mafia-Specific* crimes. Figure 3.9 depicts the trend over our reference period, 1983-2008, with the usual comparison between central-northern regions and southern ones.

[162] Of course, we need to pay attention to the fact that crime indices are generally affected by other problems as shown also by Cherry and List (2002). First of all, as we have seen, there is the issue of how to select the crimes to be included. In our case, this is particularly problematic given the difficulty of defining criminal organisations. Moreover, contrary to what we would have expected, there is not a very high correlation even amongst Mafia specific crimes. In particular between extortions and organised crime related murders and Mafia-type associations. Secondly, there is the issue of how to scale the crime rates: we used the highest value whereas we could have also used the mean.

Figure 3.8 Three main indexes in the Centre- North

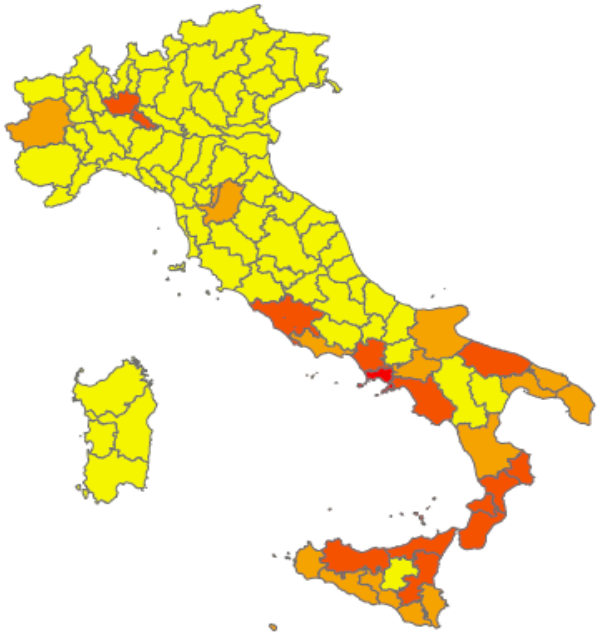


Source: Indexes based on data from ISTAT.

We note that the *Mafia-Specific* index is smaller than the *Mafia-Spy* one. Moreover, the differences between the two indices are much more pronounced in the central-northern regions. This could be explained by the fact that the crimes we consider in the *Mafia-Specific* index are more typical of the *modus operandi* of the Mafia organisations in the south of Italy. Therefore, both types of crime's indices well describe the situation. Moreover, the peaks and jumps are more pronounced in the South compared to the other macro area, which reflects a greater volatility.

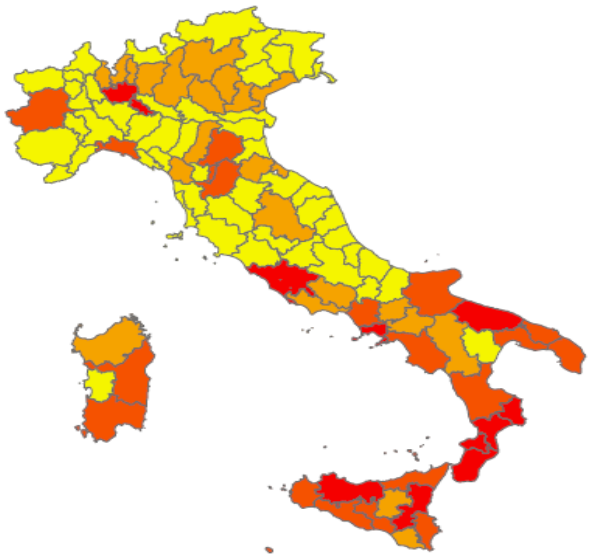
Figure 3.10 gives an idea of the heterogeneity of these indices at the provincial level, our unit of analysis. Again, *Mafia-Specific* shows how these crimes are much more present in the South. The subsequent figures illustrate well the heterogeneity in crime levels.

Figure 3.9 *Mafia-Specific* index for all Italian regions



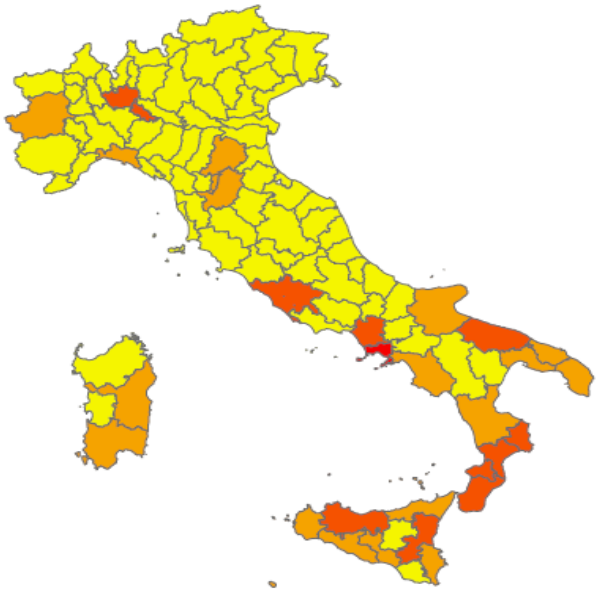
Source: Graphical representation of the mean of the *Mafia-Specific* index for all Italian provinces for the period 1983-2008. Darker colours reflect higher values of the index. Class brakes are defined by the mapping software.

Figure 3.10 *Mafia-Spy* index for all Italian regions



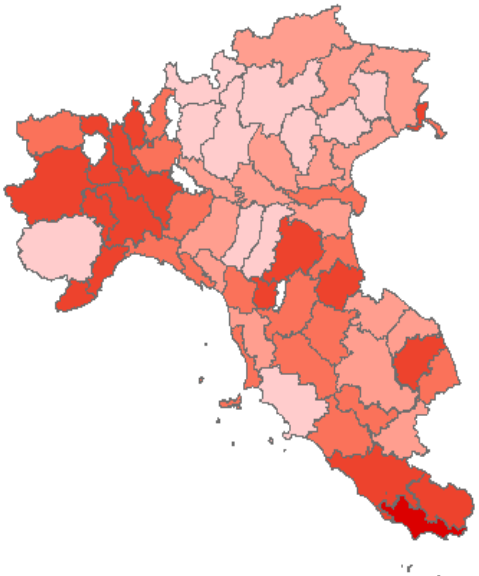
Source: Graphical representation of the mean *Mafia-Spy* index for all Italian provinces for the period 1983-2008. The darker the colour the higher is the index. Class brakes are defined by the mapping software

Figure 3.11 *Mafia-Total* index for all Italian regions



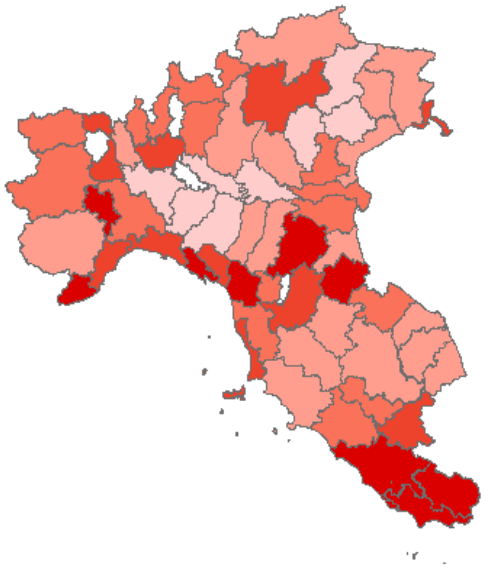
Source: Graphical representation of the mean *Mafia- Total* index for all Italian provinces for the period 1983-2008. The darker the colour the higher is the index. Class brakes are defined by the mapping software.

Figure 3.12 *Mafia-Specific* index for the central- northern Italian provinces



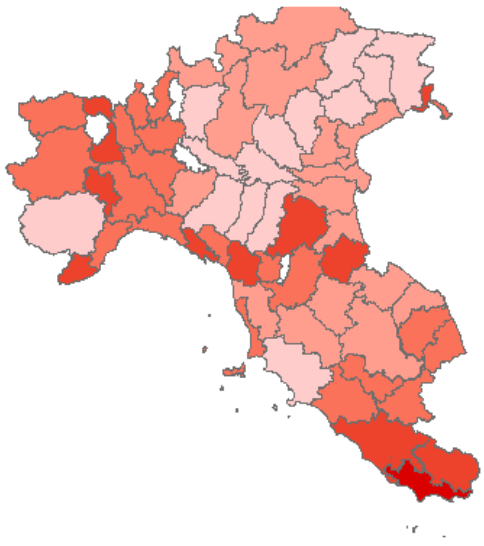
Source: Graphical representation of the mean *Mafia-Specific* index for the central and northern Italian provinces for the period 1983-2008. Darker colours reflect higher values of the index. Class brakes are defined by the mapping software.

Figure 3.13 *Mafia-Spy* index for the central- northern Italian provinces



Source: Graphical representation of the mean *Mafia-Spy* index for the central and northern Italian provinces. Darker colours reflect higher values of the index for the period 1983-2008. Class brakes are defined by the mapping software.

Figure 3.14 *Mafia-Total* index for the central- northern Italian provinces



Source: Graphical representation of the mean *Mafia-Total* index for the central and northern Italian provinces. Darker colours reflect higher values of the index for the period 1983-2008. Class brakes are defined by the mapping software.

Figures 3.13 through Figure 3.15 consider the same indices only for the 61 central and northern provinces. Regarding the *Mafia-Specific* we note that Lombardy, Piedmont, Lazio and Emilia Romagna are the regions mostly affected. Finally, we need to bear in mind that the idea behind this index is to rank provinces giving the same weight to each crime. We need to be cautious when comparing different indices. As a robustness check, we will also consider single crime categories.

The main specification consists of five year average values for the crime and the time varying control variables[163]. The reason for so doing is that Mafia measures are very volatile and, as in growth analysis (Peri, 2004), averaging over a quite long period allows us to capture more stable criminal trends. As robustness check, we also consider yearly observations and the results are quite similar.

3.3.2 Migration, forced re-settlement and control variables

As already mentioned, the migration data refer to intra provincial migration and they start in 1955. In total, we have 61 provinces in the central northern regions[164]. Therefore, we know[165] how many people in province X were coming from the remaining 94 provinces. These data are taken by the IRPPS[166] institute. To our knowledge, they have been employed only in migration studies (Bonifazi and Heins, 2000). We decided to use the migration flows of the period 1965 – 1970[167]. There are essentially two reasons for so doing. First this is the

[163] Since we cover 26 years, the last period comprises six years.

[164] Although the current number of provinces is higher we refer to the 1970s 95 provinces. Therefore, we ascribed the data of new provinces to one of the 95, according to the geographical repartition process.

[165] These data refer to registered migrants, which are inevitably a lower bound of the number of total migrants a provinces received. However, underreporting rates should be very similar for each province. This would attenuate the bias.

[166] It is a multi- disciplinary research institute, which analyses various topics, ranging from migration to welfare.

[167] We use flows of migrants rather than stocks. The reason to do so is that our data on migration start in 1955. This is the first year in which Italian authorities kept track of changes of residency between provinces. Each new registered immigrant had for the first time the opportunity of filling an *ad hoc* created form where he could specify such type of information. Therefore, we do not know what happened to migration patterns before that date and, so, cannot easily calculate the stock. It is true that we could have employed the data from the 1971 census but we preferred not do so for a variety of reasons. Firstly, they refer only to the stock of migrants in 1971 without specifying the variation of such measure in the years immediately before such date. In second place, these data are not available online and are not easily accessible. Thirdly, and most importantly, in this way we could employ an instrumental variable approach using the flows of ten years earlier than our "endogenous" variable. Using the 1971 data would have prevented us from doing so as they just refer to a point in time. Finally, it is worth reminding that there are not representative household surveys, i.e. recognized by ISTAT, which we could have used.

period preceding the explosion of the Mafia spread in the central-northern regions. Secondly, using these time specification we are able to capture migration from Campania which started a bit later compared to other regions. This is quite important considered the strength of Camorra. Finally, it allows us to use an instrumental variable approach with migration level for the period 1955-1960. The data are weighted by the destination province's population and multiplied by 100[168]. We consider the total number of migrants from the southern regions[169] and then only from Sicily, Calabria, Campania and Apulia.

Moreover, there are a series of other pull factors which played an important role in determining migrants' choice. Due to data limitations we could not consider them in the quantitative analysis. Nevertheless, there is a strong interconnectedness between such unobserved factors and the size of the legal and illegal markets. The sign of the correlation would depend on different factors. For example, wages for low skilled individuals made immigration rewarding and permitted southern citizens to increase their standard of life. This increased welfare certainly produced a "negative externality", i.e. it boosted demand also for illegal goods, as drugs and betting. In turn, this would have led to more opportunities for mafia to develop. This thesis is in line with the view of many scholars on this field (Dalla Chiesa, 2011; Sciarrone, 2004). Citizen security, proxied by some deterrence variable, is another aspect we would have liked to consider. It is likely that the highest degree of protection of property rights in the north compared to the south was a strong pull factor. At the same time, it also influenced opportunities in the legal and, consequently, illegal sector (Becker, 1968; Ehrlich, 1973). Similarly, the quality of institutions in the hosting provinces might have convinced people to move north. Amongst such characteristics, we could mention local authorities' efficiency or quality of the public sector. Along with an obvious impact on the legal sector (Putnam, 1993), the institutional framework played a central role in the development of illegal sectors.

Continuing, the forced re-settlements data were manually copied from the 1976 anti-Mafia commission report. They refer to 1961-1972, and therefore, do not cover the whole period of this measure[170]. Unfortunately, we tried to find the data for the remaining years

[168] Therefore, they tell us the number of southern migrants per 100 total residents.
[169] We adopt the definition of southern regions used by the national institute of statistics.
[170] This measure was implemented in the following decades but in a small number.

but we could not get them[171] .To our knowledge, they have never been used before in any economic work. We consider the rate of forced re-settlers on the hosting provinces' population. However, as a robustness check we also consider the ratio.

Finally, it is likely that Mafia presence in the central-northern regions is due to other factors. For example, many authors (Sciarrone, 2009) stress how economic development in these regions created opportunities in the drug market and other sectors, such as construction. Therefore, we first control for the level of development. We consider GDP per capita at 2000 constant prices, as a measure of development, as suggested by Ehrlich (1996). For example, Fajnzylber et al. (2002) analysed the determinants of homicides and robbery for a number of developed and developing countries[172]. They consider the period 1970-1994, using a panel data GMM methodology, without finding strong evidence that the average income (GDP) influenced the level of both intentional homicides and robberies. Entorf and Spengler (2000a) analysed the determinants of eight different crimes (both property and violent ones) for German Leander for the period 1975-1996. As for Italy, Germany contains striking regional disparities, but, in this case, between the eastern and the western parts. The authors found a strong and significant effect of the average income variables for almost all the crime variables. Buonanno (2006) analysed a series of socio-economic factors that might determine the level of crimes. He considered property crimes, thefts and the total number of crimes over the period 1993-2002 at a provincial level. In order to account for the striking disparities between the North and the South this author ran two additional regressions with only the provinces in the Centre-North and in the South. He used two variables: GDP per capita but also the level of wages. He found that GDP is significant and positive at the national level. However, when the author considered the above mentioned specification, he found that GDP was positive and significant only for the South. For wages, the results are similar, although in the Centre-North it is significant for the specification total crimes. He found that for the southern regions, the GDP per capita, differently for the Centre-North, is positive and significant, "indicating that for southern regions improvements in the overall economic condition increase the illegal opportunities, thus increasing crime rates" (ibid., p.15).

[171] We checked on past and subsequent parliamentary enquiries but we could not find them. Moreover, we tried to contact some prefecture (government houses) in some provinces but they were not able to give us these data.

[172] 45 countries for the homicides regression and 34 for robberies.

As well as the economic variables, socio-cultural ones play a role in explaining the presence of organised crime. Again, there is a reciprocal influence.

First of all, we consider the composition of the population. We have two variables: the percentage of young people in the total population and the density of population. The reason for using the former is that, again, crime is typically associated with young people. Moreover, regarding the density of population, Glaeser and Sacerdote (1996) suggested that crime in cities might be higher than in rural areas for three reasons: a) there is a greater concentration of wealth in cities and b) in smaller areas the probability of arrest is much lower as it is possible to hide in the crowd. Finally, c) urban areas attract individuals with criminal intentions. Young males are generally the typical offender in the vast number of crimes. This has been found in many studies, as Fajnzylber et al. (2002) on violent crimes. Entorf and Spengler (2000a) found that the percentage of young male in the 15-24 age range is always significant for all types of crimes. It is thought that they are more prone to commit crimes because of several reasons, such as less acceptance of social norms, greater physical strength and social pressure from peers.

Table 3. 1 Summary statistics

Variable	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
Mafia-Specific	305	3.514	1.888	0.500	12.974
Mafia-Spy	305	3.349	1.343	1.043	10.156
Mafia-Total	305	3.405	1.367	1.143	9.456
Mafia Murder	305	0.017	0.043	0.000	0.316
Not Mafia Murder	305	0.765	0.346	0.091	2.245
Organised Crime Charge	305	0.080	0.118	0.000	0.870
Extortion	305	3.993	2.293	0.635	16.523
Migration All South	61	0.394	0.332	0.080	1.913
Migration Mafia Regions	61	0.302	0.270	0.058	1.517
Migration All South 1955-60	61	0.321	0.261	0.074	1.427
Migration Mafia Regions 1955-60	61	0.302	0.296	0.068	1.824
Forced Re-settlement	61	0.546	0.357	0	1.385
GDP	305	0.015	0.006	0.004	0.054
Young Male	305	9.861	1.651	5.963	18.520
Density Population	305	1155	1165	96	5625

3.4. Econometric concerns and strategy

3.4.1 Econometrics concerns

To empirically verify the impact of migration and forced re-settlement on Mafia expansion is not an easy task. There are various reasons. First of all, there is the issue of measurement errors. As we have seen, organised crime data are intrinsically problematic.

As stressed in Pinotti (2012), the under-reporting issues, that typically affect all official crime statistics, may be particularly acute for mafia-related offences due to *omertà* (code of silence) and intimidations that may discourage victimized individuals to report to the judicial authority. If the measurement error is not connected with the explanatory variabiables, than it will only affect the variance of the estimators which will be larger than in the case without measurement error (Angrist and Pischke, 2009). If the error is linked to one of the included explanatory variables, than we would be in trouble. This is true for the measurement error in either the dependent and independent variable. In fact, we would not only have biased estimates (Cameron and Trivedi, 2005) but also unconsistent ones. The orthogonality between regressors and error term would be violated and we would incur in the famous *classical errors in variables (CEV).* In our case, a particular reason of concern might come from the explanatory variables, and particularly from the migration one. One way to deal with measurement error is to use an instrumental variable approach. In the next sections we will do so, using a 10 years lagged measure of migration as an instrument. The possible census adjustments should not cause problems since we are considering average values[173].

Omitted variables might be another issue, as this would cause endogeneity problems. As we have seen in Section 2.7, there are other factors that we do not consider but which might be relevant in explaining Mafia expansion. For example, we did not consider any measure of the drug market. As already explained, we could not find detailed data that could have been used in this analysis. Also, we do not take into consideration any social capital measure (Varese, 2006). However, this would not make much sense as the differences between provinces are quite small, especially between north-west and north-

[173] As we are not dependent too much on single year observations.

east. In any case, we add regional level fixed effects which may account for time invariant characteristics, as social capital (Putnam et al., 1993). Except for this, we feel confident that the model we are estimating is correctly specified.

Continuing, are our explanatory variables really exogenous in respect to our measure of organised crime? Is there reverse causality issue?[174] Let us examine each variable separately. Our migration measure refers to the period 1965-1970. Therefore, to infer causality we need to rule out the possibility that our migration measure is exogenous to Mafia presence, for that we have data from 1983[175]. First of all, we have thirteen years of difference between migration and Mafia data. This would make us quite confident of exogeneity of our x variable. However, it might be that past level of Mafia activity, on which we do not have data, are linked with migration patterns. In turn, this would be the case if Mafia presence influenced migration or Mafia members' migration represented a high influx of migrants. We feel we can exclude both possibilities. Regarding the former, it is reasonable to think that Mafia presence might have attracted some people where it was active. In particular, this was probably true when organised crime groups started controlling some industries as construction and hospitality. However, if this was the case it happened only after 1970. Moreover, it is more reasonable to think that Mafia groups exploited workers that were already present in the destination provinces (Varese, 2006). Regarding the latter issue, Mafia members' migration involved very few people. In fact historical and journalistic evidence show that the actual size of people affiliated to organised crime groups are really low which rules out that migrant flows might in any way represent Mafia migration. However, in order to completely exclude possible endogeneity, we used an instrumental variable approach.

[174] Varese (2011, p. 414), argues: "Mafiosi might find themselves in the new territory by an accident of history, such as migration, or because they have been forced to reside there by a court order. In such cases, their presence is due to exogenous factors rather than explicit ex ante plan to set up shop in a new region. Alternatively, or in addition, the Mafia of origin might consciously decide to open a branch in a new land. In both scenarios the "foreign" Mafiosi actively work at creating a new group, relying on the skills acquired beforehand. The new entity of "family" is either affiliated to or a branch of an established existing Mafia family. The outpost might become financially autonomous and able to generate its own profit, or continue to rely on transfers from the centre. A rather crude indicator of the phenomenon is whether the Mafiosi in question reside in the new territory, although they might be seen occasionally to travel back "home". Over time the branch organisation might drift away from the original "firm" and become fully autonomous as well as financially independent, or retain a degree of dependency with the homeland".

[175] The first year in which Mafia-type crimes were recorded.

Forced re-settlement poses fewer problems compared to migration. The reason is that, as the term suggests, criminals were forced to relocate to another place. This makes their presence in the central-northern regions exogenous to Mafia presence. Indeed, the only potential issue is that sometimes criminals were offered a choice between different locations selected by the judiciary authority. In turn, this might lead us to think that these decisions could have been somewhat endogenous to criminal tastes and, eventually, to early Mafia presence. However, it is reasonable to exclude this possibility because a) potential locations were not selected by criminals b) they were given limited alternatives. If that was not the case, Sicilian criminals would have chosen to go closer to Sicily, for example in Apulia or Basilicata, rather than to Cuneo.

3.4.2 Econometric techniques

We have a provincial panel for the period 1983-2008 for only the central northen regions. Our two main explanatory variables are time-invariant, whereas the control variables are time-varying[176]. Our dependent variable is continuous. We therefore employed a random effect model. This model supposes that the unobservable individual effects, let us call them $\phi_{i,}$ are completely independent of the regressors (Cameron and Trivedi, 2005). Therefore, these individual characteristics are completely random and are included in the error term, which is itself i.i.d. The random effect model is calculated through GLS. The advantage of using a random effect model is that it allows estimating time invariant variables that have large sample properties. It should not be preferred if the true model was a within estimation. Indeed, it would have been interesting to use fixed effects because of the possibility of allowing the individual-specific characteristics to be correlated with the included regressors. In order to establish causality and correct for omitted variable bias we use an instrumental variable approach.

The econometric model we estimate is:

$$Mafia\ Index_{it} = \alpha_i + Migration_i + Forced\ Resettlement_i + x_{it} + \mu_r + \vartheta_t + \varepsilon_{it}$$

[176] Obviously, the use of time invariant characteristics (migration and *confino*) does not allow us to fully exploit the nature of the panel. Moreover, since they refer to a period before to the one of the other panel variables, we are not able to analyse in details the within province changes in the crime rates. The interpretation of the regressions' coefficients should then consider such limitations.

Where i stands for province, r for region and t for time. Again, *Mafia Index* is one of three indices we consider: *Mafia-Specific, Mafia-Spy* and *Mafia-Total.* We use five year averages to take into consideration the high volatility of crime measure. *Migration* refers to incoming migration in province i from southern regions weighted by population, for the period 1965-70. *Forced Re-settlement* refers to the period 1961-72. X_{it} are our time- varying control variables: GDP per capita (*GDP*), density of population (*Density Population*) and the percentage of young male (*Young Male*). All the control variables are averaged over five years. ε_{it} is the error term that summed to the provincial random effect, α_i, gives the composite error term u_{it} . We also include regional dummies in order to control for time invariant characteristics we have not included but that are uncorrelated with the regressor. We added time dummies to capture events that might have affected control variables, such as political changes, economic shocks etc. Finally, we use panel-robust standard errors which control for both serial correlation and heteroskedasticity.

3.5. Results and robustness checks

3.5.1 Results

We start by regressing the three indices on the two explanatory variables.

Table 3. 2 Five years: only explanatory variables

	Mafia-Specific	*Mafia-Spy*	*Mafia-Total*	*Mafia-Specific*	*Mafia-Spy*	*Mafia-Total*
Migration All South	1.598**	0.725*	1.055**			
	[0.635]	[0.422]	[0.465]			
Migration Mafia Regions				2.140***	0.986*	1.422**
				[0.830]	[0.527]	[0.597]
Forced Re-settlement	-0.097	-0.110	-0.106	-0.068	-0.093	-0.085
	[0.412]	[0.425]	[0.369]	[0.415]	[0.415]	[0.362]
Observations	305	305	305	305	305	305
Provinces	61	61	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R- squared	0.466	0.337	0.474	0.473	0.340	0.481

Note:[1] This table shows the random effects results on a panel of five years averaged observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column. *Migration All South* represents the percentage of incoming migrants from all the eight southern regions weighted by the province's population for the period 1965-1970. *Migration Mafia Regions* refers only to migrants from Apulia, Calabria, Campania and Sicily. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [3] All regressions include time and regional fixed effects.

Table 3. 3 Five years: adding control variables

	Mafia-Specific	*Mafia-Spy*	*Mafia-Total*	*Mafia-Specific*	*Mafia-Spy*	*Mafia-Total*
Migration All South	1.985***	0.606	1.133**			
	[0.627]	[0.473]	[0.496]			
Migration Mafia Regions				2.546***	0.830	1.483**
				[0.783]	[0.575]	[0.611]
Forced Re-settlement	-0.319	-0.030	-0.143	-0.313	-0.020	-0.135
	[0.437]	[0.447]	[0.398]	[0.440]	[0.440]	[0.394]
GDP	-1.692	2.592	1.769	-1.623	2.621	1.804
	[13.673]	[6.492]	[6.666]	[13.644]	[6.501]	[6.675]
Young Male	0.332***	0.278** *	0.306***	0.318***	0.273** *	0.298***
	[0.101]	[0.081]	[0.064]	[0.103]	[0.080]	[0.063]
Density Population	-0.002**	0.000	-0.001	-0.002**	0.000	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Observations	305	305	305	305	305	305
Provinces	61	61	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R- squared	0.482	0.347	0.482	0.490	0.350	0.488

Note:[1] This table shows the random effects results on a panel of five years averaged observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column. *Migration All South* represents the percentage of incoming migrants from all the eight southern regions weighted by the province's population for the period 1965-1970. *Migration Mafia Regions* refers only to migrants from Apulia, Calabria, Campania and Sicily. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [3] All regressions include time and regional fixed effects.

The coefficient for the migration from all southern regions (*Migration All South*) is positive and significant for all three. In particular, an increase of 1 percent of migrants in the host province increases the index by 1.6. This is a very high value. Continuing, the effect of migration is greater for the *Mafia-Specific* index compared to the *Mafia-Spy* one. This result is as expected since the former includes the typical Mafia-related crime. The *Mafia-Total* index, which considers all crimes, has a quite high coefficient. *Forced Re-settlement* is positive but not significant in all specifications. Interestingly the R squared is higher when the dependent variable is *Mafia-Specific*. This is a further demonstration that the

explanatory variables are more appropriate to explaining those kinds of crimes. Turning now to the other three columns, we see that, again, *Migration Mafia Regions* is positive and significant for all three indices. However, the coefficients are higher compared to the previous specification. In particular, an increase of 1 percent in the number of migrants from Campania, Calabria and Sicily leads to an increase by 2.14 index points. The increase in the coefficients is more pronounced in the *Mafia-Specific* index. *Forced Re-settlement* is positive and insignificant in all cases. In Table 3.3 we include three control variables, i.e. *GDP*, *Young Male* and *Density Population.* As before, we consider the two types of migration. Contrary to the previous specifications, we have that the result for *Mafia–Spy* is insignificant. The result for *Mafia-Specific* is greater than the one with only the explanatory variables. The result for *Mafia-Total* is positive and significant. *Forced Re-settlement* is again insignificant and , in the first specification, is negative.

Regarding the control variables, *Young Male* is highly significant and positive. An increase of 1 percent in the rate of young males in the population leads to a rise of 0.33 index points of the *Mafia-Specific* index. This result is consistent with the vast literature on crime that finds young males to be more prone to commit crimes (Entorf and Spengler, 2000b).

GDP is not significant and negative for the *Mafia-Specific* specification. We would have expected it to be significant and positive, reflecting greater business opportunities for Mafia groups. However, it is worth reminding the reader that the North of Italy is quite homogenous in terms of development. *Density Population* plays a negligible role in explaining Mafia presence. This could be consistent with the fact that Mafia groups are active not only in big cities but also in small towns (Dalla Chiesa, 2010).

Before continuing with the instrumental variables results, we need to discuss the *Forced Re-settlement* result. How it is possible that one of the factors considered as an important facilitator of Mafia migration is not significant? As already mentioned, a possible explanation is that we only have the number of criminals who were forced to re-settle. However, we do not know their role. It is logical to think that a boss such as Leggio might facilitate the creation of Mafia networks more than a low profile Mafia member. In particular, we do not know how many Mafia people were attracted to the host regions by the presence of the re-settled person. In this respect, a Mafia member said: “the *confino* has been a really important step. Wherever I went I brought another 5, 6, and 10 (people). I had

my brother: we are four, all quite smart" (CPA, 1994, p.78). Finally, we have data until 1972 although this policy continued for some other time, even though with smaller intensity.

3.5.2 Instrumental variables

As we have said in the previous section, we are quite confident that our migration measure is exogenous to the crime measure. However, we could not completely rule out this eventuality. In this case, the orthogonality condition is violated, rendering our least square estimates biased. In order to correct this problem, we need to find an instrument Z_i which satisfies the condition $E[\,[Z_i(\,u_{it}\,)] = 0$ where u_{it} is the composite error term of the province-specific characteristics, α_i, and the regression error, ε_{it}. Therefore, we need an excluded instrument that is strongly correlated with the endogenous regressor but that is linked to the Mafia measures only via the regressor (Angrist and Pischke, 2009) . Applying an instrumental method will eventually correct omitted variable biases (Angrist, 2001). Fortunately, we have data on migration from 1955 and, so, we decided to consider the migration flows for the period 1955-1960 as an instrument. We believe that this is a suitable instrument for a variety of reasons. First of all, the relevance condition is satisfied. As we have seen in Section 2, migration patterns are highly correlated over time. Moreover, we are considering a significantly large time gap that would impact on crime levels only through the instrumented variable.

As an estimation technique, we use a random effect 2SLS (Woodridge, 2002). The main idea here is just to apply the usual GLS transformation to the instrument and then continue with the standard two stage procedure. Another option was to use the Baltagi's (2004) error components 2SLS (EC2SLS) estimator. The difference from the other one is that instruments are constructed passing a within and between transformation. However, the results between the two are almost identical and, so, we decided to use the former one.

Obviously, we could not use a fixed effects 2SLS because of the presence of time invariant regressors. Also, we also could not employ GMM because we have a just-identified model. However, Baltagi (2006) showed that the use of random effects 2SLS is consistent with the crime equation. In fact, he considered a model of crime using a panel on North

Carolina's counties. In his model[177], there were two endogenous variables and two instruments. He performed a Hausman test based on the difference fixed and random effects 2SLS. Given that he could not reject the null hypothesis of the consistency of the random effects model, he concluded the legitimacy of using a random effects model.

Table 3.4 below shows the random effect 2SLS results. These are in line with the previous results. In particular, the migration variables are strong predictors of Mafia presence.

[177] It is a replication of Cornwell and Trumbull (1994) work.

Table 3. 4 Five years: instrumental variables

	Mafia-Specific	*Mafia-Spy*	*Mafia-Total*	*Mafia-Specific*	*Mafia-Spy*	*Mafia-Total*
Migration All South	2.358***	1.215**	1.664***			
	[0.692]	[0.525]	[0.512]			
Migration Mafia Regions				2.968***	1.526**	2.088***
				[0.874]	[0.671]	[0.649]
Forced Re-settlement	-0.239	0.100	-0.029	-0.241	0.098	-0.032
	[0.503]	[0.382]	[0.373]	[0.494]	[0.379]	[0.367]
GDP	-1.768	2.479	1.672	-1.671	2.556	1.742
	[15.139]	[12.663]	[10.899]	[15.148]	[12.663]	[10.904]
Young Male	0.327***	0.270***	0.301***	0.312**	0.264***	0.291***
	[0.122]	[0.099]	[0.088]	[0.121]	[0.099]	[0.088]
Density Population	-0.002**	-0.000	-0.001	-0.002**	-0.000	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Observations	305	305	305	305	305	305
Provinces	61	61	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R- squared	0.481	0.339	0.477	0.489	0.343	0.484
			First Stage			
Migration All South 1955-60	1.079***					
	[0.017]					
Migration Mafia Regions 1955-60				0.712***		
				[0.032]		
Partial R-squared	0.888			0.846		
F-stat[excluded instruments]	31.2			14.41		

Note: [1] The top part of the table shows the results for the random effects two stage least squares (2SLS) on a panel of five years averaged observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column. *Migration All South* shows the percentage of incoming migrants from all the eight southern regions weighted by the province's population for the period 1965-1970. *Migration Mafia Regions* refers only to migrants from Apulia, Calabria, Campania and Sicily. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] The bottom panel represents the first stage results of the migration measure on its values for the period 1955-60. All the control variables in the top panel are also included in the first stage regression, even though not reported. It also reports the F-statistics which refers to the null hypothesis that the coefficients of the excluded instruments are jointly equal to 0. [3] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [4] All regressions include time and regional fixed effects.

An increase of 1 percent in the number of migrants from all southern regions (*Migration All South 1955-60*) leads to an increase of 2.36 index points. This coefficient is slightly higher than the specification when we did not address endogeneity. The migration measures, both for the entire South and for Mafia regions are now positive and significant also for the *Mafia-spy* index. The magnitude is well above than the previous specification. The coefficient for *Mafia –Total* is greater than before. Again, we find that Mafia presence is greater in provinces with higher rates of migrants coming from regions with a traditional strong presence of organised crime. This confirms the view that migrants might have facilitated Mafia diffusion by providing a cheap labour force for Mafia bosses. *Forced Re-settlement* is always insignificant and even negative for *Mafia-Specific*.

The control variables' results are almost identical to the random effects specification. In particular, *GDP* is positive but never significant. *Young Male* is positive and always significant. An increase in the percentage of young male leads to an increase of *Mafia-Specific*, with migrants from all southern regions, of 0.33 index points. *Density Population* is negative and significant only for *Mafia-Specific*, although the coefficient is negligible.

The first stage results show that our instruments are strongly correlated with the included endogenous regressors. This is particularly true for *Migration Mafia Regions 1955-60* which shows that there is more migration path consistency in the regions with Mafia presence. Moreover, the F-statistic of the random effects first stage for the two specifications are respectively 31.20 and 14.41. These are well above the threshold of 10 recommended by Stock and Yogo (2002). These results, along with the coefficient of the excluded instrument show that we do not have weak instrument problems (Angrist, 2001).

3.5.3 Robustness checks

In order to verify the robustness of our result we consider several sets of tests. First of all, we re-ran the same regressions using the yearly observations, without averaging for 5 years. In this new specification we have far more observations, 1'508. Moreover, we have the advantage of considering yearly time dummies that might take into account political

changes and shocks that happened in particular years[178]. As Table 3.5 below shows we have very similar results to the specifications with average values.

Table 3. 5 All years: main specifications

	Mafia-Specific	*Mafia-Spy*	*Mafia-Total*	*Mafia-Specific*	*Mafia-Spy*	*Mafia-Total*
Migration All South	1.849***	0.575	1.050**			
	[0.612]	[0.461]	[0.487]			
Migration Mafia Regions				2.363***	0.791	1.376**
				[0.762]	[0.562]	[0.600]
Forced Re-settlement	-0.329	-0.024	-0.136	-0.323	-0.013	-0.127
	[0.425]	[0.426]	[0.381]	[0.428]	[0.420]	[0.378]
GDP	-3.767	-7.088	-5.785	-3.733	-7.080	-5.772
	[10.074]	[6.597]	[5.750]	[10.063]	[6.598]	[5.749]
Young Male	0.457***	0.316***	0.383***	0.449***	0.313***	0.379***
	[0.097]	[0.084]	[0.059]	[0.098]	[0.083]	[0.059]
Density Population	-0.001*	0.000	-0.000	-0.001*	0.000	-0.000
	[0.001]	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]
Observations	1,586	1,586	1,586	1,586	1,586	1,586
Provinces	61	61	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R- squared	0.353	0.213	0.355	0.356	0.214	0.358

Note:[1] This table shows the random effects results on a panel of yearly observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column. *Migration All South* represents the percentage of incoming migrants from all the eight southern regions weighted by the province's population for the period 1965-1970. *Migration Mafia Regions* refers only to migrants from Apulia, Calabria, Campania and Sicily. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [3] All regressions include time and regional fixed effects.

[178] For example, the political efforts toward the fight against organised crime.

Table 3. 6 All years: instrumental variables

	Mafia-Specific	*Mafia-Spy*	*Mafia-Total*	*Mafia-Specific*	*Mafia-Spy*	*Mafia-Total*
Migration All South	2.244***	1.118**	1.538***			
	[0.669]	[0.516]	[0.506]			
Migration Mafia Regions				2.809***	1.394**	1.921***
				[0.845]	[0.660]	[0.641]
Forced Re-settlement	-0.243	0.094	-0.029	-0.245	0.091	-0.033
	[0.488]	[0.376]	[0.369]	[0.478]	[0.373]	[0.363]
GDP	-3.840	-7.189	-5.872	-3.790	-7.153	-5.839
	[9.185]	[8.334]	[6.623]	[9.185]	[8.333]	[6.623]
Young Male	0.453***	0.311***	0.379***	0.446***	0.308***	0.375***
	[0.084]	[0.074]	[0.061]	[0.083]	[0.074]	[0.061]
Density Population	-0.002**	-0.000	-0.001	-0.002**	-0.000	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Observations	1,586	1,586	1,586	1,586	1,586	1,586
Provinces	61	61	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R- squared	0.352	0.210	0.352	0.356	0.212	0.356
			First Stage			
Migration All South 1955-60	1.079***					
	[0.017]					
Migration Mafia Regions 1955-60				0.713***		
				[0.014]		
Partial R-squared	0.888			0.846		
F-stat [excluded instruments]	4124.99			2604.19		

Note: [1] The top part of the table shows the results for the random effects two stage least squares (2SLS) on a panel of yearly observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column. *Migration All South* represents the percentage of incoming migrants from all the eight southern regions weighted by the province's population for the period 1965-1970. *Migration Mafia Regions* refers only to migrants from Apulia, Calabria, Campania and Sicily. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] The bottom panel represents the first stage results of the migration measure on its values for the period 1955-60. All the control variables in the top panel are also included in the first stage regression, even though not reported. It also reports the F-statistics which refers to the null hypothesis that the coefficients of the excluded instruments are jointly equal to 0. [3] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [4] All regressions include time and regional fixed effects.

For *Mafia-Specific* we have a coefficient of 1.849 when we use *Migration All South*. In the five years average specification the coefficient was 1.985. Moreover, they are both equally highly significant. Again, the result for *Mafia-Spy* is not significantly different from 0. When we consider *Migration Mafia Regions*¸ an increase of 1 percent in the migrants' share leads to an increase of the *Mafia-Specific* index by 2.363, a bit lower than before. Turning to the control variables, we find similar results with the previous specification.

As expected, the instrumental variable approach leads to analogous conclusions. We find that the coefficient for the migration measures is now significant also for *Mafia-Spy*. In particular, an increase in 1% of *Migration Mafia Regions* is associated with an increase of the *Mafia-Spy* index by 1.12 points. The control variables results do not differ much either. However, the coefficient for *Young Male* is somewhat higher than the one in Table 3.3. As expected, increasing the number of observations leads to an increase in the first stage F statistic.

In the second set of robustness checks, we consider each crime category from the *Mafia–Specific* index separately. Therefore we consider the impact of our explanatory and control variables on *Mafia Murder*, *Not Mafia Murder*, *Mafia–Type Associations* and *Extortion*. The results for the linear random effects are in Table 3.7 and Table 3.8.The ones for instrumental variables in Table 3.9 and Table 3.10[179].

[179] In Table 3.8 we also report the results with the specification with all the years.

Table 3. 7 Five years: Mafia-Specific crime categories: migrations from all regions

	Mafia Murder	*Not Mafia Murder*	*Organised Crime Charge*	*Extortion*
Migration All South	0.029**	0.284**	0.089**	1.967***
	[0.012]	[0.120]	[0.036]	[0.668]
Forced Re-settlement	-0.006	-0.069	-0.034	-0.211
	[0.008]	[0.096]	[0.026]	[0.525]
GDP	0.128	4.754	-0.272	-2.029
	[0.300]	[2.898]	[0.901]	[14.526]
Young Male	0.001	-0.008	0.028***	0.271**
	[0.002]	[0.017]	[0.005]	[0.118]
Density Population	0.000	0.000***	-0.000**	-0.002*
	[0.000]	[0.000]	[0.000]	[0.001]
Observations	305	305	305	305
Provinces	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
R- squared	0.260	0.428	0.209	0.564

Note: [1] This table shows the random effects results on a panel of five years averaged observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column and represent the four offences which compose the *Mafia- Specific* index. *Migration All South* represents the percentage of incoming migrants from all the eight southern regions weighted by the province's population for the period 1965-1970. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [3] All regressions include time and regional fixed effects.

Table 3. 8 Five years: Mafia-Specific crime categories: migration from Mafia- infested regions

	Mafia Murder	*Not Mafia Murder*	*Organised Crime Charge*	*Extortion*
Migration Mafia Regions	0.039***	0.376***	0.117**	2.499***
	[0.015]	[0.145]	[0.046]	[0.822]
Forced Re-settlement	-0.005	-0.066	-0.033	-0.208
	[0.008]	[0.093]	[0.026]	[0.530]
GDP	0.134	4.783*	-0.270	-1.926
	[0.299]	[2.897]	[0.901]	[14.512]
Young Male	0.001	-0.010	0.027***	0.257**
	[0.002]	[0.017]	[0.005]	[0.119]
Density Population	0.000	0.000***	-0.000**	-0.002*
	[0.000]	[0.000]	[0.000]	[0.001]
Observations	305	305	305	305
Provinces	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
R- squared	0.265	0.435	0.214	0.569

Note: [1] This table shows the random effects results on a panel of five years averaged observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column and represent the four offences which compose the *Mafia- Specific* index. *Migration Mafia Regions* represents the percentage of incoming migrants from Apulia, Calabria, Campania and Sicily weighted by the province's population for the period 1965-1970. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [3] All regressions include time and regional fixed effects.

Table 3. 9 Five years: instrumental variables Mafia-Specific crime categories: migration from All Regions (second stage results)

	Mafia Murder	*Not Mafia Murder*	*Organised Crime Charge*	*Extortion*
Migration All South	0.028**	0.349***	0.090**	2.442***
	[0.012]	[0.108]	[0.041]	[0.769]
Forced Re-settlement	-0.006	-0.055	-0.033	-0.109
	[0.009]	[0.079]	[0.030]	[0.560]
GDP	0.128	4.740	-0.273	-2.131
	[0.476]	[3.217]	[1.305]	[16.791]
Young Male	0.001	-0.009	0.028***	0.265*
	[0.003]	[0.023]	[0.009]	[0.135]
Density Population	0.000	0.000**	-0.000**	-0.002**
	[0.000]	[0.000]	[0.000]	[0.001]
Observations	305	305	305	305
Provinces	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
R- squared	0.260	0.427	0.209	0.563

Note: [1] The table reports only the second stage results for the random effects two stage least squares (2SLS) on a panel of five years averaged observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column. *Migration All South* represents the percentage of incoming migrants from all the eight southern regions weighted by the province's population for the period 1965-1970. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [4] All regressions include time and regional fixed effects. [3] All regressions include time and regional fixed effects.

Table 3. 10 Five years: instrumental variables Mafia-Specific crime categories: migration from Mafia- infested regions (second stage results)

`	*Mafia Murder*	*Not Mafia Murder*	*Organised Crime Charge*	*Extortion*
Migration Mafia Regions	0.038**	0.469***	0.112**	3.073***
	[0.016]	[0.137]	[0.052]	[0.978]
Forced Re-settlement	-0.006	-0.050	-0.034	-0.111
	[0.009]	[0.077]	[0.029]	[0.552]
GDP	0.134	4.775	-0.270	-1.996
	[0.474]	[3.214]	[1.304]	[16.805]
Young Male	0.001	-0.012	0.027***	0.249*
	[0.003]	[0.023]	[0.009]	[0.135]
Density Population	0.000	0.000**	-0.000**	-0.002**
	[0.000]	[0.000]	[0.000]	[0.001]
Observations	305	305	305	305
Provinces	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
R- squared	0.265	0.433	0.214	0.567

Note: [1] The table reports only the second stage results for the random effects two stage least squares (2SLS) on a panel of five years averaged observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column. *Migration Mafia Regions* represents the percentage of incoming migrants from Apulia, Calabria, Campania and Sicily weighted by the province's population for the period 1965-1970. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [3] All regressions include time and regional fixed effects.

Table 3. 11 All years: single crime categories

	Mafia Murder	*Not Mafia Murder*	*Organised Crime Charge*	*Extortion*	*Mafia Murder*	*Not Mafia Murder*	*Organised Crime Charge*	*Extortion*
Migration All South	0.028**	0.280**	0.085**	1.836***				
	[0.011]	[0.112]	[0.033]	[0.666]				
Migration Mafia Regions					0.026**	0.323***	0.076**	2.094***
					[0.012]	[0.074]	[0.033]	[0.629]
Forced Re-settlement	-0.006	-0.078	-0.030	-0.248	-0.009	-0.111	-0.042	-0.471
	[0.008]	[0.088]	[0.024]	[0.518]	[0.008]	[0.088]	[0.026]	[0.511]
GDP	-0.083	3.348*	-0.448	-3.059	-0.072	3.397*	-0.423	-2.953
	[0.189]	[1.909]	[0.871]	[11.515]	[0.186]	[1.919]	[0.874]	[11.507]
Young Male	0.002	0.005	0.027***	0.440***	0.003*	0.006	0.028***	0.442***
	[0.002]	[0.020]	[0.006]	[0.097]	[0.001]	[0.021]	[0.006]	[0.098]
Density Population	0.000	0.000***	-0.000**	-0.002	0.000	0.000***	-0.000**	-0.001*
	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]	[0.001]
Observations	1,586	1,586	1,586	1,586	1,586	1,586	1,586	1,586
Provinces	61	61	61	61	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R- squared	0.0912	0.177	0.0710	0.448	0.0898	0.179	0.0689	0.450

Note: [1] This table shows the random effects results on a panel of yearly observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column and represent the four offences which compose the *Mafia- Specific* index. *Migration All South* represents the percentage of incoming migrants from all the eight southern regions weighted by the province's population for the period 1965-1970. *Migration Mafia Regions* refers only to migrants from Apulia, Calabria, Campania and Sicily. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [3] All regressions include time and regional fixed effects.

As expected, the coefficients for *Migration All South* are all positive and significant. Migration has the greatest impact on *Extortion*. An increase of 1 percent migration from all southern regions leads to an increase in the extortion rate per 100'000 inhabitants by 1.97. The smallest effect is the one on *Mafia Murder.* This coefficient is much smaller than *Not Mafia Murder*. However, this result should be interpreted with caution because often Mafia murders are classified as "normal" murders. This is particularly true in the period following the introduction of Mafia-type charges, i.e. 1982. Especially in the Centre-North, it took

some time before the Mafia nature of certain crimes was recognised and recorded. *Forced Re-settlement* is always insignificant. The results in Table 3.8 show that, as before, the biggest channel through which Mafia could transplant in the central and northern regions is given by migrants from Mafia-infested regions. The coefficients for each crime categories are higher than for *Migration all South.* For example for *Organised Crime Charge* the coefficient is now 0.117 whereas in the other model it was 0.089.

With respect to the control variables, we find that *Young Male* is negative and significant only for *Organised Crime Charge* and *Extortion. GDP* is never significant. However, it is positive for the murders measure and negative for the other two crime categories. The results for murders is particularly interesting because in the literature (Fajnzylber et al., 2002) a negative association between development and murder rates is well established. Here, where we consider only quite developed provinces, the direction of this relationship seems to have an opposite sign.

The IV results in Table 3.7 confirm our findings. Again, the coefficients for the migration measures are slightly higher than the linear results.

The third robustness test consists of considering only migration from Campania, Calabria and Sicily. As we have seen in Section 3.2.3, the historical Mafias are Camorra, 'Ndrangheta and la Cosa Nostra. The Apulean Sacra Corona Unita developed more recently. Therefore, the migration from this last region might play a smaller role in the transplantation of Mafia outside their traditional territories. Moreover, migrants coming from Apulia might have been less used to deal with criminal groups compared to those from Campania, Calabria and Sicily. Table 3.12 report the random effects results.

Table 3. 12 Five Years: migration from Campania, Calabria and Sicily

	Mafia-Specific	*Mafia- Spy*	*Mafia- Total*
Migration from Calabria, Campania and Sicily	3.364***	1.140*	1.985***
	[0.878]	[0.676]	[0.688]
Forced Re-settlement	-0.315	-0.015	-0.133
	[0.435]	[0.429]	[0.379]
GDP	-1.444	2.704	1.907
	[13.607]	[6.512]	[6.699]
Young Male	0.300***	0.268***	0.289***
	[0.103]	[0.080]	[0.063]
Density Population	-0.001**	0.000	-0.001
	[0.001]	[0.001]	[0.001]
Observations	305	305	305
Provinces	61	61	61
Regional FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
R- squared	0.502	0.353	0.498

Note: [1] This table shows the random effects results on a panel of five years averaged observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column. *Migration from Calabria, Campania and Sicily* represents the percentage of incoming migrants from all these regions weighted by the province's population for the period 1965-1970. Data are taken by IRPPS. *Forced Re-settlement* is the rate of forced re-settlers for the period 1961-72 weighted by the province's population. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [3] All regressions include time and regional fixed effects.

As we can see, the coefficients of *Three Mafia Regions* are higher than the ones in the last three columns in Table 3.2b. In particular, an increase by 1 percent of migrants' rate leads to an increase of the index by 3.36 points of the *Mafia-Specific* index. This is around 0.81 points more than the counterpart with Apulia as well. Obviously, there are not many differences for the other variables.

Finally, in the last set of robustness tests, we consider forced re-settlement in levels rather than in rates. The reason for doing so is that it could be argued that in provinces as Milan or Turin, weighting the number of forced re-settlers for the population might lead to very low rates. In turn, this would under-estimate the true impact of this policy in these provinces. In order to take into account this eventuality we consider the absolute number of re-settled people.

Table 3. 13 Five Years: forced re-settlement levels

	Mafia-Specific	*Mafia-Spy*	*Mafia- Total*	*Mafia-Specific*	*Mafia-Spy*	*Mafia-Total*
Migration All South	2.017***	0.591	1.137**			
	[0.597]	[0.425]	[0.461]			
Migration Mafia Regions				2.585***	0.811	1.488***
				[0.745]	[0.521]	[0.570]
Forced Re-settlement Levels	-0.011	-0.004	-0.007	-0.011	-0.004	-0.007
	[0.009]	[0.007]	[0.007]	[0.009]	[0.007]	[0.007]
GDP	-0.859	2.842	2.205	-0.752	2.856	2.247
	[13.990]	[6.359]	[6.752]	[13.983]	[6.364]	[6.767]
Young Male	0.341***	0.280***	0.311***	0.326***	0.275***	0.302***
	[0.104]	[0.082]	[0.066]	[0.105]	[0.081]	[0.065]
Density Population	-0.001*	0.000	-0.000	-0.001*	0.000	-0.000
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Observations	305	305	305	305	305	305
Provinces	61	61	61	61	61	61
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R- squared	0.485	0.348	0.485	0.493	0.351	0.491

Note: [1] This table shows the random effects results on a panel of five years averaged observations for the central and northern Italian provinces. The dependent variables are showed at the top of each column. *Migration All South* represents the percentage of incoming migrants from all the eight southern regions weighted by the province's population for the period 1965-1970. *Migration Mafia Regions* refers only to migrants from Apulia, Calabria, Campania and Sicily. Data are taken by IRPPS. *Forced Re-settlement Levels* is the total numbers of forced re-settlers that went to the province in the period 1961-72. Data are taken by CPA (1976). All others variables' description can be found in the appendix. [2] For each regression, robust standard errors clustered at the provincial level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%. [3] All regressions include time and regional fixed effects.

The results are given in Table 3.13. Indeed *Forced Re-settlement Levels* is never significant as before. Moreover, it is slightly negative in all the specifications. This means that the way we consider this variable, in rate or levels, does not affect the results.

3.6. Conclusions and further research

This paper analysed an under-explored field of economic research: the transplantation of the southern based Italian criminal groups to the central and northern Italian regions. Lately, this topic is receiving much attention from historians and sociologists (Sciarrone, 2009; Forgione, 2009) who showed how Mafias became more entrenched in the socio-economic life of these areas. Despite this, there are not contributions from economists who can offer insights using econometric techniques. Our research question was exploring the factors that might have facilitated the expansion of Mafias in not-traditional territories in the North of Italy.

We make several contributions to the literature. First, we improve the measurement of Mafia presence. The existing literature (Peri, 2004; Daniele and Mariani, 2011) has used murder rates or employed indices summing crime rates. We created three Mafia indices where each crime has the same weight. We did so because the indistinct summations of crime rates assign too much "importance" to high frequency crimes. We selected the crimes following the reports by the DIA, which is a national agency dedicated to the fight against organised crime. Our major interest is on *Mafia-Specific* index which includes the typical Mafia-type offences. In order to empirically answer this question, we constructed a panel dataset from 1983 until 2008 using previously unused primary source data for the central and northern provinces.

The historical and sociological literature on Mafia transplantation stressed the role of migration and forced re-settlement in influencing Mafia transplantation. The first is thought to have facilitated Mafia spread because Mafia bosses might have exploited migrants' networks in the hosting regions. In particular, it is thought that when Mafia started to control sectors as construction and earth movement, it recruited heavily amongst migrants. Moreover, southern migrants were used back home to dealing with criminal organisations and might have not provided a strong opposition to their expansion. We considered the amount of southern migrants that each central and northern province hosted in the period 1965-1970. Most likely migrants from southern Mafia regions might have been associated with more possibilities for Mafia to develop. Therefore, we also considered migration from the four Mafia-infested regions, along with total migration from the South. Forced re-

settlement was a policy implemented in mid 1950s that facilitated relocation of southern criminals to social capital rich areas in central and northern of Italy. It is thought to have been a Mafia spread facilitator because it failed to account the improvements in the system of transports and communication. Therefore, relocated Mafia members were not isolated and could rule from the North. We managed to find the number of criminals that each of the central and northern province hosted for the period 1961-1972. As control variables we included: the level of development, the percentage of young males and the density of population.

We found that migration is the most important predictor of Mafia transplantation to the North. In the baseline regression (Table 3.2) we find that an increase of 1% in southern migrants in the hosting province leads to an increase in the Mafia index by 1.6 point. Moreover, we find that if we restrict our attention to migrants from the four Mafia-infested regions, this effect is even larger by 0.554 points. This result is consistent when we instrument migration by its lagged measure for the period 1955-1960. We further find that forced re-settlement is not a channel for Mafia expansion in all the specifications. Probably what matters is not the number of criminals transferred to the central and northern regions but their "quality". For example, their role in the organisation or their ability of attracting other Mafia members to the North might be more important. Amongst the control variables, only the rate of young men in the population seems to significantly and positively affect the presence of Mafia. Interestingly, the level of development does not seem to have affected Mafia migration.

Our results are robust to various checks. In particular, we find that migration from the three regions where Mafia was historically rooted play the biggest role. Moreover, we also checked whether the absolute number, and not the rate, of forced re-settlers affected Mafia spread. Again we found that this was not the case.

Finally, ours is the first attempt to model the determinants of Mafia movements outside their original territories. We decided to focus on the two factors that are supposed to have played a major role in explaining Mafia migration. Indeed, this field of research looks promising. One of the avenues that future research might take is to consider the other factors supposed to foster Mafia transplantation (CPA, 1976) we were unable to consider here. For example, it would be interesting to look at the role of the drug business or the creation of new opportunities in the legal sector.

3.7 Appendix

3.7.1 Variables: definition and sources

Mafia–Specific: Index which considers Mafia murders, general murders, extortions and Mafia-type criminal associations. In the text it is explained how we constructed the index. Source: Statistiche Giudiziarie Penali- Italian National Institute of Statistics (ISTAT).

Mafia-Spy: Index that considers general criminal associations, bomb or fire attacks, kidnapping with extortionist purposes, murders and arsons. In the text it is explained how we constructed the index. Source: Statistiche Giudiziarie Penali- Italian National Institute of Statistics (ISTAT).

Mafia-Total: Index that considers all the crimes from Mafia-specific and Mafia-spy. The index is constructed as the other two. Source: Statistiche Giudiziarie Penali- Italian National Institute of Statistics (ISTAT).

Mafia Murder: Mafia related murders per 100'000 inhabitants. Source: Statistiche Giudiziarie Penali- Italian National Institute of Statistics (ISTAT).

Not Mafia Murder: Total killings, minus the Mafia related ones, per 100'000 inhabitants. Source: Statistiche Giudiziarie Penali- Italian National Institute of Statistics (ISTAT).

Extortion: Extortions per 100'000 inhabitants Source: Statistiche Giudiziarie Penali- ItalianNational Institute of Statistics (ISTAT).

Org Crime Charge: Mafia-type criminal associations (Art 416-bis) per 100'000 inhabitants Source: Statistiche Giudiziarie Penali- Italian National Institute of Statistics (ISTAT).

Migration All South: Migrants from all southern provinces per 100 inhabitants of destination province for the period 1965-1970. Source: IRPPS

Migration Mafia Regions: Migrants from Calabria, Campania, Apulia and Sicily per 100 inhabitants of destination province for the period 1965-1970. Source: IRPPS.

Migration All South 1955-60: Migrants from all southern provinces per 100 inhabitants of destination province for the period 1955-1960. Source: IRPPS.

Migration Mafia Regions 1955-60: Migrants from Calabria, Campania, Apulia and Sicily per 100 inhabitants of destination province for the period 1955-1960. Source: IRPPS.

Migration from Calabria, Campania and Sicily: Migrants from Calabria, Campania and Sicily per 100 inhabitants of destination province for the period 1965-1970. Source: IRPPS.

Forced Re-settlement: Number of criminals hosted by province following a forced re-settlement act. The data are weighted per 100'000 people of the destination province's population. Source: CPA (1976).

GDP: Gross Domestic Product per capita at constant prices of the year 2000. Source: Italian National Institute of Statistics (ISTAT).

Density Population: Population per square km. Source: Italian National Institute of Statistics (ISTAT).

Young Male: Rate of young male aged 19-29 on total population. Source: Italian National Institute of Statistics (ISTAT).

3.7.2 Tables

Table 3. 14. Indexes description

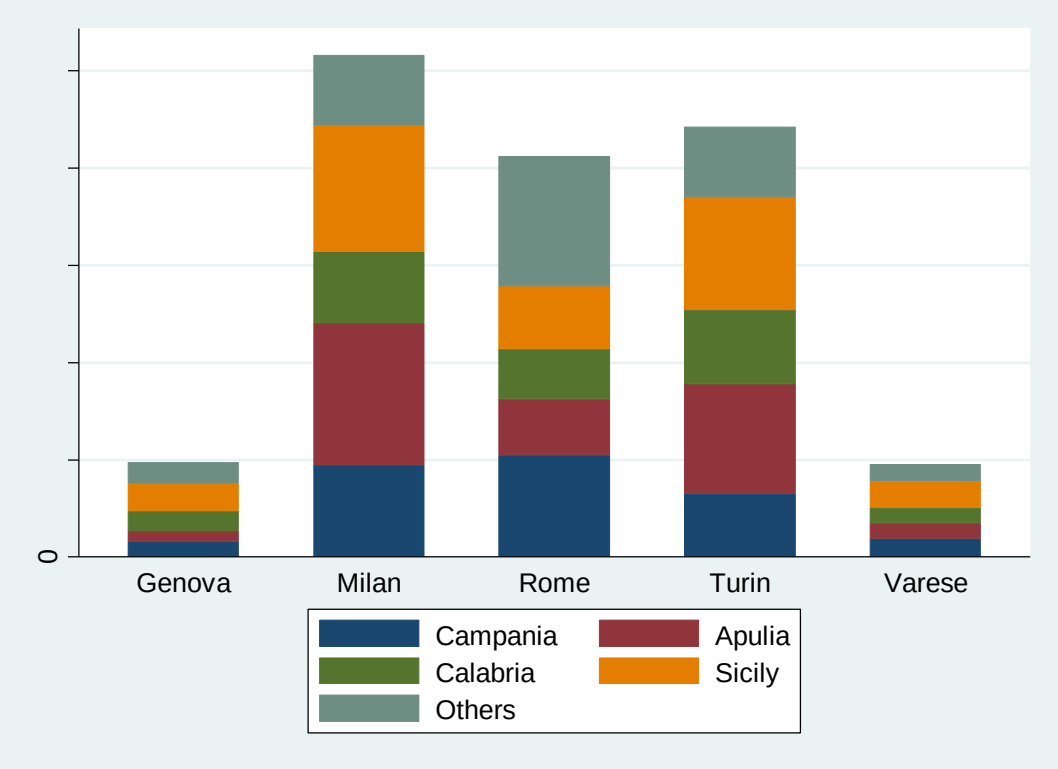
Index	*Crimes Included*	*Methodology*	*Sources*
Mafia–Specific	Mafia murders, general murders, extortions and Mafia-type criminal associations	α is a variable comprised between 0 and 1 where every crime rate (i) at the provincial level is proportional to the rate of the province with the highest value, set at 1. *Set* N the number of crime rates we are considering, the measure is given by: $Mafia\ Index = (\frac{\sum \alpha_i}{N}) * 100$	Statistiche Giudiziarie Penali- Italian National Institute of Statistics (ISTAT).
Mafia-Spy	General criminal associations, bomb or fire attacks, kidnapping with extortionist purposes, murders and arsons.		Statistiche Giudiziarie Penali- Italian National Institute of Statistics (ISTAT).
Mafia-Total	All the crimes from Mafia-specific and Mafia-spy		Statistiche Giudiziarie Penali- Italian National Institute of Statistics (ISTAT).

Table 3. 15 Correlation table amongst indexes

	Mafia–Specific	Mafia–Spy	Mafia–Total
Mafia–Specific	1		
Mafia–Spy	0.7776	1	
Mafia–Total	0.9378	0.9475	1

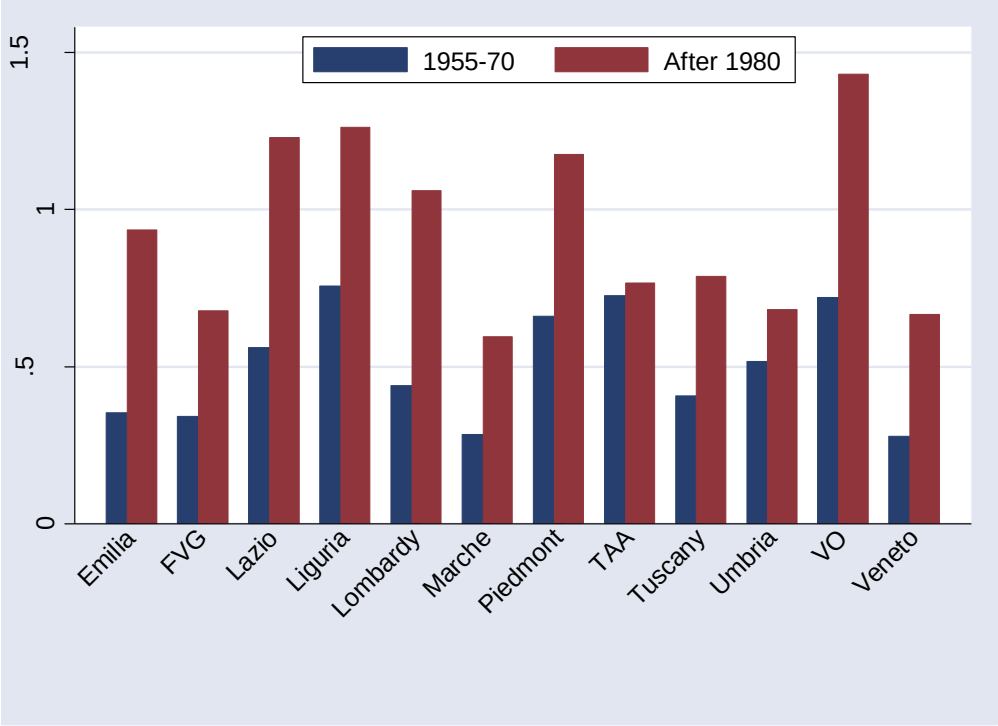
3.7.3 Figures

Figure 3.15 Main destination provinces by region of origins



Source: IRPPS.

Figure 3.16 Average murder rates before and after Mafia expansion



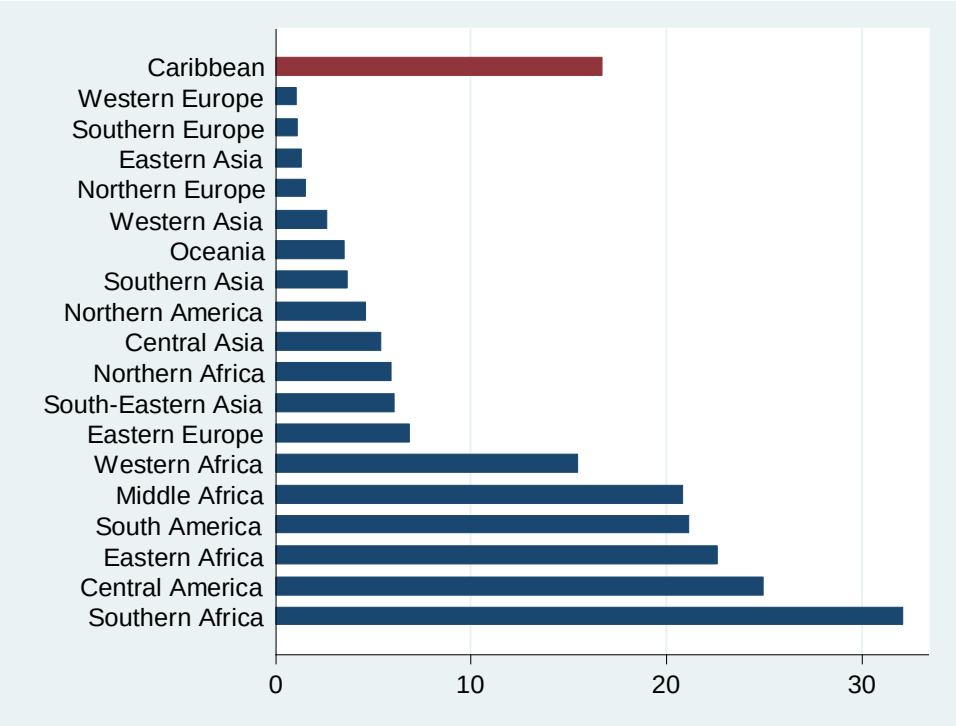
Note: crime rates (per 100'000 inhabitants) based on data from ISTAT. Emilia stands for Emilia Romagna, FVG for Friuli Venezia Giulia and VO for Valle d'Aosta.

Chapter 4: **Trust and victimization: evidence from five Caribbean countries**

4.1 Introduction and motivations

According to the United Nations Office on Drugs and Crime (UNODC), murder rates in the Caribbean region are one of the highest in the world. This can be seen from Figure 4.1. Despite the few reliable statistics, it seems that Caribbean countries present abnormally high rates in other crime categories too[180]. As illustrated in Figure 4.2, crime and security worry citizens in this regions more than any other issue.

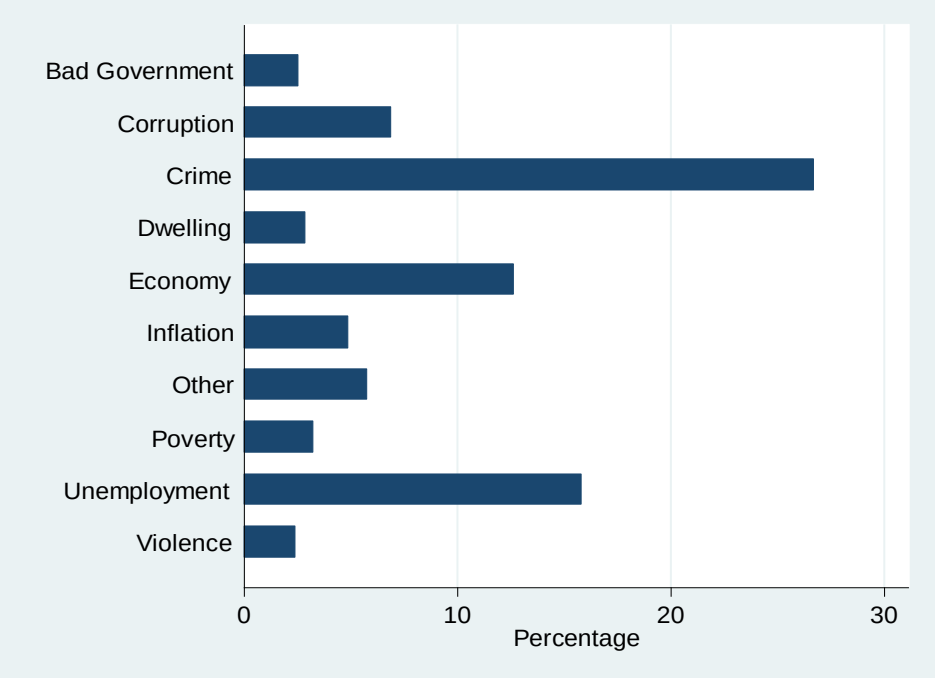
Figure 4.1 Murder rates across subcontinents



Note: Data are taken from UNODC (2012) which gather information from various sources, such as the World Health organization (WHO), Pan American Health Organization (PAHO) and national statistical office. They refer to the latest available year. Each crime is weighted by the resident population in that year.

[180] For example, in the WB-UNODC (2007) there is a table based on data from different editions of the UN crime survey on rape. The findings show that Caribbean countries have some of the highest rates.

Figure 4.2 Most serious issues faced in the five countries



Note: Data are personal elaborations based on Lapop (2012). Individuals were asked "Most serious problem faced by your country?" and were given a series of alternatives. The countries considered are the five of this study

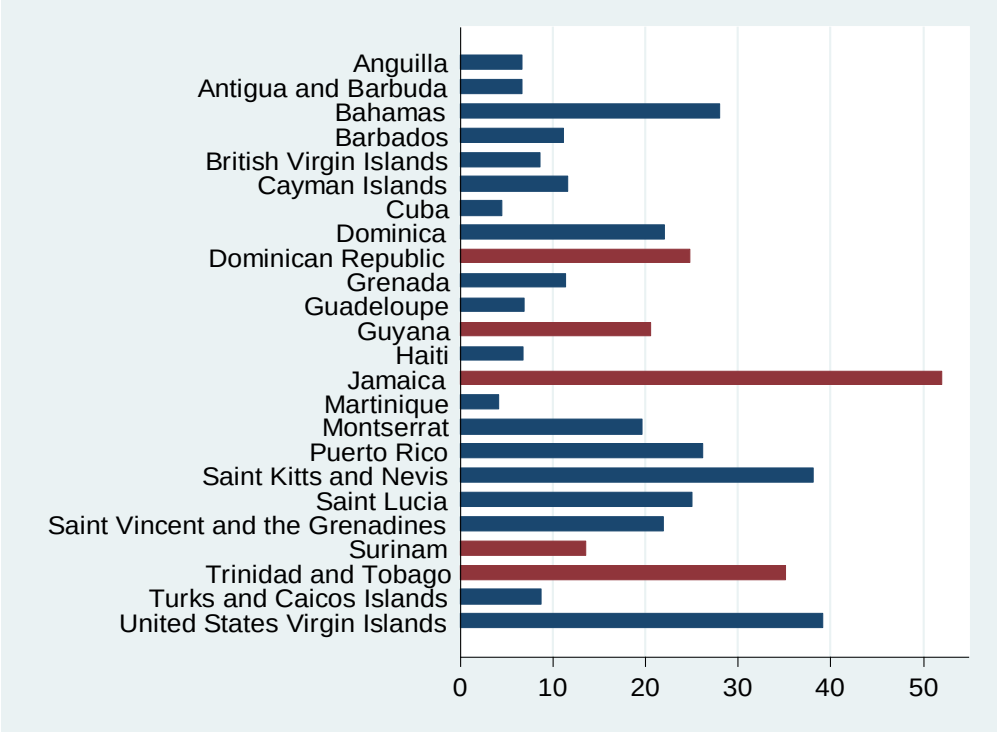
In order to understand this phenomenon, many explanations have been offered. Some authors stress the geography of Caribbean states which are located in between the southern American drug-producing and the North American drug-consuming countries (Klein et al., 2004). In the last few years, these states became major transhipment harbours for drugs going to USA and Canada[181]. The surge in drug trafficking attracted and was facilitated by many criminal organizations that sought to exploit this profitable market (USDS, 2011). Another major issue that is recognised as playing a key role is the constant influx of criminal deportees from Canada, USA and UK (UNODC-WB, 2007)[182]. In fact, it is common practice to send back Caribbean criminals to their countries of origins. In turn, this might have a crime inducing effects (Jamaica Gleaner, 2006). Others stress the role of the increased availability of guns (The Economist, 2008) [183].

The criminal situation in the Caribbean is not the same all over the region and there are relevant intra-country differences, as illustrated in Figure 4.3. For example, Jamaica has one

[181] Of course, the geographical disadvantage is strong in other countries too. For example, some Mexican regions became controlled by gangs which exploit this business.
[182] This phenomenon does not involve all the countries but it especially applies to Jamaica, Trinidad and Tobago and Guyana.
[183] In this case, the route of trade is the opposite of the drug one. In fact, guns are bought mainly from the USA.

of the highest murder rates in the world. Its murder rate has stayed above 35 per 100'000 inhabitants for more than a decade (The Economist, 2008). Countries like Cuba and Barbados are not in such critical situation, although they still have very high crime rates compared to other regions of the world.

Figure 4.3 Murder rates in Caribbean countries



Note: Data are taken from UNODC which gather information from various sources, such as the World Health organization (WHO), Pan American Health Organization (PAHO) and national statistical office. They refer to the latest available year. Each crime is weighted by the resident population in that year. Red columns stand for the countries included in this study.

Regional and international actors are becoming progressively more involved in the fight of criminal practices. For example, the CARICOM group[184] has created the Implementation Agency for Crime and Security (IMPACS), based in Trinidad and Tobago[185]. Several international organizations are active in the area. For example, the World Bank and the United Nations Office on Drugs and Crime (2007) have produced a comprehensive report on this topic. Moreover, many other projects are in the pipeline by other major organizations

[184] A union of Caribbean countries.
[185] This agency promotes co-ordination in crime security initiatives amongst the CARICOM member states.

such as the Inter American Development Bank (IADB), Organization of American States and United Nations Development Programme (UNDP)[186].

Despite this growing interest, academic contributions, especially from economists, is quite scarce, except for few examples (Gilbert and Sookram, 2010; Saridakis et al., 2009). We intend to enrich the existing literature, by analysing the role of trust on victimization rates in five countries: the Dominican Republic, Jamaica, Trinidad and Tobago, Suriname and Guyana. As it is well established in the literature, higher levels of trust have a beneficial effect on many socio-economic variables such as growth and financial decisions (Keefer and Knack, 1997; Guiso et al., 2004). These works mainly use macro data at the national level (Buonanno et al., 2009; Lederman et al., 2002). They found partial evidence of a crime-reducing role of social capital. However, little attention has been devoted to analyzing its role in determining crime levels.

In order to contribute to the existing literature, we use individual data from Americas Barometer that allow us not only to have a much higher number of observations but also to assess the determinants of victimization at the individual level. We consider three specifications: one with all crimes, one for property and the last for violent crimes. We also control for a variety of individual and local characteristics that are likely to influence victimization experience. Given the endogeneity of our social capital measure, trust, and the presence of omitted variables we use an instrumental variable technique. In particular, we use trust in elections as instrument for trust. The model with the endogenous trust measure shows the negative relationship between crime and trust in all the specifications. However, when we implement an instrumental variable approach we find evidence that trust causes reduction for the comprehensive crime measure and for property crimes. We do not find evidence of a crime reducing effect of trust for violent crimes. Sensitivity and robustness checks confirm our results. Finally, we also consider separate single country regressions in order to verify possible heterogeneity amongst them. This is particularly interesting to evaluate differences with the standard literature that started with Becker's (1968) seminal work.

[186] With the term 'active' we mean that these organizations are running both citizen security programs and conducting analyses which will facilitate a better understanding of the crime problems faced by these countries.

The chapter is organised as follows. In the second section, we review the (scarce) economics of crime literature in the Caribbean, the works on social capital and the few works which link social capital and crime. In the third section, we explore the data and in particular the crime and social capital measures. In the fourth, we consider the econometric issues. In the fifth section, we present the main results. In section 6 we perform the robustness checks and in the seventh we show the single country results. The conclusions follow with the summary of the major results and ideas for future research.

4.2 Theory and literature review

4.2.1 Economics of crime in the Caribbean

As demonstrated above, crime is a major issue in the Caribbean. Nevertheless, there are few economics papers on crime in this region, whereas there is a more robust literature for continental South America (Di Tella et al., 2010; Gaviria and Pagés, 2002). In particular, there are few contributions which analyse this topic in a multi country approach. This is mainly explained by the lack of directly comparable statistics amongst countries: few Caribbean countries adhere to the UN crime trends databases that record crimes according to standardized crime definitions (UNCTS). Moreover, the same problem applies to the International Crime Victimization Survey (ICVS), with Barbados being the only Caribbean country participating. Some authors have used national recorded statistics to analyse different countries. For example, Bennet et al. (1997) considered the determinants of crime in Barbados, Jamaica and Trinidad and Tobago. All these countries have a similar cultural and legal heritage, being former English colonies. The authors gathered data from 1975 to 1995 on a variety of crimes: homicides, rape, burglary etc. All the data were taken from governmental agencies. They ran correlation analyses using a variety of social and economic factors such as inequality, youth population, urbanization, unemployment, GDP, inflation and private consumption. They found little evidence of a significant correlation for each crime separately. Moreover, economic variables do not predict homicides well. In general, the results for violent crimes are not very robust and show great differences amongst each country. Property crimes are also quite problematic, as the authors find that some socio-

economic variables affect crime in different ways in different countries. For example, all the seven explanatory variables employed have different signs for Barbados and Jamaica. Even when they considered the macro category of violent and property crimes, the results are mixed[187]. The authors concluded that the standard model of crime (Becker, 1968; Ehrlich, 1973) might not be adequate in explaining crime in this region, although they recognise that more sophisticated statistical models are needed.

There are more single country studies but only for some, not all countries. This is the case for Jamaica, Barbados and Trinidad and Tobago[188]. Gilbert and Sookram (2010) analysed the determinants of crime in Jamaica. In particular, the authors were interested in the relationship between clear up rates, the size of the police force and socio-economic factors, such as social spending. They considered the period 1978-2008. The data were taken from the "Economic and Social Survey Jamaica"(ESSJ) and a VAR strategy was employed. They found that all these variables were important in explaining levels of violent crimes and, amongst them, the size of the police force was the most important one. They also found that clear up rates is not *granger* causing violent crimes. Another important work on Jamaica is that of Alleyne and Boxill (2003) that investigated the impact of crime on tourism arrivals. They employed a rich dataset for the period 1960-1999 and used an ARMA model. As additional variables, they considered the GDP in the USA, the main origin country of tourists, and expenditure on tourism advertising. Moreover, they separated arrivals from Europe and other regions. They found that crime exerts a small negative impact, and the effect is stronger for European arrivals.

Saridakis et al. (2009) focused on Trinidad and Tobago. This work studied the relationship between the clearance rate[189], the unemployment rate, the percentage of the labour force with tertiary education and the percentage of females in employment with serious crime in Trinidad and Tobago over the last four decades. Data were taken from the Central Statistical Office (CSO). Again, they employed an unrestricted VAR model. They found that all four variables had an impact on crime. In particular, the results demonstrated a strong negative relationship between crime and clear-up rates. This relationship is positive

[187] For example, inequality is negatively associated with burglary for Barbados and positively with Jamaica. Inflation has opposite signs for both countries.
[188] These are also the countries where the campuses of the University of West Indies (UWI) are located. This university is quite active in the field of economics of crime.
[189] Defined by the rate of cleared crimes on the total amount of committed crimes.

with unemployment, the percentage of females in employment and the percentage of people with tertiary education.

Warner and Greenidge (2001) considered the determinants of crime in Barbados. They used reported crime data to the police for the period 1980-1999. In particular, they considered house breaking, manslaughter, murder, rape and drug-related crime. As explanatory variables, they considered three for deterrence: the number of police per capita, per capita police expenditures, and prison overcrowding. As socio-economic variables they used population size, growth in GDP and the unemployment rate. They employed a simultaneous equation technique to take into consideration the endogeneity of deterrence variables. They found that, amongst the deterrence variables, all were negatively related to crime except prison overcrowding. Moreover, they found that GDP growth was negatively related to crime whereas positively with education. Along with these, there are other papers which analysed crime in the region (Nowak, 2001).

As demonstrated above, the existing literature on the economics of crime in this region is scarce and it covers only few countries. In order to fill some gaps we aim at studying the impact of trust on victimization rates. To our knowledge, no studies on the Caribbean have considered the role of social capital, and trust in particular. We believe that this analysis contributes to our understanding of the heterogeneity of crime experiences in such region of the world.

4.2.2 What is trust?

The concept of social capital has been widely used by sociologists since the 1970s[190]. However, it is only from the beginning of the 1990s that economists became interested in the topic. This is mainly the result of the pioneering work by Putnam et al. (1993). Their work analysed how the current heterogeneity in institutional efficiency[191] between the north and the south of Italy can be explained by the differences in social capital endowments between the two areas. The authors defined social capital as civic engagement which they proxied by voter turnout, newspaper readership, membership in choral societies

[190] However, it is supposed that the term was first employed in 1916 by L. J. Hanifan, as mentioned by Putnam (2000).

[191] As proxy for institutional quality, they considered the efficiency of Italian regions in different areas of intervention such as agriculture and health.

and football clubs, and confidence in public institutions. Moreover, since social capital is a very slowly changing variable, the authors argued that current levels are strongly correlated with past levels. In particular, they noted a strong correlation with Medieval Italy. In a subsequent work, Putnam (1995) provided a broader definition of social capital, which included norms and trust. In this approach, social capital is the "features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (ibid., p.6, 7)[192]. From an economic point of view, this suggests that one of the main consequences of social capital is that it reduces transaction costs. This is due to the fact that the costs of enforcing contracts decrease with high levels of social capital.

Other authors provide important definitions of this concept. For example, Coleman (1990, p.302) argued that "social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: they all consist of some aspect of social structure, and they facilitate certain actions of individuals who are within the structure". His definition captures the heterogeneity of those factors that constitute social capital[193]. In our analysis, we focus on a prominent aspect of social capital: trust[194]. Amongst the scholars who defined social capital, Fukuyama (1999) has focused mostly on trust. He argued that "social capital can be defined simply as an instantiated set of informal values or norms shared among members of a group that permits them to cooperate with one another. If members of the group come to expect that others will behave reliably and honestly, then they will come to trust one another. Trust acts like a

[192] As we noted in the introductory chapter, new institutionalist economists place a great emphasis on the role of social capital. In particular, North classified them as informal institutions and recognised that they play a major role in societies. Williamson (2000) placed them in the first level of his institutional ladder. He defined them as the social embeddedness level which includes norms and costumes. These types of social arrangements change very slowly over time, in the order of centuries and millenniums.

[193] That social capital is a multi-faceted concept has been highlighted, amongst the others, by Dasgupta and Sarageldin (2000).

[194] The relationship between social capital and trust is quite debated in the literature. According to Putnam (1993), Coleman (1990) and Fukuyama (1999), trust is an important feature of social capital. In particular, trust is a precondition for the existence of social capital. For example, Coleman (1988) affirmed that a system of mutual trust is an important form of social capital. Moreover, the author says that future obligations and expectations will be based on these features. Also relevant for our analysis, Francois (2003) argued that trustworthiness is a very economically important component of the culture of a society which includes its social capital. Alternatively, it could be considered as one of social capital consequences (Woolcock, 1998). Despite the causality debate, the majority of authors agree on the strong correlation between social capital and trust.

lubricant that makes any group or organization run more efficiently" (ibid., p.16)[195]. Trust amongst people is a facilitator of relationship (trade) between countries which allows organizations to reduce transaction costs. Moreover, it is a substitute for formal contracts because people are generally perceived as trustworthy. As a consequence, they have less incentive to protect themselves through contracts compared to low social capital areas (Becchetti and Conzo, 2010).

Starting from these assumptions, a literature developed which analysed how trust, and social capital in general, impacts on a variety of institutional and socio-economic outcomes. Scholars have studied its impact on growth from different perspectives. Keefer and Knack (1997) is one of the seminal works in this field. The authors used a Solow framework in a cross country regression with 29 market economies. As a proxy for social capital, they used indices of civic cooperation and trust in other people, taken from the World Values Surveys (WVS) questionnaires. Their hypothesis was that higher trusting countries should also be those with higher level of growth. In order to address endogeneity, they instrumented trust with the rate of law students in the population in 1963 and the percentage of the largest "ethnolinguistic" group. They found that an increase by one standard deviation of the trust measure led to an increase as high as one and half standard deviation of economic growth. However, their econometric specification has been heavily criticized by Durlauf (2002)[196]. Many other papers analysed this relationship using more sophisticated econometric techniques. For example, as an instrument for trust, Algan and Cahuc (2010) considered inherited trust of descendants of past migrants in the USA. This is because this measure is highly correlated with country of origins of migrants and the timing of arrival. In this way, they found robust evidence of its (positive) effect on growth[197]. Tabellini (2010) analysed the impact of culture on growth in Europe. Amongst the cultural variables, he considered a measure of trust. As instrument for this, the author employed two historical variables, i.e. the literacy rate at the end of the XIX century, and the form of ancient political institutions. Again, the author found strong evidence that cultural traits have a strong impact on development[198]. Another major role played by trust is on organizations' efficiency and

[195] Going back, Arrow (1972, p. 357) argued that "much of the economic backwardness in the world can be explained by the lack of mutual confidence".
[196] For example, Durlauf criticized the choice of the instruments and the few growth determinants employed.
[197] Beugelsdijl et al (2004) also analysed this question.
[198] Also Knack and Zak (2001) focused on the link between trust and growth.

particularly that of institutions. One of the pioneering works on this topic is La Porta et al. (1997) who considered the role of trust in determining judicial efficiency, corruption, bureaucratic quality, tax compliance and other variables. They found the effect to be quite strong: a standard deviation increase in trust leads to 0.7 standard deviation increase in the judicial efficiency score. However, this work did not consider endogeneity of trust with respect to effectiveness measures. This could be misleading as judicial efficiency could affect trust in turn.

Many other socio-economic outcomes have been associated with trust. Guiso et al. (2004) explored the link between social capital and financial development in Italy. These authors argued that social capital is a major determinant of trust and that "financial contracts are trust intensive contracts par excellence" (ibid., p.526). As a proxy for social capital, they used blood donation and electoral turnout, both of which are thought to represent civicness. Guiso et al. investigated this question using individual data from the Italian Survey on Households and Wealth (SHIW). Their findings demonstrated that people with higher levels of social capital make fewer payments by cash, invest more in stocks and obtain credit more easily compared with low social capital individuals. Guiso et al. (2009) looked at how bilateral trust influences trade and investment in two countries. Their OLS results showed that an increase by a standard deviation in the importer's trust toward the exporter has the effect of increasing bilateral trade by 10%. Moreover, they found a positive relationship also with FDI and portfolio investments. However, when they instrumented trust with cultural characteristics they noticed an abnormal increase in coefficients. Therefore, they suspected that their instruments might not be adequate. Uslaner (2004) found that more trustworthy societies have also lower corruption level. The problem is that trust is a slowly changing variable and, so, from this perspective, it is hard to fight corruption.

As we have seen, trust is likely to affect many different socio-economic variables. These studies suggest that trust reduces transaction and enforcements costs, and improves sense of responsibility and respect of norms. Despite this growing body of evidence, economists have devoted little attention to our understanding of the nexus with crime.

4.2.3 Trust and crime: theory and empirical evidence

Whether social capital and trust in particular, is affecting crime decisions at all is a recent and promising field of research. Indeed, the (scarce) theoretical and empirical literature shows a crime reducing effect.

Following the standard expected utility model applied to the criminal choice (Becker 1968; Ehrlich 1973), we can see the channels through which higher level of trust can lead to decreased victimization.

First of all, high level of trust increases the probability of being caught by the police. This happens through two channels. Firstly, trust rich societies exert more efficient informal surveillance at the local level. This is well explained by Sampson and Wilson (1995, p.8) who argued that "it is hypothesized that communities lacking in social cohesion (social capital) are less effective in exerting informal means of social control through establishing and maintaining norms to reduce violence compared to communities with higher levels of social capital". On the same line, Bellair (1997, p.683) argued that "communities with extensive networks are assumed to be more integrated and cohesive, and the residents more likely to engage in informal surveillance, to develop movement-governing rules, and to intervene in disturbances". The second channel is that trust enhances also the efficiency of the criminal law system and police efficiency. This is mainly due to the reduction of transaction costs (Fukuyama, 1999) which improve the efficiency of all types of organisation, even those involved in the crime fighting activities.

An increase in the probability of being arrested, due to improvement of the criminal law system or of informal surveillance, will lower the expected utility of the average criminal. Crime will then pay less in such societies.

Secondly, it increases the costs associated with crime. In fact, high trusting societies might increase the psychological cost as the stigma ones (Rasmussen, 1996). Such types of costs are due to the high level of interconnectedness between people. Again, the higher these extra costs for the criminal the less likely that he/ she will commit a crime.

Thirdly, trust softens the consequences of conflicts. This is well explained by Lederman et al. (2002, p.510) who argued that social capital "allows for peaceful resolution of conflicts, both interpersonal (at home, in the neighbourhood or workplace) and societal (such as a perceived unfair distribution of economic opportunities)". The reason is that

people reach agreement more easily than low trust societies. As a consequence, there will be fewer opportunities for committing crime.

Indeed, trust, and social capital, might be particularly important in developing countries such as the Caribbean ones where the rule of law is very weak. As we argued in the introductory chapter, in such contexts social capital might function as a substitute for legal enforcement in deterring crime[199].

On the other hand, social capital might also have negative effects and increase the number of crimes. In order to explain why this might be the case, it is useful to refer to the notion of bridging and bonding groups (Putnam, 2000). Beyerlein and Hipp (2005) claimed that bridging groups "establish connections with others outside their group increase social capital at the community level by expanding the overall network structures of the communities in which they are embedded" (ibid., p.994). On the other hand, bonding groups are supposed to increase the level of social capital only inside their own groups and, eventually, reduce community level social capital. The typical example of the latter is given by Banfield (1958) who defined the so–called "amoral familism" of the south of Italy. He argued that southern Italians have very strong family ties but are less trustful toward the rest of society.

If in a society there is a prevalence of bonding rather than bridging group, this could lead to greater level of crime rather than fewer (Beyerlein and Hipp, 2005)[200]. This could be even more problematic if the group is a criminal one. In this case, a greater level of trust amongst gang members would certainly lead to increases in crime and violence.

Rubio (1997) provided a clarifying example of different types of social capital in Colombia. The author affirmed that in this country there are two opposite types of social capital: a "productive" and a "perverse" one. The former is the positive one which stimulates economic growth. In the latter the rent- seeking behaviour and political activities

[199] Unfortunately, there are no studies which assessed the interaction of social capital and formal institutions in deterring crime. However, as we argued in the introduction, in Ollson and Pelle (2009) social capital exerts a bigger impact on growth in countries where the formal institutions are weak.

[200] Beyerlein and Hipp (2005) considered religious adherence as a proxy for bridging and bonding groups. They argued that typical Protestants and Catholics promote community wide social capital that is associated with less crime. On the other hand, evangelical Protestants, focus mainly on the wealth of their inner members. In turn, this will increase thin trust and lead to higher levels of crimes. They consider the percentage of adherents to each religion in the population as main explanatory variable, along with other control variables, and various crime categories as dependent variables. They found evidence that bridging religions reduce crime rates whereas bonding ones are associated with higher levels.

are detrimental to the growth. The two types of social capital can live together. As an example, Rubio talked about the region of Antinoquia where "some cultural characteristics that facilitated the accumulation of productive social capital, as trust, were also determining elements for the development of perverse social capital, such as trust, were also determining elements for the development of perverse social capital. The fact that the first major advances in exporting cocaine from Meddellin were based on trust relationship among the shipping partners has been relatively well documented" (Rubio 1997, p. 89). Therefore, cartels exploited the general low level of trust of a society to dominate more efficiently illegal businesses.

Similar analysis could be made about the Southern Italian mafias. In fact, Sicily has always been a low trust the level of trust region (Putnam, 1993). Despite this, as we argued in the second chapter Mafia could have been the product of a perverse social capital. In fact, there was a lot of trust amongst its members[201].

Continuing, societies with high levels of trust might have higher level of crimes because of reduced self-defence mechanisms and/or naive behaviour. As Buonanno et al. (2009) explained, societies where people tend to trust others more could be more easily approached by potential criminals. Anecdotal evidence suggests that in high trust societies, it is not un-common to leave the door open or not to lock the bike. In turn, this would lower the probability of being caught regions and increase the expected utility of the criminals. This would lead to more offences[202].

Concluding, from a theoretical point of view it appears clear that an increase in the level of trust would cause a decline in crime rates. Although trust might reduce crime, the "net effect" on the expected utility of an average rational criminal will be necessary negative.

[201] Indeed mafias affect the societal level of (dis)trust.

[202] A formal model of the role of social capital on crime levels has been provided by Lederman et al. (2002) incorporated these two types of social capital in a simple theoretical model to assess its effect on crime. Using a framework similar to Ehrlich (1973), the author considered a situation with three agents. The agents' net benefit from committing a crime depends on the value of things stolen (positively), foregoing wages (negative) and a change in utility due to changes in social capital. Moreover, wages depend on human and social capital. The latter is a function of social distance and sympathy with other people, here towards agents j and z. Moreover, assuming social distance and stock of capital to be fixed, the author considered the net benefit associated with sympathy. Lederman et al. considered three scenarios: community wide social capital increases, increases in social capital for group i and j that excludes z, and one that excludes i, the criminal. He finds that community social capital has a greater crime reducing effect compared with group-specific ones. Therefore, implicitly he agrees with the bridging and bonding view expressed above.

Furthermore, we need to remind that our trust data refer to "bridging" social capital rather than bonding[203]. Therefore, we expect a strong crime reducing effect of trust.

So far, we have reviewed the theoretical explanation of the trust–crime nexus. In the following section, we analyse the empirical contributions on this topic.

4.2.4 Trust and crime: empirical evidence

There are not empirical works which specifically consider the impact of trust on crime. Still, there are some that consider the link social capital-crime, which also include trust as one of the proxies. The following paragraphs briefly review the most important contributions.

Trust and crime contributions

Akçomak and Weel (2012) considered the impact of social capital on crime at the municipal level in the Netherlands. They use not only variables that represent the presence of social capital but also others which reveal its absence. They include trust, voluntary contributions per household, blood donations, voter turnout (presence), divorce rates and population heterogeneity (absence). The trust variable is taken by the European Social Survey (ESS), which asks an analogous question to the World Value Survey one. Moreover, they constructed an index based on the variables which represent the presence of social capital. As dependent variables, they considered nine crime categories and ran regressions on 142 municipalities. They recognize that their measures of social capital might be endogenous because of simultaneity, measurement errors and omitted variables. In order to tackle this issue they employed a 2SLS approach. As instrument, they followed the approach of Tabellini (2010), using historical municipal variables which refer back to 1859. These are the percentage of foreigners, the percentage of Protestants and the number of schools per inhabitants. As the dependent variable, they consider a) an indicator of all recorded crime rate and b) each crime separetely. The authors found robust evidence of a crime reducing impact of social capital on crime. The OLS results show that, a one standard deviation

[203] This is because our trust question refers to the wide society and not to particular groups.

increase in the level of trust leads to a decrease by 0.20 standard deviation of the overall crime rate[204]. On the contrary to other social capital measures, the 2SLS coefficient is insignificant. Regarding the single crime categories, trust seems to have more impact on violent than to property crimes. In fact, it reduces assault, robbery and rape. However, the authors do not explain why this might be the case.

Another important paper is the one by Lederman et al. (2002). They considered the causal impact of social capital on violent crimes, proxied by the rate of intentional homicides. The authors considered a cross country regression with 39 countries over the period 1980-1994. As measures of social capital, the authors used trust, membership in organizations, membership of a secular organization, participation in meetings, degree of religiosity and church attendance. These data are taken from the World Value Survey(WVS) which we will describe shortly. OLS results showed that a one percent increase in the measure of trust leads to 0.4 percent decrease in the rate of homicides. However, the coefficient is insignificant. In order to account for the likely endogeneity of social capital measures, Lederman et al. employed regional dummies and radios per capita as instruments. The reason for using the last is that the ownership of radios reduces the cost of social interactions. As control variables, they used GDP growth and Gini index, standard in the economics of crime literature. As econometric strategies they employed a GMM procedure as there is over identification. They found that amongst the social capital measures, only trust has a negative effect on homicide rate whereas the others do not. In particular, an increase of 1% of the trust measure leads to a reduction of crime rates by 1.21%. The coefficient is higher than the OLS specification. However, it is worth keeping in mind that the number of countries considered is quite small, that could pose several doubts on its representativeness.

Baumer et al. (2004) used the SCBS data to explore the link between social capital and homicides in the USA. In order to account for the fact that social capital is multi-faceted, the authors used different measures, including trust. They found that, amongst all the social capital proxies, only the latter exerts a negative and significant effect on the level of homicide. These results are confirmed by the inclusion of relevant socio, economic and demographic conditions such as resource deprivation and divorce rates. Moreover, the

[204] For the index of social capital, the reduction is by 0.32 standard deviation.

authors found that social activism has a significant positive relationship with homicide. The authors considered also the likely reverse causality between homicides rates and social capital. Using a simultaneous equation technique, they found that homicides affect negatively trust and positively social activism.

So far, the works which directly studied the causal effect of trust on crime. Let us see, the ones who consider broader definition of social capital.

Social capital, but not trust, and crime contributions

Buonanno et al. (2009) analysed the role of social capital on property crimes for 103 Italian provinces in a cross sectional study for 2002. As crime categories, they considered (all-types) thefts, car thefts and robberies. They chose car theft because it has very high reporting rates compared with the other two. As a proxy for social capital they used recreational associations, voluntary associations, *referenda* turnout and blood donations. Moreover, they controlled for a number of socio-economic determinants of crime plus two deterrence variables[205]. They employed an instrumental variable approach to tackle endogeneity of the network associations' measures and possible measurement errors. As instruments, they used Putnam's historical measures of associations in Italy. The results demonstrated that for thefts and robberies, the relationship with social capital is positive, although not significant. In the contrast, the results for auto thefts are generally negative and significant. The authors explained by stating that car theft is generally reported, whereas "normal" thefts and robberies are not, making their results biased. In particular, they found that an increase in a standard deviation of blood donations and association density leads to a reduction in car thefts by 9 and 13 percent respectively.

Chamlin and Cochran (1997) focused on social altruism. As its proxy, they considered the amount of money given to United Way, a North American charity. The authors regressed this measure of social capital, along with other covariates, on violent and property crimes (279 cities for property crimes and 273 for violent crimes). They found a negative and significant effect on both crime groups, although slightly more negative for property crimes. In particular, the total effect on property crimes is -.12, whereas on violent ones is -.10.

[205] Average years of first and second order trials and the clear up rate.

Heaton (2006) investigated the impact of religion on crime at county level for the USA. The author used data for religiosity from 2000 and regressed it, along with other covariates, on property and violent crimes. As in previous studies, the OLS result yielded negative and significant results. Heaton then used past level of religiosity (from 1916) as instrument for current level and found no significant effect of religiosity on both property and violent crimes. Moreover, Heaton used increases in church attendance during Easter as a natural experiment[206] to check changes in crime rates. Even in this case, he did not find any statistical relationship.

There is also a vast literature which investigates the role of networks on crime. For example, Kling et al (2005) analysed the effect of neighbourhood mobility on youth crime. They used data from Moving to Opportunity (MTO). This 2001 experiment randomly assigned poor families to wealthy neighbourhoods. They found that young males and females respond to relocation in a different way. Treated females had lower propensity to commit crimes compared to the control ones, even for some years after the experiment. Male results are mixed since after two years, the level of certain types of crimes is higher in the treated ones. Glaeser et al. (1996) developed a theoretical model which shows how social interactions influence criminal decisions. Then they tested it with data from different American cities and across precincts in New York. They found a high degree of interactions across crimes and particularly for robbery, assault and burglary[207].

Overall, the majority of these works found that greater social capital, and trust, is associated with lower levels of crime levels. One of the problems with these studies is that they employ macro data and, generally, few variables. Moreover, their use of many different proxies of social capital might deviate from focusing exclusively on trust as we do. The following section explains the data and methodology employed to fill some of these gaps.

[206] A period when church attendance is notoriously higher.
[207] However, there are other prominent works on the field such as Ludwig et al (2001); Calvo et al (2009) and Levitt and Venkatesh (2000).

4.3 Data

Our analysis is based on Americas Barometer data, which is a large household survey conducted in all the independent countries in the mainland North, Centre and South America. It also includes some Caribbean countries. This database, which is part of the Latin American Public Opinion Project (LAPOP), is mainly sponsored by the United States Agency for International Development (USAID). However, it is also supported by the Inter-American Development bank (IADB), the United Nations Development Programme (UNDP) and Universities such as Vanderbilt and Princeton, amongst the others. The aim of this survey is to question people on democratic issues and behaviours. It was first launched in 2004 when it covered eleven countries and it is repeated every other year. The latest available edition, the 2010 one, covers 26 countries; about 43,000 people were interviewed.

Survey participants are voting age citizens and are interviewed in person, except for Canada and USA where they responded on the web. The survey uses a national probability sample design that takes into consideration characteristics such as location and ethnicity[208]. Interviewers had handheld computers where they directly reported respondents' answers. This system is more efficient than paper-based questionnaires. Almost all the countries have around 1,500 individual respondents, except for few countries which are not the ones we consider[209]. In general, these data are considered to be reliable and have been used in several studies, such as the World Bank Governance Indicators[210].

In our study, we concentrate on five Caribbean countries covered in the survey. These countries are: Suriname, Guyana, Trinidad and Tobago, Dominican Republic and Jamaica[211]. We consider a cross section with data from the latest available survey, i.e., 2010. The main reason for not considering the previous surveys is that not all these five countries participated[212]. Moreover, even for the rest of the countries we have data for a couple of waves which do not provide much evidence on variation over time. Indeed, the use of a panel data approach would have been beneficial to capture time-invariant characteristics

[208] They employed sampling error to verify the validity of their result.
[209] More detailed information about each country sampling can be found in the Americas Barometer website.
[210] In the Americas Barometer website there is a list of studies which used these data.
[211] Guyana and Suriname are not geographically in the Caribbean. However, they have always been associated to Caribbean countries. For example, because of their national languages (English and Dutch) rather than Spanish, which is the most spoken language in continental Latin America.
[212] Trinidad and Tobago and Suriname have data only for the last survey.

which might influence trust levels[213]. After cleaning the data for missing observations we are left with 6,940 observations. This is a good advantage compared to other studies on social capital and crime, which are mainly based on macro data.

Haiti is not included in our study. In 2010, Haiti experienced a devastating earthquake. As a result, the questionnaires refer only to the six months prior to this event. Moreover, the data in the survey are not self-weighted for Suriname and Trinidad and Tobago.

4.3.1 Crime data

Crime statistics are problematic for a variety of reasons. Generally, economic studies focus on data recorded by the police. This kind of data might suffer from under-reporting, i.e. people fail to report their crime experience. The greater is the under-reporting rate, the higher is the so-called "dark number": the difference between the true and recorded crime numbers. Many works (MacDonald, 2002; Soares 2004) tried to analyse the driving factors behind this phenomenon. They find that there are macro and micro characteristics which make the probability of under-reporting lower. For example, Soares (ibid.) finds that, contrary to previous work, developed countries seem to exhibit higher crime rates because of their higher reporting rates. In fact, low income countries tend to report much less than richer counterparts and, so, crime regressions show positive correlations between crime and development. MacDonald (2001, 2002) analysed the individual characteristics that are more likely to be associated with reporting practices. The author found that unemployed people tend to report less than those employed. This result has also been found by Diez-Ticio et al. (2000). Those who have been victims on many occasions also tend to report less because of their "habit" of being victimized. On the other hand, insured individuals tend to report more in order to get indemnity from the insurance companies. However, reporting rates might depend also on under-recording by the authorities. As Fajnzylber et al. (2000) notes in "El Salvador the Fiscalia General de la Republica (the office of the country's chief prosecutor) only records crimes for which there is an indicted suspect" (ibid., p.235). As a result, comparisons of recorded crime data between countries are particularly problematic.

[213] As shown by Algan and Cahuc (2010).

A further problem is the employment of different definitions of the crimes that compose crime categories.

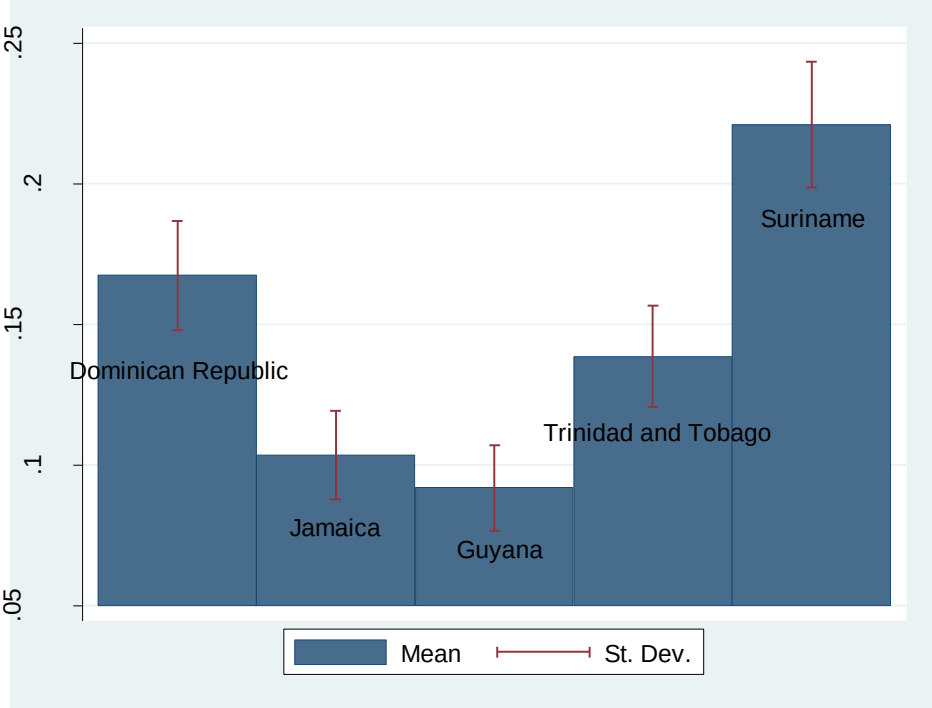
A way to partially solve these issues is to use victimization surveys. The reason is that people are more willing to declare their victimization experience to a neutral interviewer rather than to the police. The most famous kind of such survey is the International Crime Victimization Survey (ICVS) made by the UNICRI. However, even such data are not immune from criticism. This is well explained by Skogan (1975) who argues that victimization surveys suffer from sampling issues, because they might not be representative of the population. Also, surveys often fail to consider tourists who are preferred victims of criminals (Skogan, 1975).

Bearing these considerations in mind, we consider America Barometer data. Although it is not a victimization survey, it contains some questions on victimization experiences. The advantage of using it is that the same questionnaire was sent out to each country, which makes the data comparable. Here, we consider mainly two questions. One is the standard victimization question: "have you been a victim of any type of crime in the past 12 months? That is, have you been a victim of robbery, burglary, assault, fraud, blackmail, extortion, violent threats or any other type of crime in the past 12 months?"[214] Based on this, we created our main dependent variable *All Crimes* that can take two values, 1 if the answer was yes and 0 for no. Figure 4.4 shows the victimization rates for the countries in our sample. Suriname is the country with the highest rate, slightly over twenty percent. Jamaica is the one with the lowest[215]. Moreover, Figure 4.5 shows the heterogeneity of victimization at the provincial level.

[214] Even though the last part of the question refers to other types of crime, in reality high volume categories such as thefts and larcenies have not been considered.

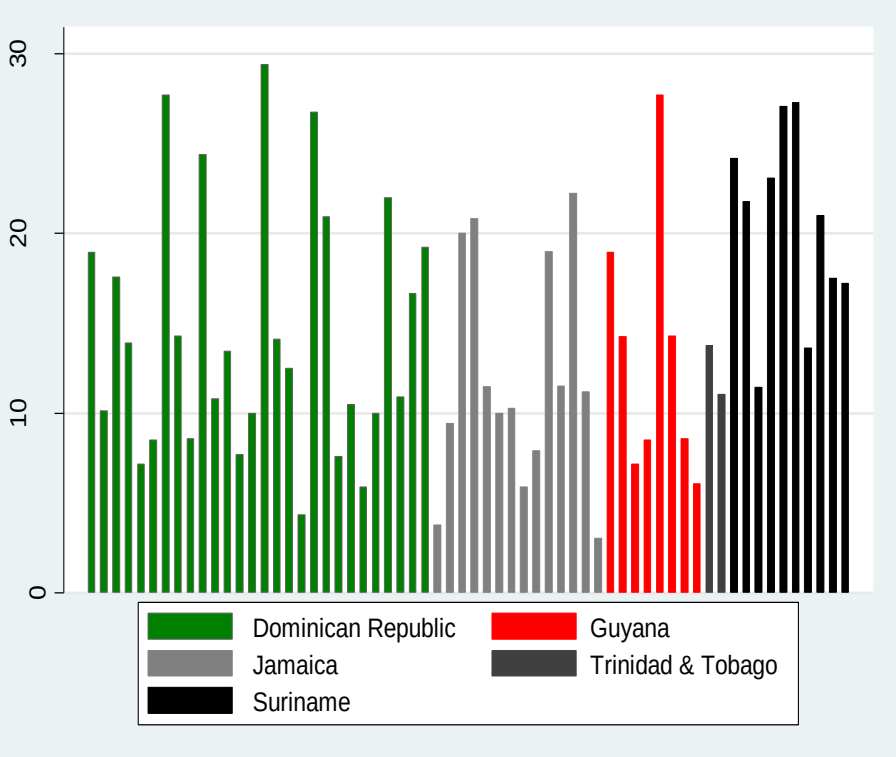
[215] Unfortunately, given the lower number of crime categories we cannot really compare these values with other surveys.

Figure 4.4 Victimization rates by country



Note: Data are personal elaborations based on Lapop (2012). The red line represents standard deviation.

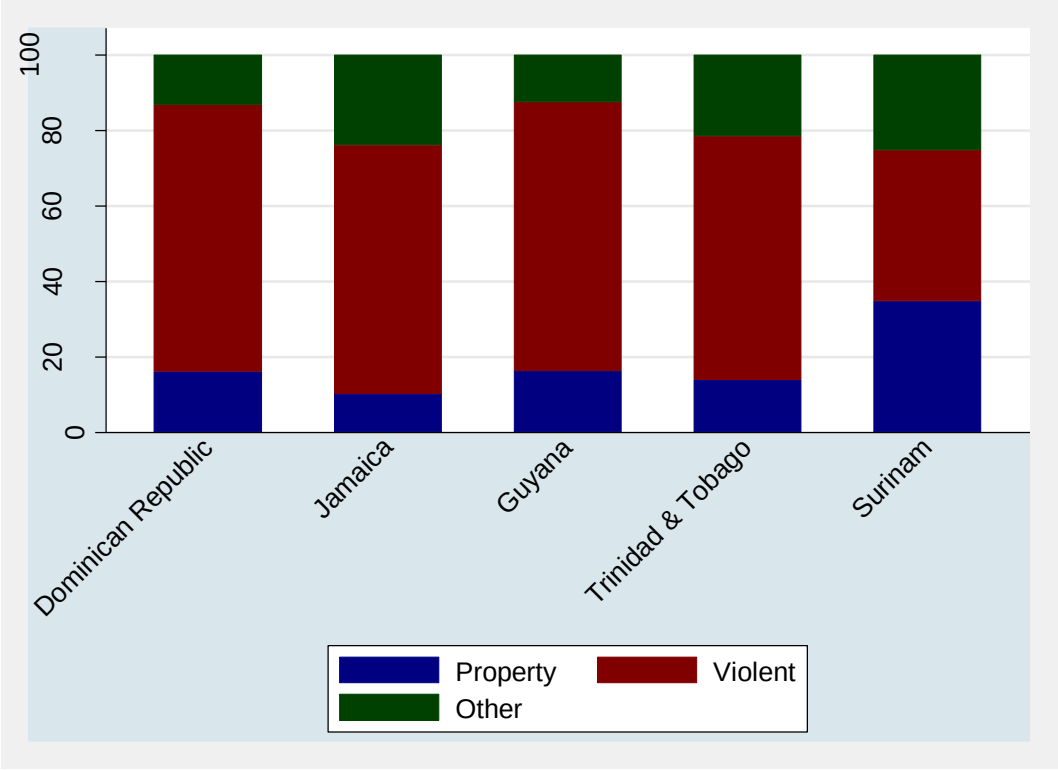
Figure 4.5 Victimization rates by province



Note: Data are personal elaborations based on Lapop (2012).

The other question is more specific and refers to the type of crime. The possibilities were: unarmed robbery, no assault or physical threats; unarmed robbery with assault or physical threats; armed robbery; assault but not robbery; rape or sexual assault; kidnapping; vandalism; burglary of the house; extortion and other. Many important crime categories are missing. Except for homicides, for obvious reasons, we do not have high volume crimes such as motor thefts and larceny thefts. Following the FBI uniform crime report[216], we created two variables: violent (*Violent Crimes/ Violent* henceforth) and property crimes (*Property Crimes/ Property*). In the first category, we include rape or sexual assault, unarmed robbery with assault or physical threats and assault, unarmed robbery without assault or physical threat, armed robbery but not robbery. In the latter, we have just one category: burglary. Therefore, violent crimes are much more numerous compared to typical crime statistics where property crimes have greater volumes. This is illustrated in Figure 4.6.

Figure 4.6 Crime categories



Note: Data are personal elaborations based on Lapop (2012).

[216]The FBI uses the following categories. Violent crimes: murder and non negligent manslaughter, forcible rape, robbery and aggravated assault. Property crimes: burglary, larceny-theft, motor vehicle theft and arson.

4.3.2 Social capital

Our question on trust is: "now, speaking of the people from around here, would you say that people in this community are very trustworthy, somewhat trustworthy, not very trustworthy or untrustworthy?" We created a dummy equal to 1 if the respondents answered yes to one of the first two options.

Regarding this question there are some considerations to be made. The typical data on trust used by scholars are taken from the World Value Survey (WVS) and the General Social Survey (GSS). The former is a cross-country study whereas the latter is only for the USA. However, in both questionnaires, the question is the same: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" Many works have questioned the validity of this result and considered whether it truly reflects the level of trust in others. In order to deal with these reservations, Glaeser et al. (2000) ran a trust game (Berg et al., 1995), along with asking the WVS-GSS questions, to Harvard undergraduate students. The trust game is the standard game where a sender has an endowment of some money, who has to choose the fraction of the money to give to the receiver. In turn, the receiver obtains a multiple of the amount sent, which was the double in the game played by Glaeser et al. (2000). The receiver than chooses how much to return. Generally, the sender's behaviour is considered the trust component whereas the receiver behaviour is seen as trustworthiness. Glaeser et al. (2000) showed that the WVS question is statistically correlated with the receiver's behaviour, i.e. trustworthiness. Fehr et al. (2003) questioned this result and, using German data, showed a correlation between a WVS type question and the sender's behaviour. In order to clarify this issue, Sapienza et al. (2007) ran a similar trust game with the University of Chicago MBA students. They found that trust has two components: belief and preference. The relevance of each component might vary depending on the homogeneity of the sample considered. Therefore, the different results between Glaeser et al. (2000) and Fehr et al. (2003) depend largely on heterogeneity in their sample. In particular, in homogenous contests, people answer the WVS question predicting their own behaviour and this explains the correlation with trustworthiness. Indeed this last result is particularly important to our research[217].

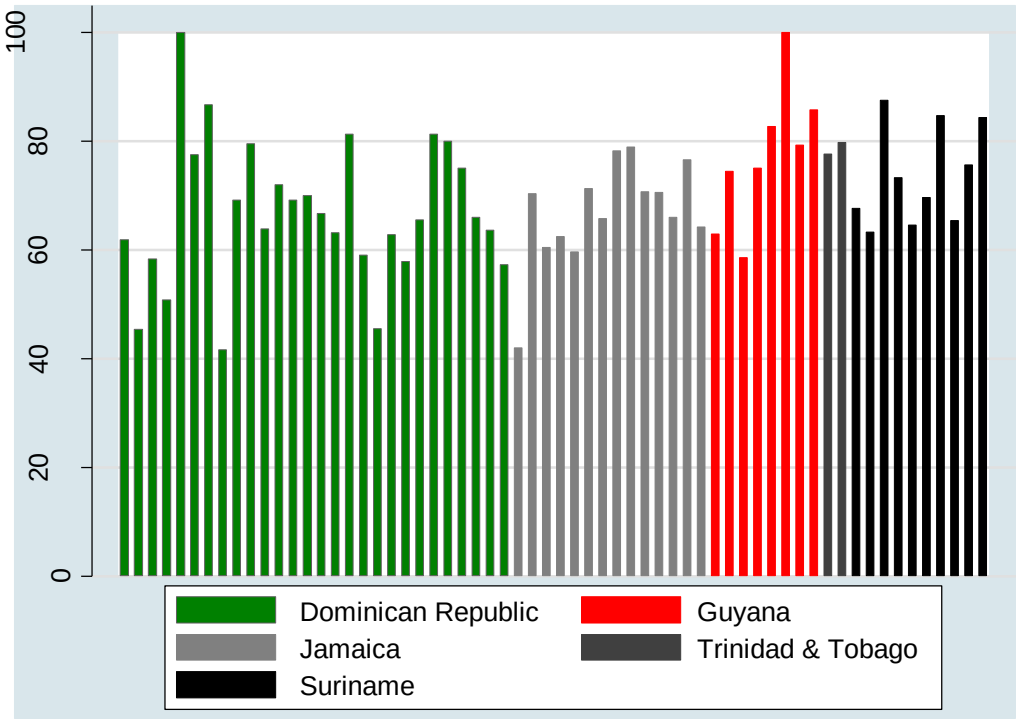
[217] We feel that our measure of trust does not create problems of comparability amongst diverse countries as the ones considered in this work. Although each of them has specific cultural traits, they all belong to the same

As we have seen, our question asks directly to what degree people are trustworthy, not the standard WVS question on trust. To our knowledge, there are not laboratory experiments which analyse such questions. However, Guiso et al. (2009) found a positive relationship between their WVS type question on trust and a question on trustworthiness asked in the same survey. They questioned participants: "suppose that a random person you do not know personally receives by mistake a sum of 1000 euros that belong to you. He or she is aware that the money belongs to you and knows your name and address. He or she can keep the money without incurring in any punishment. According to you what is the probability (a number between zero and 100) that he or she returns the money?" Although this question is different from ours, it still captures trustworthiness. Therefore, we can assume that our measure of trustworthiness could also be considered to be related to the standard trust questions. We will refer in the same way to trust and trustworthiness in the remaining of the paper.

Figure 4.7 below shows the different levels of trust by country. Moreover, the values are quite high and there is less variation than expected. Our suspect is that these results depend on the phrasing of the question. In comparison to other surveys' question, it has a very "positive" approach which might lead people to respond excessively optimistic. For example, in the WVS the question is set more negatively which might lead to lower "trust rates". Unfortunately, we cannot compare these data with the ones of the World Value Survey because only Trinidad and Tobago participated in this survey. Nevertheless in Sapienza et al (2007), 58.6% of people answered that most people can be trusted which is a high result compared to WVS.

geographical area and are coming from similar colonial history. Indeed, WVS covers a much more heterogenous number of countries and, still, is recognized as reliable by the scientific community.

Figure 4.7 Trust levels by province



Note: Data are personal elaborations based on Lapop (2012). Information on how we built *Trust* is in the Appendix.

Geographical specification

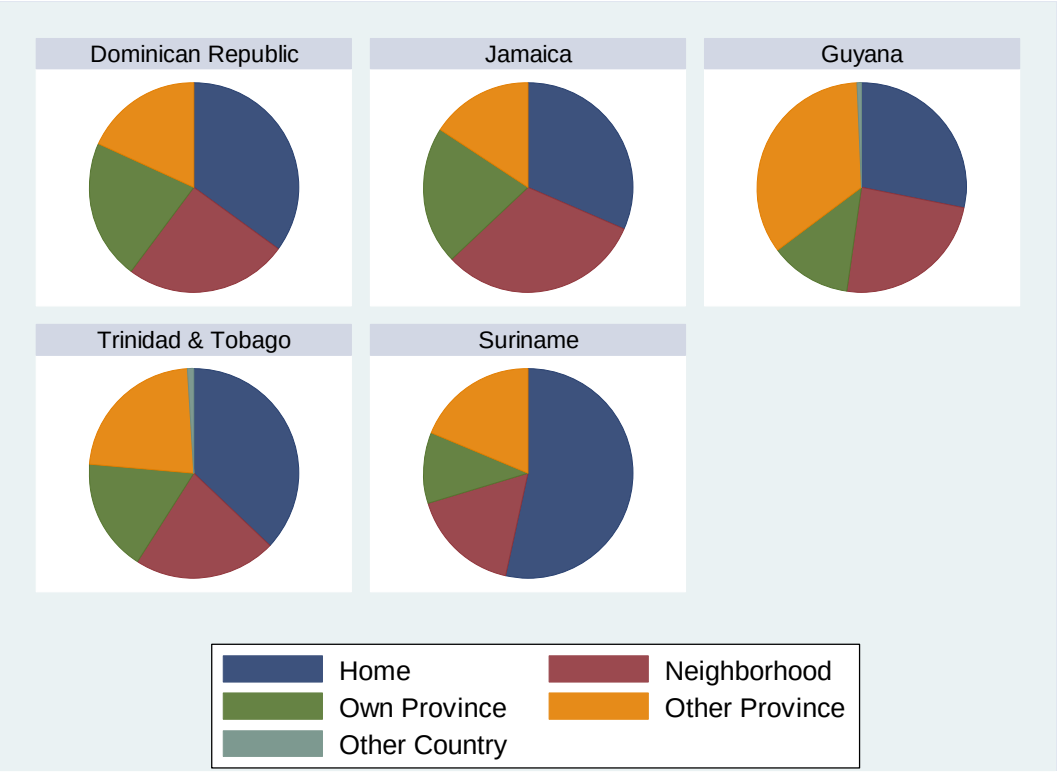
In our analysis, we are not interested in individual levels of trust because they are not likely to have an impact on the probability of being victimized[218]. Therefore, we need to aggregate the individual data[219]. Which geographical specification is more likely to affect the probability of being victim of a crime? This question is not trivial since there is not a theoretical background that can inform our choice. Figure 4.8 below shows that most of the crime happens in the proximity of where the victims live[220].

[218] Although somebody might argue that for a criminal it would be easier to steal from a person who trusts "others" more. This is because criminals might exploit this situation.

[219] In this respect, Baumer et al (2004. p. 886) argued that: "previous studies demonstrate the applicability of the social capital concept at diverse levels of aggregation, from countries to nation-states".

[220] This is not a very surprising result. Also, in the victimization in Jamaica (McCall, 2009), we find similar results.

Figure 4.8 Place where victimization took place



Note: Data are personal elaborations based on Lapop (2012).

Given that, it would be preferable to choose a smaller geographical unit. Therefore, we decided to opt for *upm*, which in the survey is the primary sampling unit. Each *upm* comprises around 18 people in the survey. This raises questions of representativeness. As a robustness check, we consider a higher geographical specification, such as the parish/province, where each province represents an average of 120 people.

4.3.3 Control variables

As control variables, we employ standard ones from the economics of crime literature. Moreover, we consider these at the individual and aggregated level. The reason for doing so is that crime depends not only on individual characteristics, but also on the average conditions of the area where people live. This is a common approach in the literature, as per Kling and Vollard (2008).

As individual characteristics, we consider several that are thought to be important determinants in the economics of crime models. We consider age groups, gender, years of schooling, income, ethnicity, marital status, whether a person is working and if he/she is

living in an urban area[221]. The *upm* level variables are the rate or means of all individuals in the survey which belong to the same geographical specification. We decided to include the mean levels of income and education. Moreover, we consider the rates of male, young and working people on the population.

Given that we have individual and aggregated data, we need to be cautious in explaining the channels through which they might increase (decrease) the probability of being a victim of a crime. For example, as we will discuss below, income at the individual level should be negatively related to property crimes whereas at the aggregated one the statistical relationship is not clear.

We now analyse what the literature says about the variables we chose. For the individual results, we mainly refer to Fajnzylber et al. (2000) who analyse victimization rates in South America. In particular, this study compares four works on victimization for Mexico City (Funsalud, 2000), Rio de Janeiro (Piquet, 2000), San Salvador (Cruz et al., 2000) and Sao Paolo (Piquet, 2000). For the results at the "macro level ", we can consider a rich literature.

Young people are supposed to have a greater propensity to commit crimes compared to the rest of the population. This has been demonstrated in many studies. Using German data, Entorf and Spengler (2000a) found that young people, who represent 21% percent of the population, account for 40% of crimes. Similar results have been reported by Freeman (1991) and Grogger (1998). Therefore, higher rates of young people should lead to more crime. On an individual level, Fajnzylber et al. (2000) showed that the typical victim is often young, although for Mexico City this variable was not significant[222]. We consider a dummy if the individual is aged between 18 and 29. At the *upm* level we consider the rate of young people in the survey population.

Males are supposed to be more likely to commit and be victims of crimes. In almost all the specifications based on the four victimization surveys, Fajnzylber et al. (2000) found that the dummy male is positive and significant. However, women are more likely to be the victims of crimes such as rape and domestic violence. On the *upm* level, we expect that those with more males will be associated with greater victimization experiences.

[221] It would have been really interesting to do network analysis but the data do not allow us to do so.
[222] However, we need to bear in mind that the dependent variable referred to all types of crime. In our analysis we will make a distinction between property and violent crime.

Lochner and Moretti (2003) analysed the role of education on crime using data from the United Crime Report (UCR) and the US census bureau. In order to tackle endogeneity of education level[223] they considered changes in compulsory schooling laws. Education might reduce crime rates because it increases the opportunity costs of committing illegal acts. Also, educated people are generally more risk adverse than less educated ones. The authors found a strong crime reducing effect. Similar results have been found by Freeman (1991). However, Ehrlich (1975b) found a positive relationship between education and crime which shows how this link is far to be clear. At the individual level, education seems not to be very significant (Fajnzylber et al., 2000). Our individual education variable is the number of years of schooling, as employed by the majority of studies. The *upm* variable is the mean average level of the same variable.

The income of a region could influence criminal behaviour. According to Ehrlich (1973) high legal wages should increase participation in the legal activities and reduce crime, whereas illegal opportunities should increase criminal opportunities. Analyzing youth wages, Grogger (1997) found analogous results. On an individual level, richer people should be targeted more because they have more to steal from. However, as pointed out by Gaviria and Pages (2002) richer people have greater incentives to invest in protection, which in turn would lead to lower victimization rate. Whether this relationship is positive or negative depends on the marginal returns to private protection. Gaviria and Pages (2002) showed that if these are very low, the rich will not invest in it and will decide to accept some levels of crime. For these reasons, we used two dummies at the household level: one for middle income and another for those with high incomes. People were questioned to identify their household incomes in one of the eleven income classes. Each country had different income ranges for each class. We considered *High Income* for the last three classes, whereas *Middle (Mid)Income* for the ones from the fifth to the eight[224]. At the *upm* level we consider the mean level of these income classes[225].

Urban settings should provide more opportunities for criminals. Cities offer more anonymity that result in lower social control. Therefore, they increase criminal opportunities. According to Glaeser and Sacerdote (1996), urbanisation is not important per

[223] As education variable, they consider an indicator for high school completion.
[224] We did so, taking into consideration the distributions of income across countries.
[225] We preferred to use this rather than the rate of the individual dummy variables as it provides a better indicator of average level of income.

se. Rather it leads to higher crimes because it is associated with a series of opportunities for the criminals. These are higher pecuniary benefits given the concentration of wealth. Also, cities have lower clear up rates of crimes as it is easier to hide from the police compared to the country side[226]. We include a dummy if the single is living in an urban area.

Entorf and Spengler (2000b) argued that a strong sense of family might have an impact on crime. Statistics for Europe show that divorce and separation rates have a positive relationship with crime rates[227]. Also Cáceres-Delpiano and Giolitom (2012) found a strong effect of divorce on violent crimes using data from the FBI. Being married is a synonymous of conducting a more stable life. In turn, this life style leads to fewer opportunities to be victim of crimes. Therefore, we included the dummy *married* at the individual level.

We also consider whether a person is working or not. We would have liked to use unemployment but the type of data did not allow us to do so[228] and we decided not to use it. At the *upm* level we just consider working rate[229].

Ethnicity might affect the likelihood of being victim of a crime (Alesina and La Ferrara, 2002). We included three dummies which equal one if respondent belongs to one of the three most numerous ethnic groups in the whole sample. These are black, mixed race (black and another race) and Indian. The reason for using these is that we want to see whether the most represented ethnicities are more or less likely to be victims of crime. As a further control for ethnicity, we employ a measure of ethnic polarisation at the *upm* level. In more heterogeneous societies, there could be more social tensions that eventually will lead to higher level of crime[230]. We consider the one proposed by Montalvo and Reynal-Querol (2005). It is constructed in the following way:

$$Q = 1 - \sum_{i=1}^{N} \left(\frac{0.5 - \pi_i}{0.5}\right)^2 \pi_i = 4 \sum_{i=1}^{N} \sum_{J \neq i} \pi_i^2 \, \pi_j$$

[226] However, as we stressed in the second chapter, also rural areas offer criminal opportunities.

[227] They show the positive relationship between crude divorce rates and contact crimes per 100'000 inhabitants. Data are taken from the 2000 ICVS.

[228] Question *ocup4a* in the survey does not ask directly the respondents whether he/she is unemployed or not. Rather it asks whether the respondent is working or not.

[229] This is calculated as the number of working people on total population.

[230] As we will see, heterogeneity is supposed to be strongly negatively correlated with the level of trust.

π represents the share of each ethnicity in the population. We prefer this one because it is a better proxy of potential tensions compared to the standard fractionalization measure (Montalvo and Reynal-Querol, 2005).

A detailed list of the variables can be found in the appendix.

Table 4. 1 Summary statistics

	Observation	*Mean*	*St. Dev*	*Min*	*Max*
		Individual Level			
All Crimes	6940	0.14	0.35	0	1
Property Crimes	6940	0.03	0.17	0	1
Violent Crimes	6940	0.08	0.27	0	1
Property Crimes1	6940	0.06	0.25	0	1
Violent Crimes1	6940	0.05	0.21	0	1
Age 1829	6940	0.30	0.46	0	1
Man	6940	0.50	0.50	0	1
Education	6940	9.67	3.91	0	18.00
Working	6940	0.54	0.50	0	1
Urban	6940	0.48	0.50	0	1
Mid Income	6940	0.33	0.47	0	1
High Income	6940	0.13	0.34	0	1
Married	6940	0.32	0.47	0	1
Mixed	6940	0.45	0.43	0	1
Black	6940	0.29	0.48	0	1
Indian	6940	0.18	0.35	0	1
		UPM Level			
Trust	6940	0.68	0.16	0.14	1.00
Age 1829 Rate	6940	31.24	6.83	0.00	57.14
Man Rate	6940	49.68	3.91	33.33	66.67
Income Mean	6940	4.04	1.34	1.17	8.09
Working Rate	6940	0.53	0.14	0.13	1.00
Polarization	6940	0.66	0.25	0.00	1.00

Table 4. 2 Summary statistics by country

Country	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev
	All Crimes		Property Crimes		Violent Crimes	
Dominican Republic	0.17	0.01	0.03	0.01	0.11	0.01
Jamaica	0.1	0.01	0.01	0.01	0.06	0.01
Guyana	0.09	0.01	0.01	0.01	0.06	0.01
Trinidad	0.14	0.01	0.02	0.01	0.08	0.01
Suriname	0.22	0.01	0.08	0.01	0.08	0.01
	Property Crimes1		Violent Crimes1		Trust	
Dominican Republic	0.08	0.01	0.07	0.01	0.64	0.02
Jamaica	0.04	0.01	0.04	0.01	0.68	0.02
Guyana	0.03	0.01	0.05	0.01	0.74	0.02
Trinidad	0.06	0.01	0.05	0.01	0.78	0.01
Suriname	0.11	0.01	0.05	0.01	0.70	0.03
	Trust Elections		Age 1829		Man	
Dominican Republic	4.14	0.05	0.3	0.01	0.49	0.01
Jamaica	3.59	0.04	0.25	0.00	0.51	0
Guyana	3.9	0.01	0.3	0.01	0.5	0
Trinidad	3.68	0.00	0.35	0.01	0.5	0
Suriname	5.09	0.01	0.27	0.01	0.5	0
	Education		Working		Urban	
Dominican Republic	8.77	0.21	0.46	0.01	0.73	0.03
Jamaica	10.09	0.14	0.52	0.02	0.52	0.05
Guyana	9.31	0.13	0.54	0.02	0.29	0.06
Trinidad	9.42	0.16	0.61	0.01	0.56	0.04
Suriname	11.2	0.16	0.56	0.01	0.48	0.03
	Mid Income		High Income		Married	
Dominican Republic	0.34	0.02	0.08	0.01	0.22	0.02
Jamaica	0.36	0.02	0.09	0.01	0.27	0.01
Guyana	0.43	0.02	0.03	0.01	0.37	0.02
Trinidad	0.30	0.06	0.12	0.03	0.38	0.01
Suriname	0.34	0.02	0.47	0.02	0.36	0.02
	Mixed		Black		Indian*	
Dominican Republic	0.68	0.47	0.10	0.30	0.10	0.29
Jamaica	0.09	0.29	0.88	0.33	0.03	0.16
Guyana	0.21	0.41	0.35	0.48	0.33	0.47
Trinidad	0.27	0.45	0.40	0.49	0.30	0.46
Suriname	0.17	0.38	0.27	0.45	0.24	0.42

Note: [1] * For Dominican Republic, Indian refers to White. The reason is explained in the text.

Unfortunately, we do not have data on deterrence and inequality which are considered important predictors of crime level. For example Levitt (1996) demonstrated that the prison population strongly reduces crime rates. In order to address endogeneity, this author considered prison overcrowding litigation in a state as instrument in changes in prison

population. Levitt (1997) showed that the size of police force has a strong deterrent effect on crime levels. As instrument the author used the timing of political elections as it is linked to the size of the police force but not the crime levels. However, there are many papers that analysed the role of deterrence on crime (Di Tella and Schargrodsky, 2004; Koning and Vollaard, 2008)[231]. Also, inequality seems to play an important role in explaining crime rates (Bourguignon, 2000)[232].

As we will see in the next section, one way to partially take into consideration specific characteristics is to use country fixed effects and employ an instrumental variable approach.

4.4 Econometric strategy and results

4.4.1 Econometric issues

Our analysis presents several econometric challenges, as most of the crime regressions do. First of all, there is the omitted variable issue. In our study, this aspect might be particularly relevant. One of the main reasons is that we lack a series of relevant predictors of crime levels. For example, it would have been useful to have data on deterrence variables, such as the number of police forces per capita or the efficiency of the juridical system[233]. Unfortunately, we could not find data capturing these factors at the country level, not to mention at the small geographical unit we consider. This is a common problem when analyzing developing countries. Moreover, we could not even find proxies as the Americas Barometer survey do not include other types of variables. The omitted variable bias is quite relevant if the excluded variables are correlated with the included explanatory variables. This is the so called endogeneity problem. In turn, this leads to biased estimates. We can suppose that variables such as the ones reflecting the quality of institutions might be correlated with many socio-economic outcomes. We try to partially solve this issue in

[231] Di Tella and Schargrodsky (2004) consider the increase in police protection following the terrorism attack at the main Jewish centre in Buenos Aires in 1994 as a natural experiment. The authors found a strong causal deterrent effect of police on crime. Koning and Vollaard (2008) found similar results using the Dutch Victimization survey. The authors instrumented the size of the police with the police funding formula.

[232] This paper considers a cross country analysis with 50 observations. It found that the degree of relative poverty or income inequality in a country generally leads to a rise in criminality.

[233] In the Americas Barometer, individuals were questioned about their opinion on police or judicial system efficiency. However, these measures might be upward and downward biased depending on whether the individual has been victimised or not.

two ways: we include country fixed effects with the hope of capturing some variables such as efficiency of the judicial system or police forces. We need to bear in mind that, except for Jamaica and the Dominican Republic, these are very small countries. The second way of dealing with this issue is to use an instrumental variable approach (Angrist and Krueger, 2001).

Another major econometric issue is that of measurement errors. Police recorded crime statistics are generally affected by underreporting. In our case, since we are using victimization data, we are likely to partially avoid this problem. In fact, respondents to surveys are generally more prone to report victimization experience. One reason is that they are not constrained by fear or shame which prevents many people from reporting. Moreover, many people do not trust the police and believe that the crime will go unpunished, preferring not to report. Still, even in the survey we consider there is going to be underreporting[234]. In the case that this measurement error is unrelated to the explanatory variables, this would lead to a larger error variance but it would not bias our estimates (Wooldridge, 2002). On the contrary, if the measurement error is linked with the right hand side variables, this would bias our coefficients. For example, this could be the case if report rates depended on the level of education, because of more self – consciousness. In this case, the error term would be negatively correlated to the education variable, leading to a positive bias of the relative coefficient. Again, the instrumental variable approach will help us to deal with this issue.

Finally, the other big problem in estimating the impact of social capital on crime is that of reverse causality of our main explanatory variable, *Trust*. The level of trust could be influenced by victimization experience. People who have been victims of crime could trust other people less and change the perception of trustworthiness of the people in their community as a result. In fact, in his study on the determinant of trust, Alesina and La Ferrara (2002) included also a measure of crime. From an econometric point of view, the likely double direction of the relationship between crime and trust might lead to the trust coefficient being biased and inconsistent. This is because the trust variable is correlated to the error term, causing an endogeneity problem. Again, an instrumental variable is needed.

[234] The Americas Barometer is not a victimization survey, rather an opinion poll with some questions on victimization experience.

Having presented all these issues, the equation which link trust and crime is the following:

$$Victimization_{iuc} = \alpha + Trust_{uc} + X_{iuc} + T_{uc} + \varphi_c + \epsilon_{iuc}$$

Where *i* stands for individual, *u* for *upm* and c for country. *Victimization* is a dummy variable that takes value 1 if the respondent has been a victim of crime. As we have seen in the previous section, it could be *All Crimes, Property* and *Violent. Trust* is our main explanatory variable which is at the *upm* level, at least in the main specification. For robustness we also consider the provincial level too. *X* represents the individual characteristics that we presented in the previous section. T represents the *upm* characteristics. φ are the country fixed effects. We believe that, by including them we are able to catch some time–invariant characteristics such as the quality and efficiency of institutions. It is worth keeping in mind that these are quite small countries which are generally centralized[235]. ϵ_{iuc} is the zero mean error term.

Since we have a binary dependent variable, we do not have much choice regarding the most appropriate estimation technique. We could employ the nonlinear logit and probit and/or the linear probability model . Supposing that p_i is the probability that an individual is victim of a crime, conditional of all our regressors, we have that:

$$p_i \equiv Pr[y_i = 1 \,|x] = F(x_i\beta)$$

F (·) is the cumulative distribution function (cdf). If F (·) is the cdf of a normal distribution we have a probit model, whereas if it is of a logistic distribution, we have a logit model. The former is $p = \phi(x^i\beta)$, with ϕ representing the standard normal cdf, whereas the latter is $p = \Lambda(x^i\beta)$, the logistic one. Both are estimated through maximum likelihood. On the other hand, the linear probability model does not consider any distribution function but implies that there is a linear relationship, i.e. $p_i = (x_i\beta)$.

The preferred model should be probit or logit, given the discreetness of our dependent variable. Both methods could be used. Therefore, we choose to use probit because of it is

[235] As it is shown in Table 4.14.

more often used in economic studies. As a robustness check, we will also consider the LPM. A disadvantage of using it could be that it leads to predicted outcomes that might be bigger than one or smaller than 0 (Cameron and Trivedi, 2005). Also, it leads to heteroskedasticity, which could be easily controlled for. However, it has the advantage of producing consistent and unbiased estimates. Moreover, the coefficients represent marginal effects. In particular, they are easy to interpret when there are dummies as they represent the change in probabilities by switching from 0 to 1. Finally, as we discuss later, it presents several advantages once we consider an instrumental variable approach.

Having said this, we estimate the following standard probit specification:

$$\Pr(Victimization_{iuc} = 1) = \phi(\alpha - Trust_{uc} - X_{iuc} - T_{uc} - \varphi_c)$$

As it is difficult to interpret the probit results, we calculate the marginal effects. Given that there are several ways of calculating it (Cameron and Trivedi, 2005) and the fact that we are not interested in any specific level of trust we decided to calculate the average marginal effects. So we have that marginal effects are given by $\frac{\vartheta Pr[y_i=1|x_i]y}{\vartheta x_{ij}} = F'(\mathrm{x^i}\beta)\beta_\mathrm{j}$ and the average marginal effects are $N^{-1}\sum_i F'(x_i'\hat{\beta})\widehat{\beta_j}$.

4.4.2 Results

Table 4.3 reports the main specification results, respectively for the probit and the OLS specifications. As mentioned, for the probit specification we do not report the actual coefficient but the average marginal effects, *Marg Eff*. In each table we report the results for all crimes, *All Crimes*, property crimes, *Property*, and violent crimes*, Violent.* We include the individual and *upm* controls.

Given the particular survey designs, we activated survey weights. The reason for doing so is to have results that are representative of the population [236]. Weights represent the inverse probability of an individual to be selected. Ignoring them might lead to

[236] We are dealing with a "one-stage clustered design with stratification". So basically the population is divided in different strata and then upm (which are our primary sampling unit) are sampled independently within each strata.

unrepresentative results (Lee and Forthofer, 2006). Moreover, all the regressions have clustered standard errors at the *upm* level. As expected, the results for both the linear and nonlinear specifications are very similar. Therefore, we focus mainly on the *Marg Eff* results.

Table 4. 3 Probit and LPM results

	All Crimes		*Property*		*Violent*	
	Marg Eff	LPM	Marg. Eff	LPM	Marg. Eff	LPM
Trust	-0.149***	-0.148***	-0.037**	-0.036**	-0.079***	-0.076***
	[0.033]	[0.034]	[0.015]	[0.014]	[0.023]	[0.023]
Individual Characteristics						
Age 1829	0.016	0.015	-0.010*	-0.009*	0.021***	0.022***
	[0.010]	[0.011]	[0.006]	[0.005]	[0.008]	[0.008]
Man	0.022**	0.023**	0.007*	0.008*	0.001	0.001
	[0.010]	[0.010]	[0.004]	[0.005]	[0.007]	[0.008]
Education	0.002	0.002	-0.000	-0.000	0.001	0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Working	0.011	0.010	-0.008*	-0.009*	0.004	0.004
	[0.010]	[0.011]	[0.005]	[0.005]	[0.008]	[0.008]
Urban	-0.008	-0.007	0.005	0.005	-0.009	-0.009
	[0.011]	[0.011]	[0.006]	[0.005]	[0.009]	[0.009]
Mid Income	0.020*	0.018*	0.000	0.001	0.020**	0.020**
	[0.010]	[0.010]	[0.005]	[0.004]	[0.008]	[0.008]
High Income	0.026	0.027	0.006	0.010	0.012	0.012
	[0.016]	[0.018]	[0.007]	[0.011]	[0.014]	[0.015]
Married	-0.016	-0.016*	0.002	0.003	-0.010	-0.010
	[0.010]	[0.010]	[0.005]	[0.006]	[0.008]	[0.007]
Mixed	-0.021	-0.023	0.004	0.004	-0.027**	-0.029**
	[0.015]	[0.016]	[0.007]	[0.007]	[0.012]	[0.013]
Black	-0.029*	-0.030*	-0.007	-0.003	-0.016	-0.017
	[0.016]	[0.016]	[0.007]	[0.006]	[0.012]	[0.013]
Indian	-0.027	-0.025	0.002	0.004	-0.024*	-0.023*
	[0.018]	[0.020]	[0.007]	[0.010]	[0.013]	[0.013]
UPM Characteristics						
Age 1829 Rate	0.000	0.000	-0.000	-0.000	0.001	0.001
	[0.001]	[0.001]	[0.000]	[0.000]	[0.001]	[0.001]
Man Rate	-0.000	0.000	0.001	0.001	-0.002*	-0.002*
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Education Mean	0.010**	0.010**	0.002	0.002	0.007**	0.007**
	[0.004]	[0.004]	[0.002]	[0.002]	[0.003]	[0.003]
Income Mean	-0.002	-0.002	-0.002	-0.001	-0.004	-0.004
	[0.006]	[0.006]	[0.003]	[0.003]	[0.005]	[0.004]
Working Rate	-0.001	0.001	-0.026	-0.019	0.046	0.045
	[0.036]	[0.035]	[0.018]	[0.015]	[0.029]	[0.029]
Polarization	0.036*	0.027	0.005	0.003	0.016	0.014
	[0.028]	[0.024]	[0.014]	[0.009]	[0.022]	[0.019]
Observations	6,940	6,940	6,940	6,940	6,940	6,940
Pseudo R-squared	0.0337		0.0807		0.0236	
R-squared		0.028		0.025		0.013
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-2738		-832.4		-1869	

Note: [1] For each regression, robust standard errors clustered at the *upm*-level (368) are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent crimes* in the last two columns. *Trust* is the percentage of people in the *upm* who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the appendix. [3] Marg. Eff are the marginal effects of the probit model and LPM are the OLS results. [4] All the regressions employ survey weights.

Trust is negative and strongly significant in all the specifications. In particular, we find the crime reducing effect of *Trust* on *All Crimes* is the largest. An increase of *Trust* of 1 percent reduces the probability of being a victim of any type of crime by 0.15%. This is a substantial crime reducing effect. We cannot compare it with other studies (Buonanno et al., 2009; Lederman et al., 2002) because we are using different offences and trust measures. We further find that the role of trustworthiness in reducing property crimes, i.e. burglary, is negative but somewhat smaller than *All Crimes* and also *Violent.* An increase of one percent leads to a reduction in the probability by 0.037%. For *Violent,* we find an almost double effect of *Trust* compared to *Property.*

The comparison with the two studies which directly study the effect of trust on crime is not very simple in this case. This is because each study employed a different measure of trust. Moreover, we have a dichotomous variable as dependent whereas the other studies used crime rates. Nevertheless, Lederman et al (2002) found an elasticity of trust on homicide rates of 0.40. However, this coefficient is not significant. Akçomak and Weel (2012) found that their measure of trust has a negative coefficient of 0.203. That means that an increase of one of their trust index lead to a decrease in the overall crime rate of 0.203. Again, their coefficient is insignificant. Interestingly, they report that trust is negatively affecting robbery, although they do not report the table with such regressions.

Turning now to the control variables, we find interesting results. If a person is aged between 18 and 29 he/she is less likely to be a victim of property crimes, whereas it is the opposite for violent crimes. Holding all the other variables constant, being young is associated with a 1% lower probability of being victim of a burglary, i.e. property crimes. However, if an individual is young, he is 2.1% more likely to be the victim of a violent crimes. This result is in line with Fajnzylber et al. (2000) that identified young people as being more likely victims of crime. We should bear in mind that *Property Crimes* consists only of burglary and so, those who have a house that might attract the criminals' attention might be older. As expected, *Man* is positive, although significant only for *All Crimes and Property.* The

coefficient for the former is much higher than the latter. For *All Crimes,* we find that men are 2.2 % more likely than females to be victimized. The coefficient for *Violent* is really small. This could be due to the inclusion of crimes such as rape and physical assault where the victim is generally female. The number of years of education is never significant and has an almost neutral effect. In a previous work, Fajnzylber et al. (2000) found that the individual effect of education is not significant. Indeed, given that we controlled for income, we are sure that the education variable is not indirectly capturing the fact that educated people are generally richer. Whether a person is working or not is significant only in the property crimess specification although with a very small sign. Those who work are 0.8 % less likely to be victimized. These results are quite ambiguous as we would have expected that those who are working will spend less time at home, leaving it unguarded. However, it is also likely that those who are working will also be able to afford protection and, so, have lower victimization rates. Contrary to the findings of Glaeser and Sacerdote (1996), we do not find any greater probability of being a victim of any type of crime for those living in urban areas. Turning to the income variables, we find that people belonging to the middle class are more likely to be victims of a crime. However, this result is mainly driven by violent crimes, where for property crimes we find an insignificant coefficient. In particular, *Mid Income* is associated with a 2% higher probability of being victim of any of the crimes we consider. *High Income* is never significant although positive. Therefore, we cannot really assess the difference between middle and high income individuals. Still we note that the coefficient for *High Income* for *Property* is higher than for *Mid Income.* This might mean that richer people have more valuable property to be stolen as against the view that they are better equipped in protecting their properties (Gaviria and Pages, 2002).

Married individuals are less likely to be victims of crime, at least if we consider all crime categories. This result is quite obvious as married people usually conduct a more stable life which leads them to a less exposure to risks. We find that the ethnic variables are quite significant. In particular, black people are less likely to be victims for *All Crimes.* A black person has a 2.9% fewer probability of being a victim of any type of crime compared to a not black, all other variables kept constant. Mixed race individuals have fewer probabilities of being victim of violent crimes, as those of Indian descendents. Given that we have very heterogeneous countries from an ethnic point of view, we leave a more detailed analysis to the section with the single country results.

So far the individual characteristics demonstrated that the results are generally acceptable and in line with the theory. We now address the *upm* characteristics. The first thing we note is that we have few significant coefficients, for all the specifications. In particular, the rate of young people in the population is never significant and has almost negligible coefficients. As said before, we would have expected a positive association (Entorf and Spengler, 2000a). The rate of males in the population is significant only for the *Violent* specification. However, the sign is negative, although the size of the coefficient is very small. Contrary to what Lochner and Moretti (2003) found, we find a positive association between the level of education and crime, except for *Property*. In fact, an increase by one year of education at the *upm* level leads to an increase of the probability of being a victim of any type of crime by 0.1 %. Indeed, a very small effect. The mean income measure is negative for all the three specifications but never significant. Again, this is a quite surprising effect for economic motivated crime. On the other hand, this could mean that crime is more likely to take place in deprived areas. *Working Rate* is never significant. Finally, ethnic Polarization is positively associated with *All Crimes.* This could be due to the fact that in more polarized contexts there might be more social tensions and so higher crime rates. Again, the linear probability model results are almost identical to the probit ones. The measure of goodness of fit of our models is quite low. The likely importance of deterrence variables is one of the main candidates for this result. Finally, the values of the r- squared are quite low. The highest is 0.028 for all types of crime. The literature on the economics of crime (Bianchi et al., 2011) usually found very low values. The reason is that crime equation is quite difficult to model, as opposed to wage ones for example. Nevertheless, our values are particularly low which show that the problem of omitted variables is particularly important in our work. We do not have data on deterrence which are important determinants of crime. Moreover, the *upm* level's reliability depends on the right sampling. Finally, it should be reminded that we are using opinion polls which present several disadvantages.

4.5 Instrumental variables

The results we exposed so far might be biased because of endogeneity issues, due to reverse causality, omitted variable bias and measurement error. A way to solve these issues

is to employ an instrumental variable (IV) approach. For example, regarding the measurement errors issue, we have that the excluded instrument should be uncorrelated with the measurement error in the equation error, but only with the correctly measured variable. In turn, this would lead to consistent estimator. Moreover, if our instrument is unrelated to the omitted variables and the error term, we can estimate our variable of interest consistently. Our result will not depend on the omitted variables then. Finally, an IV approach will help us clarify the causality direction of *Trust* on crime. The main idea is to find a variable which is correlated with *Trust* (relevance condition), excludable from the main equation (excludability condition) and unrelated with the error term (ortogonality condition).

However, a good instrument needs to be also theoretically motivated. For example, Angrist and Krueger (2001, p.73) say: "in our view, good instruments often come from detailed knowledge of the economic mechanism and institutions determining the regressor of interest". On this regard, finding a suitable instrument for *Trust* proved quite troublesome[237].

The literature suggests many possible socio-economic factors that might be correlated with the level of trust, whether at the micro or macro level. For example, Alesina and La Ferrara (2002)[238] showed that individual trust is lower for young, black, female, poor, educated and divorced people. These results are robust to different specifications. In their study on bilateral trust, Guiso et al. (2009) found that people tend to trust more those that are similar to them. For example, those individuals who share the same religion or that are somatically and genetically closer. Similarly, Alesina and La Ferrara (2002) found that the degree of fractionalization strongly decreases the level of trust. This is true only for racial but not for religious heterogeneity. Continuing, Rothstein and Stolle (2008) found that trust is affected by the quality of institutions, and particularly police and juridical system. Societies that are more trustworthy are more equal, in terms of income and opportunities (Gustavsson and Jordhal, 2008).

For curiosity we also tried to check the individual determinants of crime in our sample. The results are in Table 4.4. According to previous studies (Alesina and La Ferrara, 2002), we

[237] For a good survey on the issues related to instrumental variable in criminology, look at Angrist (2005).
[238] Other interesting studies are Gleaser et al (2000), Guiso et al (2008), Dehley and Newton (2005) and Tabellini (2010).

have that trust is decreasing with age. We do not find statistically significant coefficient for gender, education or income at the individual level. However, those who work and are married are likely to trust more. Probably, the sense of security given by the marriage leads this result. The ethnicity variables are negatively affecting trustworthiness, especially for black and Indian individuals. Regarding, the *upm* characteristics, we find that those with higher level of education have greater level of trustworthiness.

Table 4. 4 Individual determinants of trust

	Marginal Effect	Standard Error
Individual Characteristics		
Age 1829	-0.097**	[0.038]
Man	0.048	[0.034]
Education	0.005	[0.005]
Working	0.067*	[0.036]
Urban	-0.211***	[0.054]
Mid Income	0.032	[0.040]
High Income	-0.015	[0.061]
Married	0.250***	[0.043]
Mixed	-0.083	[0.067]
Black	-0.134**	[0.064]
Indian	-0.117*	[0.066]
UPM Characteristics		
Age 1829 Rate	0.009**	[0.004]
Man Rate	-0.001	[0.006]
Education Mean	0.048**	[0.022]
Income Mean	-0.023	[0.027]
Working Rate	0.218	[0.189]
Polarization	-0.015	[0.109]
Observations	6,940	
Country FE	Yes	
Pseudo R-squared	0.0223	
Log Likelihood	-3909	

Note: [1] For each regression, robust standard errors clustered at the *upm*-level (368) are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent is the level of trust at the individual level. It is a dummy variable which takes value 1 if the respondent thinks that people in his community are very or somewhat trustworthy. All other variables' description can be found in the appendix. [3] Marg. Eff are the marginal effects of the probit model and LPM are the OLS results. [4] All the regressions employ survey weights.

A suitable instrument requires, along with the ortogonality condition, to be excludable from the structural equation, meaning that it cannot affect crime in anyway except via *Trust*. However, many variables which affect trust are also, in a way or another, linked with crime. Except for the standard socio-economic variables, such as GDP or education, we have that others like religion (Heaton, 2006) and ethnic heterogeneity are also invalid.

Therefore, we opted for a measure of trust in the elections as our single instrument for *Trust.* In the survey, people were asked the following question: "I am going to ask you a series of questions. I am going to ask you that you use the numbers provided in the ladder to answer. Remember, you can use any number". The respondent could choose a number between 1, not at all, and 7, a lot. They were asked this question regarding several issues, such as their trust on the government, judicial system and national police. One of them was "to what extent do you trust election". Therefore, we interpret it as the trust on the instrument of elections. This variable should be appropriated because of a series of reasons. First of all it holds the relevance condition. As Alesina and La Ferrara (2002) pointed out, general trust is generally correlated with trust in organization, institutions, companies and organised labour. In fact, their GSS measure of trust is positively correlated with 10 out of the 13 other trust measures. Unfortunately, there is not a specific question on trust in election that we can refer to. In our sample, we find that, *Trust* and trust in elections (*Trust Elections* henceforth) are positively and significantly correlated, although not very strongly. This could be seen in the first stage of each instrumental variable regression. Continuing, our instrument also passes the excludability condition. Here the question is: should *Trust Elections* be excluded from the main equation? We do not see any reason why the level of trust in elections should have any influence on crime. In fact, trust in the elections does not represent social capital which might eventually influence crime. Moreover, it is not higher for the richer, more educated and so on. When we regress *Trust elections* on *Trust*[239], crime and the other control variables, we found that, apart from *Trust* and *black*, all the other variables were insignificant. This means that it is independent in respect to socio-economic outcomes, both at the individual and *upm* level. Moreover, the instrument should be exogenous with respect of the dependent variables. In fact, there should not be any relationship between crime and our instrument at all. This means that crime should not

[239] We did not report these results.

influence trust in election at all. Here, it seems a bit trickier but even in this case we do not find any link. One could argue that crime and violence during the election period might influence the individual trust. However, even though it happened that in some of these countries there has been violence or riots in that period[240], it never affected the correct execution of the electoral process. Moreover, it is likely that corrupted or simply poor candidates have been elected. Eventually, this would have influenced the citizens' willingness to vote, not their trust in the elections. For example, in many developed countries electoral turnouts have been declining over the last decades. However, those people might not go to vote because they do not trust the elected, not the elections[241]. As a consequence, it seems that the measure of trust in the elections is unbiased in relation to victimization experience.

Nevertheless, it must be stressed the low level of standard deviation of our instrument, as could be seen in the descriptive statistics. This might cause some problems in the regression analysis.

Having one instrument, we have a just identified model[242]. Since, our excluded instrument is a continuous variable we have the following first stage regression:

$$Trust_{uc} = \gamma_1 \, Trust\ Elections_{uc} \; + \; \gamma_2 X_{iuc} + \; T_{uc} + \; \varphi_c + \omega_{iuc}$$

ω_{iuc} is the error term that is normally distributed. Moreover, given the likely endogeneity of *Trust* in the structural equation, we have that ω_{iuc} and ϵ_{iuc} are correlated. After having estimated the above equation we obtain $\widehat{\omega}_{iuc}$. In the second, the dichotomous variable *Victimization*[243] is regressed on $\widehat{\omega}_{iuc}$, along with *Trust* and the other covariates. At this point, the choice is really between the maximum likelihood estimation or the Amemiya's Generalized Least squares (AGLS), which is often referred as the two step estimator, based on, Adkins (1987). Since our instrument is not that strong, there is not

[240] For example, Suriname. However in USDS (2012, p. 1) it is written : "President Bharrat Jagdeo was re-elected to a second full term in 2006 elections that international observers considered generally free and fair."
[241] Moreover, in the Caribbean countries the electoral turnout is quite high compared to developed countries.
[242] Using a single instrument reduce the bias (Angrist , 2001). Regarding the case of the endogenous probit model, Adkins (2008, p. 20) says: "over identification should be avoided if possible. It doesn't appear to help the performance of the IV estimators either in terms of bias or testing".
[243] Obviously it includes *All Crimes, Property* and *Violent.*

much difference between the two (Adkins, 2008)[244]. We chose to use the maximum likelihood estimator. Again, we calculate the partial effects that are computed in a slightly different way (Wooldridge, 2002, p.476). We also estimate this model with the linear instrumental variables methodology[245].

4.5.1 Instrumental variable results

Since we have one excluded variable which function as the identifying instrument we have a just-identified model. Table 4.5 below reports the results for all the three crime specifications for both the probit (IV-Probit) and linear (2SLS) instrumental variable approach. As we can see *Trust* is significant and negative for *All Crimes* and *Property,* but not for the violent ones. This result is quite different from the one with the endogenous regressor we found earlier. In fact *Trust* in that model was significant also for *Violent*. Moreover, the IV coefficients are larger. An increase of 1% of *Trust* leads to a decrease of the probability of being a victim of all types of crime of 0.35 % with IV-Probit. This coefficient is more than double compared to the one in Table 4.2. Therefore, in the endogenous specification we were wrongly assuming a smaller crime-reducing effect of social capital. The result for 2SLS is somewhat smaller, 0.32%.

For *Property* we have that the increase of 1 of our measure of trust is associated with a decline of around 0.29%. In the model with the endogenous regressor we had a coefficient of 0.037, almost eight times smaller. The 2SLS coefficient is, again, smaller than the IV-Probit ones. Interestingly, the result for *Violent* is negative, insignificant and smaller than the one in Table 4.3. Therefore, we were wrongly assuming a crime reducing effect of social capital on violent crimes, whereas that is not the case. As expected, the instrumental approach leads to greater standard errors, and obviously loss of precision.

[244] Adkins (2008) performed a monte carlo simulation to test the property of different estimator with an endogenous probit model. He concluded that when choosing, many aspects should be taken into consideration such as the strength of the instrument, sample size, the correlation between the endogenous regressor and the equations' error term.

[245] We could have used LILM as well. However, it is asymptotically equivalent to 2SLS.

Table 4. 5 Instrumental variables results

	All Crimes		*Property*		*Violent*	
	IV-Probit	IV-2SLS	IV-Probit	IV-2SLS	IV-Probit	IV-2SLS
Trust	-0.354**	-0.320**	-0.286**	-0.175***	-0.056	-0.053
	[0.141]	[0.127]	[0.133]	[0.052]	[0.108]	[0.103]
Individual Characteristics						
Age 1829	0.017	0.016	-0.013*	-0.009*	0.021***	0.022***
	[0.010]	[0.011]	[0.007]	[0.005]	[0.008]	[0.008]
Man	0.023**	0.023**	0.010*	0.008*	0.001	0.001
	[0.009]	[0.009]	[0.006]	[0.004]	[0.007]	[0.007]
Education	0.002	0.002	-0.000	-0.000	0.001	0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Working	0.010	0.010	-0.011*	-0.009*	0.005	0.004
	[0.010]	[0.010]	[0.007]	[0.005]	[0.007]	[0.007]
Urban	-0.022	-0.019	-0.011	-0.005	-0.008	-0.007
	[0.014]	[0.013]	[0.011]	[0.006]	[0.011]	[0.010]
Mid Income	0.021**	0.019*	0.001	0.002	0.020**	0.020**
	[0.010]	[0.010]	[0.007]	[0.004]	[0.008]	[0.008]
High Income	0.025	0.026	0.007	0.009	0.012	0.012
	[0.016]	[0.019]	[0.010]	[0.010]	[0.013]	[0.014]
Married	-0.013	-0.013	0.007	0.006	-0.011	-0.010
	[0.010]	[0.010]	[0.007]	[0.005]	[0.008]	[0.008]
Mixed Race	-0.020	-0.023	0.007	0.005	-0.027**	-0.029**
	[0.014]	[0.015]	[0.010]	[0.007]	[0.011]	[0.012]
Black	-0.032**	-0.033**	-0.013	-0.005	-0.016	-0.017
	[0.015]	[0.015]	[0.011]	[0.007]	[0.012]	[0.012]
Indian	-0.031**	-0.027	-0.001	0.002	-0.024*	-0.023*
	[0.016]	[0.017]	[0.009]	[0.009]	[0.013]	[0.012]
UPM Characteristics						
Age 1829 Rate	0.001	0.000	0.000	-0.000	0.001	0.001
	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]	[0.001]
Man Rate	0.000	0.000	0.001	0.001	-0.002*	-0.002*
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Education Mean	0.012***	0.011***	0.005	0.003	0.007**	0.007**
	[0.004]	[0.004]	[0.003]	[0.002]	[0.003]	[0.003]
Income Mean	0.003	0.002	0.003	0.002	-0.004	-0.005
	[0.007]	[0.006]	[0.005]	[0.003]	[0.005]	[0.005]
Working Rate	0.003	0.005	-0.030	-0.016	0.045	0.045
	[0.036]	[0.035]	[0.023]	[0.015]	[0.028]	[0.028]
Polarization	0.030*	0.022	-0.001	-0.001	0.017	0.015
	[0.025]	[0.021]	[0.017]	[0.008]	[0.020]	[0.017]
Observations	6,940	6,940	6,940	6,940	6,940	6,940
R-squared		0.023		0.010		0.013
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
First Stage						
Trust Elections	0.050***		0.050***		0.050***	
	[0.003]		[0.003]		[0.003]	
F-stat (excluded instruments)		244.761		244.761		244.761
Test of Exogeneity						
(p- value)	0.0849	0.1218	0.0107	0.0114	0.7691	0.7942
Partial R square		0.0357		0.0357		0.0357

Note: [1] For each regression, robust standard errors clustered at the *upm*-level (368) are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent Crimes* in the last two columns. *Trust* is the percentage of people in the *upm* who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the appendix. [3] All the regressions employ survey weights. [4] The top part of the table report the second stage results instrumenting *Trust* with *Trust Elections*. The models have been estimated with a probit instrumental variable (IV- Probit) and two stage least squares (IV- 2SLS) techniques. The bottom part reports the first stage coefficient for *Trust Elections*. We also report the *F*-test of the excluded instruments, the p-value of the endogeneity tests and the adjusted R- square.

The work by Lederman et al (2002) found a statistically significant coefficient of 1.21. This means that an increase of 1% in the number of respondents who said that "most people can be trusted" leads to a decrease in homicide rates. We do not consider homicide rates which make the comparison difficult. However, in our case we found that trust reduce more property rather than violent crimes. In particular, a one percent increase in our measure of trust reduces the probability of being victim of a crime by 0.354%. Although not directly comparable, this value looks lower than the one found by Lederman et al. (2002). Unfortunately, Akçomak and Weel(2002) do not report the results for the 2SLS for trust.

Our instrument *Trust Elections* is strongly correlated with *Trust*. The first stage statistics at the bottom of 4.5 show that our instrument is significant at 1% level. The coefficient is nor too high neither too small as to flag a weak instrument issue. Our instrumental variable estimators are quite different from the endogenous ones. As Angrist and Krueger (2001) said, instrumental variables estimates with very weak instruments tend to be cantered on the corresponding ordinary least squares estimate. Moreover, we have that the F test of joint significance in the first stage is well above than 10, which is considered as flagging a weak instrument problem (Stock and Yogo, 2002). Moreover, the adjusted r square is much higher than the one in the model when we did not consider the endogeneity of *Trust*. This means that we are not losing precision by using *Trust Elections* as instrument. Since we have a just identified model, we could not test for instrument validity, using an over identifying restriction test. However, we believe that the arguments used in the previous section were quite convincing. Finally, we also report the results for the endogeneity test of *Trust*. This is basically a Hausman test which compares the probit (OLS) and instrumental variables endogenous regressor. The null is that *Trust* is exogenous. We reject this null for *All Crimes*

for IV probit but we could not reject for two stage least square, even though slightly. Also, we rejected it for both estimation techniques for *Property.*

Turning to the control variables, we have almost identical results as the specification with the endogenous regressor. For the individual characteristics there are really little differences both in terms of the size of the coefficients and significance. However, in the instrumental variable approach we note that the *Married* coefficient is not significant for *All Crimes* in the LPM specification as before. Moreover, the size is a bit smaller compared to this last one. Interestingly, *Indian* turns out to be significant, at least in the nonlinear specification, and with a more pronounced negative effect. This happens only for *All Crimes* but not for *Violent* which has identical results between the two. Also, the *upm* level characteristics show similar patterns as before. Nevertheless we note that the income variable, still insignificant has changed sign for *All Crimes* and *Property.* The education variable for *All Crimes* is even more statistically significant than before and it exhibits slightly higher coefficients. Interestingly, *Polarization* for property has now a negative sign, although very close to 0.

4.6 Robustness checks

We consider two robustness checks to validate the results we have found in the previous sections. In the first we use a different classification of the crime categories, whereas in the latter we consider a different geographical level of aggregation.

4.6.1 Different crime categories

Our classification of crime data into violent and property crimes is based on the FBI scheme. Here we create two new crime categories that we call *Property1* and *Violent1.* In the former we have, as before, burglary, but also unarmed robbery without assault. The reason for doing so is that this additional crime does not involve any violence, but only material gains. In the latter one we have assault without robbery, sexual assault, armed robberies and unarmed robberies with assault. Therefore, we excluded extortion and kidnapping from the previous specification. We decided to do so because extortion and

kidnapping often do not appear as property crimes. Summary statistics can be found in the appendix.

Table 4. 6 Crime categories

	Property1		*Violent1*		*Property1*		*Violent1*	
	Marg. Eff	LPM	Marg. Eff	LPM	IV-Probit	IV-2SLS	IV-Probit	IV-2SLS
Trust	-0.066***	-0.064***	-0.042**	-0.042**	-0.352***	-0.272***	0.069	0.064
	[0.022]	[0.021]	[0.019]	[0.019]	[0.130]	[0.088]	[0.092]	[0.082]
Individual Characteristics								
Age 1829	-0.005	-0.005	0.017***	0.018***	-0.004	-0.004	0.017***	0.017**
	[0.007]	[0.007]	[0.006]	[0.006]	[0.008]	[0.007]	[0.006]	[0.007]
Man	0.005	0.006	0.006	0.005	0.006	0.006	0.006	0.005
	[0.007]	[0.007]	[0.006]	[0.006]	[0.007]	[0.006]	[0.006]	[0.006]
Education	0.001	0.002	-0.001	-0.001	0.002	0.002	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Working	-0.005	-0.005	0.006	0.005	-0.006	-0.006	0.006	0.005
	[0.007]	[0.007]	[0.006]	[0.006]	[0.008]	[0.007]	[0.006]	[0.006]
Urban	-0.004	-0.003	0.002	0.002	-0.024**	-0.018**	0.010	0.009
	[0.008]	[0.007]	[0.006]	[0.006]	[0.012]	[0.009]	[0.009]	[0.008]
Mid Income	0.009	0.009	0.011**	0.012**	0.011	0.009	0.011*	0.012*
	[0.008]	[0.008]	[0.006]	[0.006]	[0.008]	[0.007]	[0.006]	[0.006]
High Income	0.004	0.002	0.019*	0.020*	0.002	0.001	0.021*	0.021*
	[0.011]	[0.013]	[0.010]	[0.011]	[0.013]	[0.014]	[0.011]	[0.011]
Married	0.003	0.003	-0.013**	-0.012**	0.008	0.007	-0.015**	-0.014**
	[0.008]	[0.008]	[0.006]	[0.006]	[0.008]	[0.007]	[0.007]	[0.006]
Mixed	-0.007	-0.008	-0.016*	-0.017	-0.007	-0.008	-0.017*	-0.017*
	[0.011]	[0.011]	[0.009]	[0.010]	[0.012]	[0.011]	[0.009]	[0.010]
Black	0.001	0.001	-0.022**	-0.023**	-0.003	-0.003	-0.021**	-0.021**
	[0.012]	[0.012]	[0.009]	[0.009]	[0.012]	[0.011]	[0.010]	[0.010]
Indian	0.002	0.005	-0.024**	-0.023**	-0.003	0.002	-0.023**	-0.022**
	[0.014]	[0.017]	[0.010]	[0.010]	[0.012]	[0.013]	[0.010]	[0.010]
Upm Characteristics								
Age 1829 Rate	0.000	-0.000	0.001	0.001	0.000	0.000	0.001	0.000
	[0.001]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]	[0.000]	[0.000]
Man Rate	-0.001	-0.001	-0.001	-0.001	-0.000	-0.000	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Education Mean	0.002	0.003	0.006**	0.006**	0.005*	0.005	0.005**	0.005*
	[0.003]	[0.003]	[0.002]	[0.002]	[0.003]	[0.003]	[0.002]	[0.002]
Income Mean	-0.002	-0.002	-0.002	-0.002	0.004	0.003	-0.005	-0.004
	[0.004]	[0.004]	[0.003]	[0.003]	[0.005]	[0.004]	[0.004]	[0.004]
Working Rate	0.010	0.014	0.006	0.006	0.017	0.019	0.004	0.004
	[0.024]	[0.023]	[0.021]	[0.021]	[0.028]	[0.024]	[0.023]	[0.023]
Polarization	0.022	0.017	-0.005	-0.004	0.017	0.011	-0.002	-0.001
	[0.021]	[0.017]	[0.015]	[0.013]	[0.021]	[0.015]	[0.015]	[0.013]
Observations	6,940	6,940	6,940	6,940	6,940	6,940	6,940	6,940
Pseudo R-squared	0.0343		0.0230					
R-squared		0.017		0.009		0.001		0.004
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-1588		-1322					
					First Stage			
Trust Elections					0.050***		0.050**	
					[0.003]		[0.003]	
F-stat (excluded instruments)						244.761		244.761
Test of Exogeneity (p- value)					0.0021	0.0047	0.2322	0.2376
Partial R square						0.1938		0.1938

Note: [1] For each regression, robust standard errors clustered at the *upm*-level (368) are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent Crime s* in the last two columns. *Trust* is the percentage of people in the *upm* who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the appendix. [3] All the regressions employ survey weights. [4] In the left side of the table, Marg. Eff are the marginal effects of the probit model and LPM are the OLS results. [5] In

the top- right side part of the table we report the second stage results instrumenting *Trust* with *Trust Elections*. The models have been estimated with a probit instrumental variable (IV- Probit) and two stage least squares (IV- 2SLS) techniques. The bottom- right part reports the first stage coefficient for *Trust Elections*. We also report the *F*-test of the excluded instruments, the p- value of the endogeneity tests and the adjusted R- square.

Table 4.6 reports the results: in the left side we included the results with the endogenous regressor and in the right side we have the instrumental variable ones. As we can see, the results are in line with the previous ones, although with some noticeable differences. In the model with the endogenous regressor, *Trust* is negative and significant both for *Property1* and *Violent1.* However, in this model we have that the coefficient for violent crimes is smaller than for property crimes, indicating a lower crime-reducing effect. An increase by one unit of *Trust* reduces the probability of being victim of a violent crime by 0.42%. Looking at the instrumental variable results, the coefficient is more negative for *Property1* than it was for *Property.* In this case we have a result similar to the one we found before for *All Crimes.* The coefficient is now -0.352. The 2SLS ones are also smaller than before. On the other hand, the result for *Violent1* is now positive and insignificant. We can interpret such change with the fact that unarmed robbery might really be higher in context of low social capital.

Turning to the control variables, we focus on the results using the instrumental variable approach[246]. Here we notice that many variables that were important predictors of victimization experience are now not significant. Amongst them *Age1829*, *Man* or *Working* for property crimes. On the other side, *Urban* is now significant and negative for property crimes. One explanation might be that it is easier to be a victim of a burglary in rural areas, where supposedly patrolling could be difficult. Interestingly, *Mid* and *High Income* are positive and significant for *Violent1*. The coefficient for the latter is bigger than for the former case. Ethnic variables are similar to the previous specification. Regarding the *upm* level characteristics, we have that education is now positively predicting also property crimes.

4.6.2 Different geographical aggregation: provinces

[246] The reason is that there are not many differences between the endogenous case and the IV one.

As a further robustness check, we also consider *Trust* and the "local" characteristics at the provincial level, rather than *upm*. We decided to consider this geographical aggregation because it represents a bigger area compared to the *upm* one. The average province is composed by an average of 120 individuals in our sample. On the other hand, *upm* is constituted by 18 people. Table 4.7 – 4.8 show the results.

Table 4. 7 Provinces

	All Crimes		*Property*		*Violent*	
	Marg. Eff	LPM	Marg. Eff	LPM	Marg. Eff	LPM
Trust	-0.132*	-0.149*	-0.029	-0.042	-0.091*	-0.099*
	[0.075]	[0.081]	[0.034]	[0.039]	[0.053]	[0.059]
Individual Characteristics						
Age 1829	0.010	0.008	-0.013**	-0.011**	0.019***	0.020**
	[0.010]	[0.011]	[0.005]	[0.005]	[0.007]	[0.008]
Man	0.022**	0.022**	0.008*	0.009*	-0.000	-0.000
	[0.009]	[0.010]	[0.004]	[0.004]	[0.007]	[0.007]
Education	0.003***	0.004***	0.000	0.000	0.002	0.002*
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Working	0.010	0.009	-0.011**	-0.011**	0.008	0.008
	[0.010]	[0.010]	[0.004]	[0.004]	[0.007]	[0.007]
Urban	0.012	0.011	0.009	0.007	0.003	0.003
	[0.012]	[0.011]	[0.006]	[0.004]	[0.009]	[0.009]
Mid Income	0.017	0.016	-0.001	0.000	0.019**	0.019**
	[0.011]	[0.010]	[0.005]	[0.004]	[0.008]	[0.008]
High Income	0.029*	0.031*	0.009	0.013	0.013	0.011
	[0.016]	[0.018]	[0.007]	[0.011]	[0.014]	[0.015]
Married	-0.018*	-0.018*	-0.001	0.000	-0.009	-0.008
	[0.010]	[0.010]	[0.005]	[0.005]	[0.008]	[0.007]
Mixed	-0.017	-0.019	0.003	0.003	-0.023*	-0.025*
	[0.015]	[0.016]	[0.007]	[0.007]	[0.012]	[0.013]
Black	-0.029*	-0.030*	-0.007	-0.004	-0.016	-0.018
	[0.016]	[0.016]	[0.007]	[0.006]	[0.012]	[0.013]
Indian	-0.027	-0.027	0.003	0.005	-0.028**	-0.029**
	[0.017]	[0.019]	[0.006]	[0.009]	[0.013]	[0.012]
Provincial Characteristics						
Age 1829 Rate	0.000	0.000	0.000	-0.000	0.000	0.000
	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]
Man Rate	-0.002	-0.002	0.001	0.001	-0.004***	-0.005***
	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.002]
Education Mean	-0.000	-0.000	0.003	0.004	-0.003	-0.004
	[0.007]	[0.007]	[0.003]	[0.005]	[0.005]	[0.005]
Income Mean	-0.012	-0.013	-0.007	-0.008	-0.008	-0.009
	[0.011]	[0.012]	[0.005]	[0.008]	[0.009]	[0.008]
Working Rate	0.027	0.028	0.058	0.042	-0.041	-0.031
	[0.086]	[0.089]	[0.041]	[0.050]	[0.072]	[0.074]
Polarization	0.000	0.000	-0.000	-0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	6,940	6,940	6,940	6,940	6,940	6,940
Pseudo R-squared	0.0285		0.0791		0.0206	
R-squared		0.024		0.024		0.012
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-2756		-834.7		-1882	

Note: [1] For each regression, robust standard errors clustered at the *upm*-level (368) are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent Crime s* in the last two columns. *Trust* is the percentage of people in the province who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the appendix. [3] Marg. Eff are the marginal effects of the probit model and LPM are the OLS results.[4] All the regressions employ survey weights

Table 4. 8 Provincial: instrumental variables

	All Crimes		*Property*		*Violent*	
	IV-Probit	IV-2SLS	IV-Probit	IV-2SLS	IV-Probit	IV-2SLS
Trust	-0.696**	-0.646*	-0.394	-0.164	-0.272	-0.301
	[0.338]	[0.331]	[0.272]	[0.141]	[0.261]	[0.273]
Individual Characteristics						
Age 1829	0.010	0.009	-0.014**	-0.011**	0.020***	0.020**
	[0.010]	[0.010]	[0.006]	[0.004]	[0.008]	[0.008]
Man	0.022**	0.022**	0.010*	0.009**	-0.000	-0.000
	[0.009]	[0.009]	[0.005]	[0.004]	[0.007]	[0.007]
Education	0.003***	0.004***	0.000	0.000	0.002*	0.002*
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Working	0.009	0.008	-0.014**	-0.011**	0.008	0.007
	[0.009]	[0.009]	[0.006]	[0.004]	[0.007]	[0.007]
Urban	0.001	0.001	0.004	0.004	-0.000	-0.000
	[0.012]	[0.011]	[0.007]	[0.004]	[0.009]	[0.009]
Mid Income	0.018*	0.017*	-0.001	0.000	0.019**	0.019**
	[0.010]	[0.010]	[0.006]	[0.004]	[0.008]	[0.008]
High Income	0.028*	0.029	0.009	0.013	0.012	0.011
	[0.016]	[0.018]	[0.008]	[0.010]	[0.013]	[0.013]
Married	-0.014	-0.014	0.002	0.001	-0.008	-0.006
	[0.010]	[0.010]	[0.005]	[0.005]	[0.008]	[0.008]
Mixed	-0.012	-0.015	0.007	0.004	-0.022*	-0.024*
	[0.015]	[0.015]	[0.008]	[0.007]	[0.011]	[0.012]
Black	-0.030**	-0.031**	-0.009	-0.004	-0.017	-0.018
	[0.015]	[0.015]	[0.009]	[0.006]	[0.012]	[0.012]
Indian	-0.030*	-0.029*	0.002	0.004	-0.029**	-0.030**
	[0.015]	[0.016]	[0.008]	[0.009]	[0.013]	[0.012]
UPM Characteristics						
Age 1829 Rate	0.001	0.001	0.001	-0.000	0.000	0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Man Rate	0.001	0.000	0.002	0.002	-0.003*	-0.004**
	[0.002]	[0.003]	[0.002]	[0.001]	[0.002]	[0.002]
Education Mean	-0.010	-0.010	-0.002	0.002	-0.007	-0.008
	[0.009]	[0.010]	[0.005]	[0.006]	[0.007]	[0.008]
Income Mean	0.006	0.005	0.002	-0.003	-0.003	-0.001
	[0.015]	[0.017]	[0.009]	[0.010]	[0.012]	[0.013]
Working Rate	0.061	0.055	0.098*	0.049	-0.031	-0.020
	[0.080]	[0.082]	[0.054]	[0.041]	[0.063]	[0.064]
Polarization	-0.000	-0.000	-0.000	-0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	6,940	6,940	6,940	6,940	6,940	6,940
R-squared		0.016		0.022		0.010
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
			First Stage			
Trust Elections	0.050***		0.050***		0.050***	
	[0.003]		[0.003]		[0.003]	
F-stat (excluded instruments)		180.887		180.887		180.887
Test of Exogeneity (p- value)	0.0852	0.0762	0.0746	0.0775	0.4705	0.501
Partial R square		0.0728		0.0728		0.0728

Note: [1] For each regression, robust standard errors clustered at the *upm*-level(368) are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent Crime s* in the last two columns. *Trust* is the percentage of people in the province who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the appendix. [3] All the regressions employ survey weights. [4] The top part of the table report the second stage results instrumenting *Trust* with *Trust Elections*. The models have been estimated with a probit instrumental variable (IV- Probit) and two stage least squares (IV- 2SLS) techniques. The bottom part reports the first stage coefficient for *Trust Elections.* We also report the *F*-test of the excluded instruments, the p-value of the endogeneity tests and the adjusted R- square.

Looking at Table 4.7, we see that *Trust* is negative in all the specifications. However, in the model with *upm* we do not find it to be significant for *Property.* The result for *All Crimes* is similar to the previous one. In fact, an increase by 1 unit of the *Trust* measure at the provincial level reduce the probability of being victim of any type of crime 0.13% , compared to the 0.15% of before. Also, the coefficient for *Violent* is a bit smaller than before. Regarding the instrumental variable results we find that only the coefficient for *All Crimes* is significant. In particular, the estimated crime – reducing effect is greater than in the specification with the endogenous regressor. In fact, now it is -0.696 for the IV-Probit specification. Turning to the control variables in Table 4.8, we find some interesting results. The age and gender variables' coefficients are quite similar to the model with *upm* level characteristics. Moreover, *Education is* significant for *All Crimes* and *Violent.* Compared to before, *High Income* in the specification with all the crimes is positive and significant. Its magnitude is greater than the one for *Mid Income.* This might reflect that richer people attract more criminals' attention compared to middle class members.

Regarding the province level characteristics, it is worth noting that *Working Rate* is now positive for *Property* for the IV-Probit specification. The first stage results are obviously identical to before. However, we can now reject the null of exogeneity of *Trust* also for IV-Probit whereas we could not do that before. *Education Mean* is negative and not significantly different from zero for *All Crimes* and *Violent,* whereas before it was positive and significant.

4.7 Single country results

So far we have presented the results for the regression with all the countries' data stacked together. Indeed, this has the advantage of increasing the number of observations

which lead to a better estimation of the link trust-crime. However, it is also interesting to analyse how *Trust* and the control variables affect the probability of victimization at the country level. Indeed, heterogeneity in socio-economic conditions in single countries might lead to different responses of the economics of crime model.

Let us first give a brief overlook on these countries, focusing on the most important similarities and differences and then proceeds in analyzing the main findings for each one of them.

4.7.1 Key facts on our five countries

As the other Latin American and Caribbean countries, Jamaica, the Dominican Republic, Suriname, Guyana and Trinidad and Tobago share a similar colonial history. In particular, Jamaica, Guyana and Suriname were British colonies, whereas Suriname was Dutch and the Dominican Republic Spanish[247]. Indeed, each power left its mark on the language, culture, and politics (Barker et al., 2010). These countries were firstly colonized to exploit the richness of their territories, through the plantations of various profitable agricultural goods such of sugar, cocoa and coffee. Moreover, they were sought after for the preciousness of minerals such as gold and bauxite. Given the scarcity of local labour force[248], slaves from the western part of Africa were brought in and forced to work on the fields (Barker et al., 2010). For many centuries they contributed to the cultivation of huge areas. However, when slavery was abolished[249] each country substituted the freed slaves with other migrants from different corners of the world. For example, many Indians moved to Trinidad and Tobago, Suriname, and Guyana. Not only, there has been migration from far countries as China and Syria. This led to the creation of multi ethnic societies as we see nowadays[250]. Nevertheless, the colonial heritage[251] and the slavery period in particular, left remarkable scars on the

[247] However, each country has been ruled by different countries at different period of their history. For example, Suriname has been an English Colony for many years. Guyana was a Dutch colony before being ruled by the English. Dominican Republic obtained its independence by the Haitians, which was French at that time. Trinidad and Tobago has been Spanish until the XIX when it went under British control. Jamaica was Spanish until 1655.

[248] These countries were occupied by indigenous populations, the Amerindian.

[249] Each country abolished it in different periods.

[250] With the exception of Jamaica where around 90% is afro-descendent.

[251] Except the Dominican Republic, they became independent no earlier than fifty years ago. However, other dominations took place at different times

social class structures. In fact, they reinforced the class colour system and fostered inequality. On this regard Barker et al. (2010, p.193) said: "the colonial plantation system, therefore, created grossly unequal and inegalitarian social hierarchies that were primarily premised on race and skin colour". That inequality is still one of the major issues in these countries as can be seen in Table 4.14 where we report, if available, data on the Gini index. Indeed, the high degree of disparity is one of the major responsible for the abnormal levels of crime (Di Tella, 2010).

Table 4. 9 Key facts on the five Caribbean countries

	Dominican Republic	*Guyana*	*Jamaica*	*Suriname*	*Trinidad and Tobago*
Population (thousands)	9957	745	287	492	1228
GDP per Capita	5195	2945	5179	6255	15206
Unemployment Rate	14.2	11	11.4	9.5	5.3
Employment in agriculture	14.5		20.2	8	3.8
Capital City	Santo Domingo	Georgetown	Kingston	Paramaribo	Port of Spain
Capital Population (thousands)	2138	132	580	259	57
Ranking HDI	98	117	79	104	62
Gini Index	48.4	43.2	45.5		
Independence	1844 (from Haiti)	1966 (from UK)	1962 (from UK)	1975 (from Neth.)	1962 (from UK)

Note: [1] The table report the data for the latest available year [2] Population, Unemployment rate (Guyana), Capital Population, Gini Index and Independence are taken from CIA (2012). [3] GDP per Capita, Employment in agriculture, Unemployment Rate (all countries except Guyana) is taken from WB (2012). Ranking HDI is taken from UNDP (2012).

Still, these countries tried to progress from an economic point of view. Except for the Dominican Republic they all belong to Caribbean Community (CARICOM) and the CARICOM Single Market and Economy (CSME)[252]. This economic area, along with the USA, absorbs most of countries' production. Moreover, they are very active in sectors as diverse as mining, tourism, light manufacturing and agriculture[253]. Indeed, there are remarkable cross

[252] Despite the fact that Guyana and Suriname belong geographically to South America, they have always been culturally similar to the Caribbean countries. In particular, there have many similarities with the English speaking Caribbean countries.

[253] The share of the contribution of agriculture to the GDP is extremely high even compared to other developing countries. The data on employment in this sector could be found in Table 4.14.

country differences in many socio-economic aspects, as we can note in Table 4.14. Also, they are at very different stage of economic progress. Trinidad and Tobago is middle –high income country. It relies on its rich reserves of oil and gas which account for a big percentage of the GDP. On the other hand Guyana is one of the poorest in the area, although rich in minerals such as gold and bauxite. The Human Development Index (HDI) shows further evidence of the differences in terms of life expectancy and literacy rates. Such remarkable socio-economic heterogeneity does play a role in crime patterns.

In order to investigate it, in the following section we report the results for the model we presented earlier for each single country. The only difference regards the ethnicity variables for the Dominican Republic. We decided to report the linear probability, although the probit specification gives analogous results. In some countries we predict victimization rate better than others. This is not surprising as the model of crime does not fit in the same way in different regions, as showed by Bennet et al. (1997). Tables from 4.9 until 4.12 show the results.

Table 4.10 Dominican Republic

	All Crimes		*Property*		*Violent*	
	LPM	IV-2SLS	LPM	IV-2SLS	LPM	IV-2SLS
Trust	-0.096	-0.685	-0.025	-0.523*	-0.058	-0.284
	[0.101]	[0.847]	[0.039]	[0.316]	[0.091]	[0.697]
Individual Characteristics						
Age 1829	0.047*	0.048*	-0.009	-0.009	0.048**	0.048**
	[0.028]	[0.026]	[0.010]	[0.012]	[0.020]	[0.022]
Man	-0.001	-0.001	-0.000	-0.001	-0.008	-0.008
	[0.023]	[0.024]	[0.009]	[0.010]	[0.021]	[0.020]
Education	0.006**	0.006**	-0.000	-0.000	0.005**	0.005**
	[0.002]	[0.003]	[0.001]	[0.001]	[0.002]	[0.002]
Working	0.007	0.008	-0.008	-0.007	-0.000	0.000
	[0.027]	[0.024]	[0.009]	[0.011]	[0.021]	[0.020]
Urban	0.061***	0.029	0.005	-0.022	0.036*	0.024
	[0.022]	[0.051]	[0.009]	[0.018]	[0.021]	[0.043]
Mid Income	0.029	0.027	0.000	-0.001	0.033	0.033
	[0.026]	[0.024]	[0.010]	[0.011]	[0.020]	[0.021]
High Income	-0.033	-0.043	0.009	-0.000	-0.026	-0.030
	[0.051]	[0.046]	[0.025]	[0.022]	[0.035]	[0.038]
Married	0.021	0.030	0.002	0.010	0.011	0.015
	[0.029]	[0.029]	[0.015]	[0.013]	[0.021]	[0.024]
Mixed	-0.010	-0.008	-0.002	-0.000	-0.025	-0.024
	[0.033]	[0.033]	[0.012]	[0.014]	[0.028]	[0.028]
Black	0.022	0.004	-0.004	-0.019	0.023	0.016
	[0.047]	[0.054]	[0.014]	[0.021]	[0.041]	[0.048]
White	-0.050	-0.050	0.020	0.021	-0.068*	-0.068*
	[0.041]	[0.043]	[0.018]	[0.022]	[0.036]	[0.035]
UPM Characteristics						
Age 1829 Rate	-0.000	-0.001	-0.000	-0.001	0.000	0.000
	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]
Man Rate	-0.001	-0.001	0.001	0.002*	-0.005**	-0.004**
	[0.002]	[0.002]	[0.001]	[0.001]	[0.002]	[0.002]
Education Mean	0.005	0.010	0.007**	0.010**	0.001	0.003
	[0.010]	[0.011]	[0.003]	[0.004]	[0.008]	[0.009]
Income Mean	-0.006	0.006	-0.008	0.003	-0.005	-0.000
	[0.013]	[0.022]	[0.005]	[0.009]	[0.009]	[0.018]
Working Rate	0.134	0.075	-0.074*	-0.124**	0.128	0.105
	[0.117]	[0.143]	[0.038]	[0.057]	[0.103]	[0.117]
Polarization	-0.034	-0.128	-0.066**	-0.146**	0.035	-0.002
	[0.064]	[0.151]	[0.033]	[0.065]	[0.056]	[0.115]
Observations	1,423	1,423	1,423	1,423	1,423	1,423
R-squared	0.026	0.024	0.012	0.008	0.035	0.028
		First Stage				
Trust Elections		0.0269***		0.0269***		0.0269***
		[0.007]		[0.007]		[0.007]
F-stat (excluded instruments)		11.8134		11.8134		11.8134
Test of Exogeneity (p- value)		0.4749		0.0737		0.7399
Partial R square		0.1034		0.1034		0.1034

Note: [1] For each regression, robust standard errors clustered at the *upm*-level (368) are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent Crime s* in the last two columns. *Trust* is the percentage of people in the *upm* who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the Appendix. [3] All the regressions employ survey weights. [4] Column 1, 3 and 5 report the LPM results. [5]Column 2, 4 and 6 report the instrumental variables results, instrumenting *Trust* with *Trust Elections*. The models have been estimated with a two stage least squares (IV- 2SLS) technique. The bottom part reports the first stage coefficient for *Trust Elections*. We also report the *F*-test of the excluded instruments, the p- value of the endogeneity tests and the adjusted R- square.

Table 4.11 Trinidad and Tobago

	All Crimes		*Property*		*Violent*	
	LPM	IV-2SLS	LPM	IV-2SLS	LPM	IV-2SLS
Trust	-0.180**	-0.300	0.011	-0.034	-0.148***	-0.259
	[0.077]	[0.492]	[0.026]	[0.190]	[0.050]	[0.391]
Individual Characteristics						
Age 1829	0.015	0.015	-0.013	-0.013	0.033*	0.033*
	[0.023]	[0.022]	[0.009]	[0.008]	[0.019]	[0.018]
Man	0.052***	0.052***	0.014*	0.014*	0.016	0.017
	[0.020]	[0.020]	[0.008]	[0.008]	[0.017]	[0.016]
Education	0.004	0.004	0.001	0.001	0.002	0.002
	[0.003]	[0.003]	[0.001]	[0.001]	[0.002]	[0.002]
Working	0.030	0.030	-0.011	-0.011	0.014	0.014
	[0.024]	[0.022]	[0.009]	[0.010]	[0.019]	[0.017]
Urban	-0.054**	-0.062	0.002	-0.001	-0.026	-0.034
	[0.024]	[0.039]	[0.008]	[0.015]	[0.018]	[0.032]
Mid Income	-0.003	-0.003	0.007	0.007	-0.001	-0.001
	[0.023]	[0.021]	[0.008]	[0.009]	[0.018]	[0.017]
High Income	0.097**	0.099**	0.000	0.001	0.059	0.061
	[0.043]	[0.048]	[0.014]	[0.013]	[0.040]	[0.040]
Married	-0.008	-0.008	0.001	0.001	0.003	0.003
	[0.020]	[0.021]	[0.010]	[0.009]	[0.016]	[0.016]
Mixed Race	-0.000	-0.000	0.000	0.000	-0.001	-0.001
	[0.001]	[0.001]	[0.000]	[0.000]	[0.001]	[0.001]
Black	-0.000	-0.000	0.000	0.000	-0.001	-0.001
	[0.001]	[0.001]	[0.000]	[0.000]	[0.001]	[0.001]
Indian	0.023	0.025	0.012	0.012	-0.051	-0.049
	[0.071]	[0.078]	[0.010]	[0.010]	[0.070]	[0.078]
UPM Characteristics						
Age 1829 Rate	0.000	0.000	-0.001	-0.000	0.001	0.001
	[0.001]	[0.002]	[0.000]	[0.001]	[0.001]	[0.001]
Man Rate	0.003	0.003	0.002**	0.002	0.001	0.001
	[0.003]	[0.003]	[0.001]	[0.001]	[0.002]	[0.003]
Education Mean	0.011	0.013	-0.002	-0.001	0.012**	0.014**
	[0.007]	[0.008]	[0.003]	[0.004]	[0.006]	[0.006]
Income Mean	-0.007	-0.001	-0.009	-0.006	-0.007	-0.002
	[0.014]	[0.027]	[0.006]	[0.010]	[0.011]	[0.022]
Working Rate	0.003	-0.006	-0.002	-0.005	0.051	0.043
	[0.059]	[0.071]	[0.020]	[0.022]	[0.046]	[0.058]
Polarization	0.057	0.057	0.021	0.021	-0.001	-0.001
	[0.035]	[0.042]	[0.013]	[0.014]	[0.031]	[0.037]
Observations	1,390	1,390	1,390	1,390	1,390	1,390
R-squared	0.035	0.032	0.015	0.012	0.029	0.025
		First Stage				
Trust Elections		0.028***		0.028***		0.028***
		[0.007]		[0.007]		[0.007]
F-stat (excluded instruments)		19.4677		19.4677		19.4677
Test of Exogeneity (p- value)		0.5625		0.9625		0.4144
Partial R square		0.129		0.129		0.129

Note: [1] For each regression, robust standard errors clustered at the *upm*-level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent Crime s* in the last two columns. *Trust* is the percentage of people in the *upm* who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the Appendix. [3] All the regressions employ survey weights. [4] Column 1, 3 and 5 report the LPM results. [5] Column 2, 4 and 6 report the instrumental variables results, instrumenting *Trust* with *Trust Elections*. The models have been estimated with a two stage least squares (IV-2SLS) technique. The bottom part reports the first stage coefficient for *Trust Elections*. We also report the *F*-test of the excluded instruments, the p- value of the endogeneity tests and the adjusted R- square.

Table 4.12 Suriname

	All Crimes		*Property*		*Violent*	
	LPM	IV-2SLS	LPM	IV-2SLS	LPM	IV-2SLS
Trust	-0.184*	-0.289	-0.025	0.642	-0.059	-1.378***
	[0.109]	[0.676]	[0.071]	[0.418]	[0.075]	[0.520]
Individual Characteristics						
Age 1829	-0.037	-0.037	-0.019	-0.019	-0.020	-0.019
	[0.031]	[0.030]	[0.021]	[0.018]	[0.017]	[0.022]
Man	0.052	0.052**	0.032*	0.031*	0.004	0.005
	[0.033]	[0.025]	[0.016]	[0.017]	[0.018]	[0.018]
Education	-0.000	-0.000	-0.001	-0.003	-0.003	-0.001
	[0.004]	[0.004]	[0.003]	[0.003]	[0.003]	[0.003]
Working	-0.004	-0.004	-0.034**	-0.033*	0.002	0.000
	[0.031]	[0.028]	[0.016]	[0.019]	[0.019]	[0.020]
Urban	0.008	0.004	0.022	0.046	-0.019	-0.068**
	[0.033]	[0.048]	[0.028]	[0.030]	[0.029]	[0.034]
Mid Income	-0.050	-0.053	0.006	0.026	-0.018	-0.056*
	[0.037]	[0.044]	[0.021]	[0.027]	[0.027]	[0.034]
High Income	-0.010	-0.013	0.030	0.045*	-0.012	-0.044
	[0.027]	[0.040]	[0.021]	[0.025]	[0.023]	[0.029]
Married	-0.052*	-0.051*	0.025	0.019	-0.045**	-0.032
	[0.028]	[0.028]	[0.020]	[0.020]	[0.017]	[0.020]
Black	-0.025	-0.030	-0.010	0.020	0.011	-0.048
	[0.027]	[0.046]	[0.020]	[0.031]	[0.022]	[0.031]
Mixed	0.000	0.000	0.000	0.000	0.000	-0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Indian	0.036	0.032	-0.007	0.017	0.049**	0.002
	[0.033]	[0.042]	[0.021]	[0.028]	[0.021]	[0.031]
UPM Characteristics						
Age 1829 Rate	0.000	0.001	0.000	-0.002	-0.003	0.003
	[0.003]	[0.005]	[0.002]	[0.003]	[0.002]	[0.003]
Man Rate	-0.004	-0.004	-0.004	-0.008**	0.001	0.009*
	[0.003]	[0.006]	[0.003]	[0.004]	[0.002]	[0.005]
Education Mean	0.002	0.003	-0.007	-0.013*	-0.005	0.007
	[0.013]	[0.013]	[0.008]	[0.008]	[0.008]	[0.010]
Income Mean	-0.006	-0.009	-0.017	-0.000	0.010	-0.024
	[0.014]	[0.022]	[0.013]	[0.015]	[0.010]	[0.016]
Working Rate	-0.009	0.003	0.002	-0.073	0.094	0.242**
	[0.135]	[0.168]	[0.099]	[0.112]	[0.110]	[0.119]
Polarization	-0.028	-0.019	0.102	0.048	-0.085	0.021
	[0.115]	[0.171]	[0.132]	[0.119]	[0.086]	[0.110]
Observations	1,308	1,308	1,308	1,308	1,308	1,308
R-squared	0.018	0.017	0.022	0.022	0.016	0.017
			First Stage			
Trust Elections		-0.08***		-0.08***		-0.08***
		[0.010]		[0.010]		[0.010]
F-stat (excluded instruments)		99.4503		99.4503		99.4503
Test of Exogeneity						
(p- value)		0.8988		0.0651		0.0161
Partial R square		0.2297		0.2297		0.2297

Note: [1] For each regression, robust standard errors clustered at the *upm*-level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent Crime s* in the last two columns. *Trust* is the percentage of people in the *upm* who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the Appendix. [3] All the regressions employ survey weights. [4] Column 1, 3 and 5 report the LPM results. [5]Column 2, 4 and 6 report the instrumental variables results, instrumenting *Trust* with *Trust Elections*. The models have been estimated with a two stage least squares (IV- 2SLS) technique. The bottom part reports the first stage coefficient for *Trust Elections*. We also report the *F*-test of the excluded instruments, the p- value of the endogeneity tests and the adjusted R- square.

Table 4.13 Jamaica

	All Crimes		*Property*		*Violent*	
	LPM	IV-2SLS	LPM	IV-2SLS	LPM	IV-2SLS
Trust	-0.054	-0.643	-0.015	-0.075	0.013	-0.093
	[0.062]	[0.508]	[0.014]	[0.152]	[0.042]	[0.408]
Individual Characteristics						
Age 1829	0.050**	0.054**	-0.001	-0.001	0.025	0.025
	[0.022]	[0.024]	[0.007]	[0.008]	[0.019]	[0.019]
Man	0.006	0.007	-0.007	-0.007	0.006	0.006
	[0.019]	[0.018]	[0.005]	[0.005]	[0.014]	[0.014]
Education	-0.004	-0.005	-0.000	-0.001	-0.002	-0.002
	[0.003]	[0.003]	[0.001]	[0.001]	[0.003]	[0.003]
Working	0.046**	0.045**	0.006	0.006	0.022	0.022
	[0.019]	[0.020]	[0.010]	[0.008]	[0.016]	[0.016]
Urban	-0.022	-0.108	0.007	-0.001	-0.011	-0.026
	[0.024]	[0.076]	[0.007]	[0.023]	[0.018]	[0.060]
Mid Income	0.003	0.004	0.000	0.001	-0.004	-0.004
	[0.020]	[0.019]	[0.006]	[0.006]	[0.017]	[0.015]
High Income	0.017	0.029	0.017	0.018	-0.004	-0.002
	[0.033]	[0.036]	[0.015]	[0.014]	[0.029]	[0.028]
Married	-0.027	-0.019	-0.013**	-0.013**	-0.017	-0.015
	[0.019]	[0.021]	[0.005]	[0.005]	[0.015]	[0.017]
Mixed	-0.092	-0.026	0.005	0.012	-0.072	-0.060
	[0.056]	[0.073]	[0.007]	[0.017]	[0.052]	[0.061]
Black	-0.016	-0.004	0.005	0.007	-0.029	-0.027
	[0.051]	[0.049]	[0.005]	[0.005]	[0.051]	[0.045]
Indian	-0.008	0.014	0.014	0.016	-0.048	-0.044
	[0.059]	[0.057]	[0.011]	[0.013]	[0.053]	[0.049]
UPM Characteristics						
Age 1829 Rate	0.004	0.007	0.002	0.002	0.002	0.003
	[0.004]	[0.004]	[0.002]	[0.001]	[0.003]	[0.003]
Man Rate	-0.006	-0.002	-0.002	-0.002	-0.004	-0.003
	[0.004]	[0.005]	[0.001]	[0.002]	[0.003]	[0.004]
Education Mean	0.007	0.019	0.005	0.006	-0.002	0.000
	[0.012]	[0.015]	[0.004]	[0.005]	[0.010]	[0.012]
Income Mean	-0.009	0.033	-0.001	0.003	-0.012	-0.004
	[0.013]	[0.038]	[0.003]	[0.011]	[0.010]	[0.031]
Working Rate	-0.076	0.034	-0.036	-0.025	-0.037	-0.017
	[0.073]	[0.118]	[0.029]	[0.034]	[0.055]	[0.098]
Polarization	0.029	0.057	-0.026	-0.024*	0.029	0.034
	[0.043]	[0.046]	[0.019]	[0.014]	[0.036]	[0.037]
Observations	1,423	1,423	1,423	1,423	1,423	1,423
R-squared	0.017	0.006	0.016	0.007	0.012	0.007
		First Stage				
Trust Elections		0.032***		0.032***		0.032***
		[0.008]		[0.008]		[0.008]
F-stat (excluded instruments)		17.2166		17.2166		17.2166
Test of Exogeneity						
(p- value)		0.2295		0.688		0.7936
Partial R square		0.2656		0.2656		0.2656

Note: [1] For each regression, robust standard errors clustered at the *upm*-level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent Crime s* in the last two columns. *Trust* is the percentage of people in the *upm* who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the Appendix. [3] All the regressions employ survey weights. [4] Column 1, 3 and 5 report the LPM results. [5]Column 2,4 and 6 report the instrumental variables results, instrumenting *Trust*

with *Trust Elections*. The models have been estimated with a two stage least squares (IV- 2SLS) technique. The bottom part reports the first stage coefficient for *Trust Elections*. We also report the *F*-test of the excluded instruments, the p- value of the endogeneity tests and the adjusted R- square.

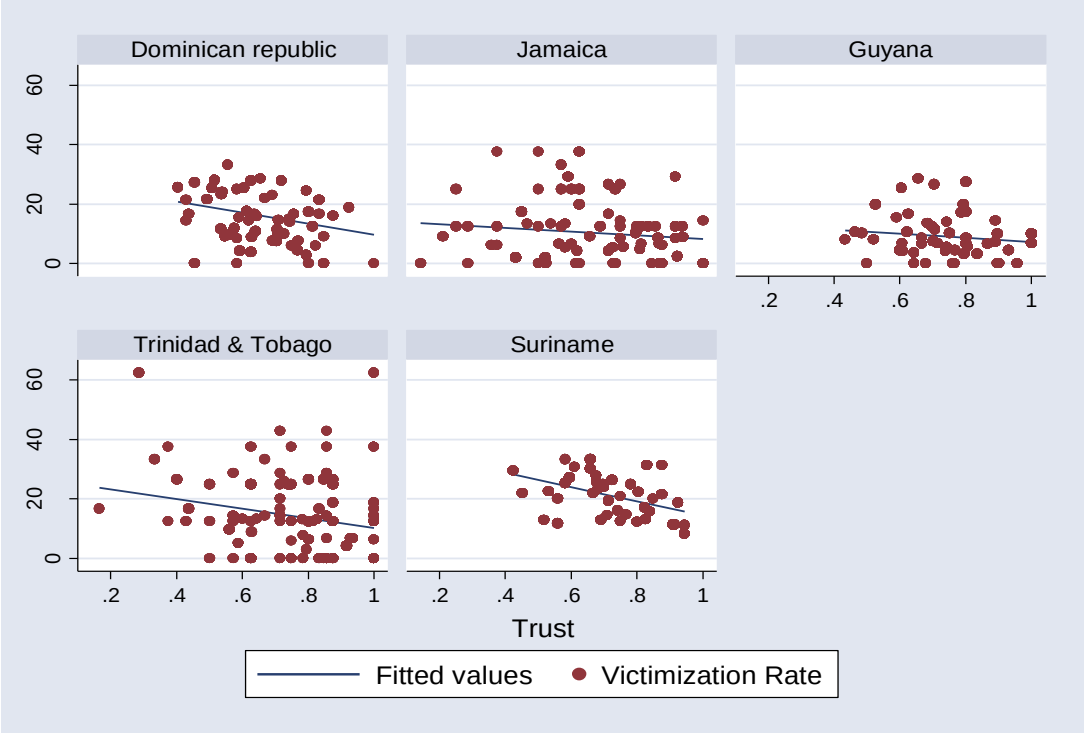
Table 4.14 Guyana

	All Crimes		*Property*		*Violent*	
	LPM	IV-2SLS	LPM	IV-2SLS	LPM	IV-2SLS
Trust	-0.145**	0.029	-0.075**	-0.066	-0.019	0.134
	[0.066]	[0.171]	[0.028]	[0.061]	[0.042]	[0.150]
Individual Characteristics						
Age 1829	-0.006	-0.006	-0.005	-0.005	0.013	0.013
	[0.015]	[0.018]	[0.007]	[0.007]	[0.015]	[0.015]
Man	0.001	0.001	0.004	0.004	-0.015	-0.015
	[0.015]	[0.015]	[0.010]	[0.007]	[0.011]	[0.013]
Education	-0.005	-0.005	-0.001	-0.001	-0.004*	-0.004
	[0.003]	[0.003]	[0.001]	[0.001]	[0.002]	[0.002]
Working	0.006	0.007	-0.001	-0.001	0.007	0.007
	[0.018]	[0.016]	[0.008]	[0.007]	[0.013]	[0.013]
Urban	0.016	0.024	0.012	0.012	-0.001	0.006
	[0.027]	[0.020]	[0.014]	[0.010]	[0.015]	[0.016]
Mid Income	0.028	0.026	-0.002	-0.002	0.028**	0.026*
	[0.018]	[0.016]	[0.006]	[0.006]	[0.013]	[0.014]
High Income	0.167**	0.170**	0.030	0.030	0.128*	0.130**
	[0.067]	[0.067]	[0.036]	[0.035]	[0.071]	[0.058]
Married	-0.008	-0.012	0.004	0.004	-0.002	-0.005
	[0.016]	[0.017]	[0.008]	[0.007]	[0.014]	[0.015]
Mixed	-0.033	-0.026	0.022**	0.022*	-0.044	-0.038
	[0.041]	[0.035]	[0.011]	[0.013]	[0.042]	[0.031]
Black	-0.081**	-0.072**	-0.004	-0.004	-0.056	-0.048
	[0.034]	[0.033]	[0.006]	[0.010]	[0.036]	[0.030]
Indian	-0.073**	-0.063**	-0.006	-0.006	-0.041	-0.032
	[0.034]	[0.032]	[0.009]	[0.009]	[0.031]	[0.029]
UPM Characteristics						
Age 1829 Rate	0.003*	0.003**	-0.000	-0.000	0.002*	0.002**
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Man Rate	0.002	-0.001	0.002*	0.002	-0.003	-0.006
	[0.003]	[0.005]	[0.001]	[0.002]	[0.002]	[0.004]
Education Mean	0.011	0.009	-0.000	-0.000	0.011	0.009
	[0.010]	[0.010]	[0.005]	[0.004]	[0.007]	[0.009]
Income Mean	0.017	0.017	0.010	0.010**	0.005	0.005
	[0.013]	[0.011]	[0.007]	[0.005]	[0.007]	[0.009]
Working Rate	-0.163**	-0.165**	-0.073**	-0.074**	-0.024	-0.025
	[0.075]	[0.075]	[0.034]	[0.034]	[0.047]	[0.063]
Polarization	0.033	0.047	-0.000	0.000	0.035	0.047
	[0.054]	[0.034]	[0.018]	[0.009]	[0.034]	[0.032]
Observations	1,396	1,396	1,396	1,396	1,396	1,396
R-squared	0.043	0.037	0.028	0.028	0.026	0.020
		First Stage				
Trust Elections		0.06***		0.06***		0.06***
		[0.005]		[0.005]		[0.005]
F-stat (excluded instruments)		144.259		144.259		144.259
Test of Exogeneity						
(p- value)		0.2682		0.8764		0.2619
Partial R square		0.2725		0.2725		0.2725

Note: [1] For each regression, robust standard errors clustered at the *upm*-level are reported in parentheses, *** significant at 1%, ** significant at 5%, * significant at 10%.[2] The dependent variables are *All Crimes* in the first two columns, *Property Crimes* in column 3 and 4 and *Violent Crime s* in the last two columns *Trust* is the percentage of

people in the *upm* who think that people in their community are very or somewhat trustworthy. All other variables' description can be found in the Appendix. [3] All the regressions employ survey weights. [4] Column 1, 3 and 5 report the LPM results. [5]Column 2, 4 and 6 report the instrumental variables results, instrumenting *Trust* with *Trust Elections*. The models have been estimated with a two stage least squares (IV- 2SLS) technique. The bottom part reports the first stage coefficient for *Trust Elections*. We also report the *F*-test of the excluded instruments, the p- value of the endogeneity tests and the adjusted R- square.

Figure 4.9 *All Crime* rate at the *upm* level and *Trust*



Note: This graph represents a scatter plot of the rate of victimization for *All Crime* at the *upm* level and *Trust*. Data are personal elaborations based on Lapop (2012).

4.7.2 Dominican republic

The good point about Dominican Republic is that in the UNODC-WB (2007) report there are some results about a victimization regression conducted in this country. Therefore, they could be used as a benchmark for ours.

Trust is always negative although we find that it is significant only for property 2SLS. The coefficients with the instrumental variable techniques are larger compared to the LPM ones. This means that endogeneity is really a problem. *Age1829* is positive and quite significant. This is not a surprise, since in the Dominican Republic youth violence is considered one of the major issues. The UNODC–WB report (2007, p.62) says: "in 2005, young Dominicans aged 11-30 accounted for 46 percent of homicide victims, yet only represented 38% of the general population". On the contrary, the result for men is quite

surprising as the same report (UNODC-WB, 2007) affirms that an extremely high percentage of victims are men. However, the result is not significant. Most of the population lives in the urban area as we can see from the summary statistics table. However, we find that the coefficient for *Urban* is positive and significant only for *All* and *Violent Crimes* in the endogenous specification. The income variables and *Working* are never significant and with mixed signs. Regarding the ethnic variable, we decided to include a dummy for *White* as the share of Indians is irrelevant. However, only this last dummy is negative and significant for *Violent Crimes.* Mixed race individuals, who make up the large majority, present a negative sign but the parameter is not significant. *Education* is significant and positive for *All and Violent Crimes.* The coefficient for property crimes is insignificant. On the contrary, the UNODC-WB report found a positive effect for property crimes.

Turning to the *upm* level, *Education* is associated with more property crimes, as found by the UNODC-WB (2007) report. However, this report takes into consideration community/province level. We also find that income is insignificant as it is also found by the same report. *Man Rate* is positively associated with property crimes in the IV specification, whereas it is negatively for violent Crimes. Interestingly, *Working Rate* and *Polarization* are negatively correlated only with *Property crimes*. Probably, in more homogenous society people share more information which might be relevant in being successful in burglaries.

The instrumental variables result show that *Trust Elections* is strongly correlated to the endogenous variable *Trust.* Moreover, the F statistic is higher than ten which means we are not dealing with a weak instrument.

4.7.3 Guyana

Unfortunately, the literature on the economics of crime in Guyana is almost nonexistent. Therefore, we could not rely on other works as comparison. Table 4.10 shows the results. We find that *Trust* is negative and significant in the exogenous specification for *All Crimes* and property crimes. On the contrary, we do not have similar results for the IV specification. Regarding the control variables, we have some interesting results. We find that *Age1829* is positively associated with violent crimes, although the coefficient is not significant. Moreover, there are supposedly high levels of crime against women (USDS, 2009). Years of schooling or whether a person is working seem not to affect the probability

of being victim of a crime. Even *Urban* is negative, although we know that most of crimes happen in Georgetown, the capital (OSAC, 2011a). The income variables are quite difficult to interpret. In fact, we find that *Mid Income* and *High Income* are positive and significant for *Violent* but not property crimes. Indeed we would have expected that for burglaries income would matter the most. Indeed, the high incidence of robberies (OSAC, 2011a) might influence the result we found for violent crimes.

Ethnicity tensions are very frequent in Guyana since there are two main ethnicities: the Indian and afro-descendent. Freedom House (2009) reported that "racial polarization" has eroded law enforcement in Guyana. Many Indo-Guyanese complain they are victimized by Afro-Guyanese criminals and inadequately protected by the predominantly Afro-Guyanese police. On the other hand, many Afro-Guyanese claim that the police carry out the agenda of the primarily Indo-Guyanese controlled government (Freedom House, 2009). Indo-Guyanese are generally those owning businesses and generally wealthier compared to the blacks. Therefore, we would have expected East-Indian descendents to be more victimized compared to the other ethnicities. Instead, we find different results. In particular, East-Indian and afro descendents are less likely to be victims of crime, although the latter with lower probabilities.

Turning to the *upm* characteristics, we have that the rate of young people has a positive small impact on *All* and *Violent Crimes.* Interestingly, *Income mean* and *Working Rate* have opposite signs, although the result for income is significant only in the property IV specification. Finally, the polarization measure is never significant. Again we would have expected it to be positive and significant.

The first stage results show that the excluded instrument and the endogenous *Trust* are correlated in a similar way as found in the specification with all the countries.

4.7.4 Jamaica

The results for Jamaica are not particularly good, as many variables turn out not to be very significant. This is an issue, as we could have fully compared these results with the ones in the UNODC-World Bank report but also with others that analyse this country. *Trust* is never significant, although generally negative. The age variable is positive for *All Crimes* and *Violent,* although significant only for the former . The result for *Property* is negative, which is

due to the fact that criminals target older people. The results for *Man* have the same tendency although none is significant. Similar results have been found in the UNODC-WB (2007) report. Also, analogous conclusions might be drawn looking at the Jamaican National Victimization Survey (McCalla et al., 2009). In particular, *Education*, *Urban* and the income variables are never significant. Indeed we would have expected urban to be positively related to crime as found by the report. Regarding the income variables, we note that, although insignificant, the coefficient for violent crime is lower than the one for property crimes. On this regard, the UNODC-WB report found that (household) income's sign is positive for property crimes whereas it is negative for violent ones. Married people are generally less likely to be victim of crime, although the coefficient is significant only for property crimes. This is consistent with the view that married people conduct a quieter life. Ethnic variables are never significant that might also express the low degree of ethnic tensions in the island. In fact, the majority is black and the society is quite homogenous. In turn this leads to ethnicity playing a minor role.

The *upm* characteristics are generally insignificant. We just find that *Polarization* is negative and significant in the IV specification for property crimes. Again, this could be seen as a confirmation of what we have said above about racial tension in the island.

4.7.5 Suriname

Suriname is, along with Guyana, a country with a very little literature to refer to. Not surprisingly, these two countries are also the ones with the smallest population. Table 4.11 shows the results. We found that *Trust* is negative and significant in *All Crimes* with the endogenous regressor and for *Violent Crimes* for the 2 stage least square. Continuing, *Age1829* is always insignificant although, surprisingly, it is negative for each specification. This could reflect the absence of youth gangs which systematically commit and are victims of crime, as it happens in other Caribbean countries. Moreover, *Man* is positive for *All and Property Crimes*. The fact that for *Violent Crimes* is not significant depends on the presence of crimes where women are more likely to be victimized. *Education* is negative in all specification but not significant; whereas we find that *Working* negatively reduce the probability of being a victim of *Property Crimes*. Still, we do find that *High Income* individuals are more likely to be victims of crime. This probably depends on the fact that income is at

the household level. Interestingly, married individuals are less likely to be victims of *Violent Crimes* but not *Property* ones. This could depend on the fact that married people stay presumably more often at home. The ethnicity variable reveals that only for *Violent* crimes*,* in the endogenous specification, Indian descendents are more likely to be victims of crime. Probably this result is driven by robberies as this ethnicity is generally wealthier than others.

Moreover, *Man Rate* is negatively correlated with *Property* but positively with *Violent.* Also, *Education Mean* is negatively associated only with *Property Crimes.* Polarization is never significant. Surprisingly, Suriname is the only country where we find a negative correlation between *Trust* and *Trust Elections* in the first stage*.*

4.7.6 Trinidad and Tobago

We find that *Trust* in Trinidad and Tobago is significant for *Property* and *Violent* but only in the LPM model. *Age1829, Man*, *Education* and *Working*'s coefficients are really similar to the main specification with all the five Caribbean countries. Males are generally more likely to be victims of crime. In particular, being male increases the probability of being victim of *All Crimes* of 0.5%. The result for *Urban* is quite unexpected. We have a negative sign, although significant only for *All Crimes* with the endogenous regressor. Evidence suggest that crime is mainly happening in urban areas and, particularly, in the outskirt of Port of Spain (Bennet et al., 1997). Nevertheless, the situation is problematic also in the inner villages where there are labourers working on plantations. In turn, this might counter balance the urbanization effect (Glaeser and Sacerdote, 1996). If *Working* is never significant and with mixed sign, we find that *High Income* is positive and significant for *All Crimes. Mid Income* is never significant, although it has smaller a coefficient. Ethnical variables are never significant. Nevertheless, the coefficient for Indian is a bit bigger which might be due to the fact that Indian descendants are historically more involved in business.

Again, as in the main specification we do not find many significant variables. The results for *Man Rate* are in line with the theory (Entorf and Spengler, 2000b). We also find that *Education Mean* increase the probability of being victimized of a violent crime. This could be explained by the relevance of robberies amongst these types of crime. The *Polarization* coefficient is never significant and this could be due to the fact that there are not serious tensions between African and Indian descendents. The first stage results reveal that *Trust*

Elections is a good predictor of *Trust* and that the F-statistic on the excluded instrument leads us to conclude that first stage instruments are significantly different from 0.

Finally, It is worth keeping in mind that in Trinidad and Tobago, most of crimes are related to drugs and to gangs. Moreover, this is one of the countries which host the highest number of deportees. Unfortunately, there are not detailed statistics which we could use to further investigate their role.

4.8 Conclusions

This chapter analyses the impact of trust on victimization experiences in five Caribbean countries: the Dominican Republic, Guyana, Jamaica, Suriname and Trinidad and Tobago. Trust, and social capital, is associated with many socio-economic outcomes, such as growth and institutional efficiency (Keefe and Knack, 1997; La Porta et al., 1997). Despite this, there is little evidence on its impact on crime levels, except for few papers (Buonanno et al., 2009; Lederman et al., 2002). This question is not trivial as social capital might have both a crime-reducing and crime-increasing effects (Rubio, 1997).

As we cannot assess the role of the deterrence variables[254], social capital becomes a kind of "social deterrence" that can substitute legal solutions and supply to weak institutions. Also, the determinants of crime might affect victimization in a different way depending on the offences considered. The literature could definitely be improved.

We aim to do so analyzing the role of trust on crime using data from Americas Barometer, which is an opinion survey run in many American countries. Amongst the questions there are some on victimization experience. We then created three victimization measures: one for all the crimes, one for property and violent crimes each. The trust question refers to the perception of trustworthiness of individuals living in the same community. Although it is not the standard WVS/GSS question we feel quite confident of its reliability. This measure is aggregated from the individuals' responses at the *upm* level, which is the primary sampling unit in the survey. We also control for a series of standard determinants of crime, such as age, gender, income and ethnicity. Crime experiences depend not only on individual characteristics but also on the community where the crime is

[254] They are not included in Americas Barometer and are not available at low level of geographical specification.

taking place (Kooning and Voolard, 2009). Therefore we added local characteristics to take this into account. Endogeneity might cause several problems and invalidate our results. In order to address this issue we employed an instrumental variable approach using a measure of trust in the elections as instrument for general trust. Given the fact that we cannot rely on lagged or historical variables, we believe that the one we choose satisfies all the characteristics of a good instrument (Angrist and Krueger, 2001). The results show that our measure of trust (worthiness) exerts a crime reducing effect on property but not violent crimes. In particular, a one percent increases in our measure of trust leads to a lower probability of being victim of property crimes of 0.286%. The analysis of the control variables suggests that individual characteristics might be more adequate than the *upm* ones to explain victimization experiences.

In order to validate our results we run two main robustness checks. In the first we employ different definitions of crime categories. In the second we consider province, instead of *upm*, as level of aggregation for trust and the "local" control variables. These results strongly support our findings, confirming the crime reducing effect of trust. We also run separate regression for each country. We do so to evaluate different patterns of the model of crime we are employing. Moreover, we can take into consideration the heterogeneity in terms of socio-economic characteristics (Barker et al., 2010). The results suggest that crime determinants might have very diverse impact on victimization experience. This calls for a deeper analysis on these issues using better quality data.

We feel that this paper can contribute to the existing literature from many different points of views. First of all, we re-considered the link between social capital and crime using individual data. In turn this is an advantage because we sensibly increase the number of observation and, so, the precision of the estimation. Also, the use of individual data allows us to consider the characteristics that make a person more likely of being victimized. Such kind of analysis is not possible in studies which employ macro-data (Buonanno et al., 2009; Akcomak and Weel, 2012). Second, we focus specifically on trust. We choose to do so because typical social capital studies employ a variety of proxies. Indeed, social capital is a multi faceted issue but the use of variables ranging from civic to sport participation might be quite difficult to interpret. Third, the impact of trust on crime has never been studied for Caribbean countries, at least to my knowledge. In fact, the role of social capital on socio-economic variables has been mainly reserved to developed western countries. Finally, we

add to the scarce literature of the economics of crime in the Caribbean. This is particularly needed, especially considering that crime is perceived as one of the main issues by the population.

Our research opens the avenue for many other works in different directions. First of all, we hope for better measurement of both social capital and crime measures. Indeed the issue of social capital in developing countries is becoming crucial as it is testified by the various projects by the World Bank[255]. Moreover, as mentioned, victimization surveys are in the pipeline by many different organizations. Such improvement will allow to better estimate the impact of trust on crime. In particular, it would be interesting to assess the impact on specific crime categories. From a policy point of view, specific social capital increasing strategies might prove more efficient than other crime prevention policies. Finally, the single country analysis we performed in section 7 can be the basis for a comparison of different crime determinants in various countries.

[255] However, to my knowledge none involve Caribbean countries.

4.9 Appendix

4.9.1 Variables: definition

All Data are taken from the 2010 Americas Barometer survey. More details on this data can be found at the website: http://www.vanderbilt.edu/lapop/

All Crimes: Dummy variable taking value 1 if the respondent answered yes to the question "have you been a victim of any type of crime in the past 12 months? "

Property Crimes: Dummy equal 1 if the respondent was a victim of burglary in the previous 12 months before interview.

Violent Crimes: Dummy equal 1 if the respondent was a victim of one of the following crime category: unarmed robbery, no assault or physical threats, unarmed robbery with assault or physical threats, armed robbery, assault but not robbery, rape or sexual assault; kidnapping and extortion.

Property1: Dummy equal 1 if the respondent was a victim of one of the following crime category in the previous 12 months before the interview: burglary; unarmed robbery, no assault or physical threats.

Violent1: Dummy equal 1 if the respondent was a victim of one of the following crime category in the previous 12 months before the interview: unarmed robbery with assault or physical threats, armed robbery, assault but not robbery, rape or sexual assault.

Trust: "Now, speaking of the people from around here, would you say that people in this community are very trustworthy, somewhat trustworthy, not very trustworthy or untrustworthy? ". Then we calculate the ratio of people that answered yes to one of the first two options of the question at the *upm* and provincial level.

Trust Elections: People were asked "To what extent do you trust elections?" Individual could choose between 1, the lowest level, to 7, the highest one. We calculated the mean at the *upm* or province level.

Age1829: Dummy equal 1 if the victim is between 18 and 29 years old.

Man: Dummy equal 1 if the victim is a male.

Mid Income: Dummy equal 1 if the respondent lives in a household with an income between the 5^{th} and the 8^{th} category (out of 11).

High Income: Dummy equal 1 if the respondent lives in a household with an income between the 9th and the 11th category (out of 11).

Education: Number of completed years of education;

Working: Dummy equal 1 if the respondent answered yes to the following question "How do you mainly spend your time? Are you currently working?"

Urban: Dummy equal 1 if the respondent is leaving in an urban area as defined in the survey.

Black: Dummy equal 1 if the respondent considers herself black or afro-descendent.

Indian: Dummy equal 1 if the respondent considers herself Indian.

Mixed: Dummy equal 1 if the person considers herself a mix between African and another ethical background ethnicity.

White: Dummy equal 1 if the person considers herself of Caucasian origins.

Married: Dummy equal 1 if the person is married.

Age1829 Rate: Ratio of the respondents aged between 18 and 29 out of the total number of respondents.

Man Rate: Rate of males at the *upm* (province) on total respondents.

Education Mean: Mean of individual *Education* at the *upm* (province) level.

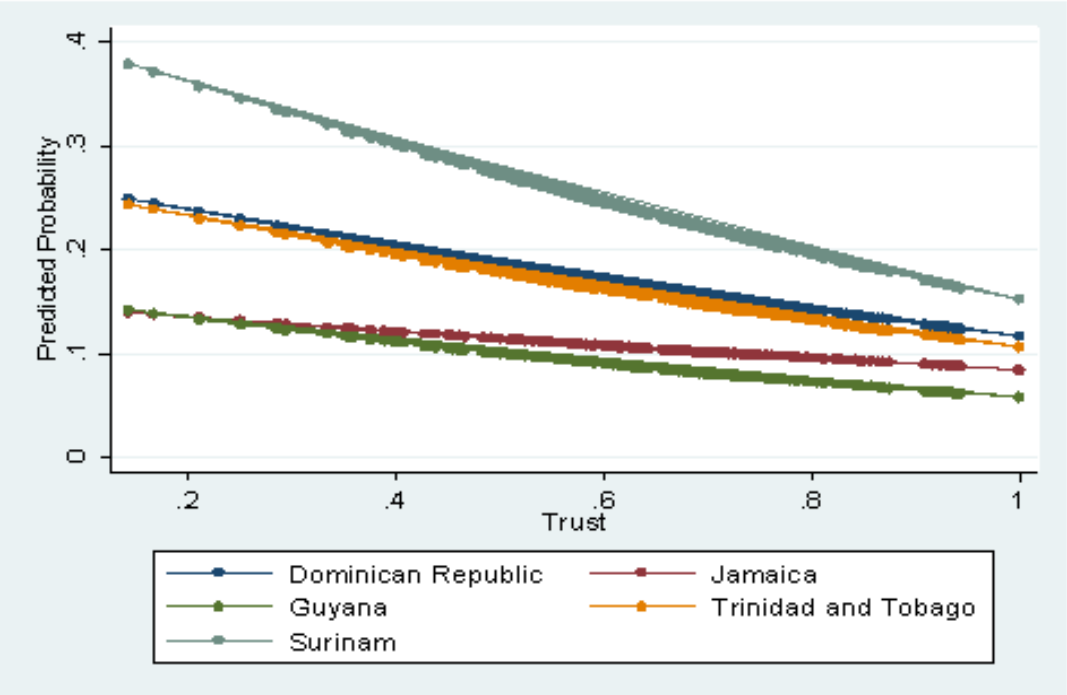
Income Mean: Mean income classes amongst all respondents in the *upm* (province).

Working Rate: Rate of people working out of the total number of respondents in the *upm* (province).

Polarization: Index calculated following the methodology explained in the text in the *upm* (province).

4.9.1 Figures

Figure 4.10 *Trust* and *All Crimes*: predicted probabilities



Note: This graph represents the predicted probabilities derived from the non linear estimation of the model of *All Crimes* on trust.

Chapter 5: **Conclusions**

The economics of crime is a recent field of research. The seminal work on this topic is Becker (1968), who considered criminals as rational agents who maximize their expected utility. In this framework, the decision to commit a crime depends on the benefits and costs of offending. This contribution spawned a rich literature which investigated crime from different economics' angles. For example, it has been analysed the role of deterrence variables, unemployment and education on crime levels (Entorf and Spengler, 2000b). Recently, the analysis extended to more sophisticated forms of crime, as those perpetuated by criminal groups (Fiorentini and Peltzman, 1995; Pinotti, 2011; Skaperdas, 2001).

In this PhD thesis we contribute to the existing literature with three original research papers. The first two deal with organised crime, whereas the latter is on standard crime.

The first is titled "Emerging Classes and the Fight for Resources: an Empirical Investigation into the Origins of the Sicilian Mafia". The quantitative approach on the origins of the Sicilian Mafia is still largely underexplored. The seminal work on this topic is Bandiera (2003) which modelled Mafia as a supplier of protection in Sicily after the Unification of Italy. The author found that Mafia is more likely to emerge where land is more fragmented and with higher value. On the other hand, our contribution follows an approach closer to those of leading historians as Lupo (2004) and Pezzino (1987). We reckon that, the market for protection hypothesis needs to be considered along with the social "turmoils" that happened at that time in Sicily. In particular, the institutional changes opened up new business and political opportunities. These could be exploited only by a small number of emerging actors, which started competing to get them. However, since property rights were unsecure, Mafia became an instrument to win such competition. Therefore, we predict that Mafia emerged not only where there were favourable conditions for the protection industry but especially where these opportunities were greater, which we proxied with the presence of large properties. We tested this hypothesis using a new measure of Mafia activity and new variables. The key results support our view. Mafia is likely to be active where there were large properties, land value was higher, density of population lower and there were few peasants who own the land. In order to give robustness to our results, we provide a comparison between Sicily and Sardinia at that time, that show how the market for protection cannot be the only reason for the emergence of an organization as the Mafia.

The second contribution is "Migrating Mafia" that deals with the transplantation (Varese, 2006) of southern Italian organised crime groups to the central and northern Italian

regions after the Second World War. At first, Mafia groups got involved in illegal business, such as drug traffic and gambling. Soon after, they became entrenched in the legal sector and corrupted some members of the political class. In this paper we explore the channels that made it possible for such organizations to settle in not traditional areas. On this regard, the historical and sociological literature agrees on two of the most important factors. The first is the migration of southern citizens to the central and northern Italian regions. The second is the policy of *confino* (forced re-settlement of criminals), which imposed perilous southern criminals to be relocated up north. So far, no one has ever quantitatively tested such hypothesis using econometric techniques. In order to fill this gap, we created a panel data at the provincial level for the period 1983-2008. The data on migration and forced re-settlement have never been used in any economic study before. We ran several robustness and sensitivity analysis to sustain our findings. Consistently with the community network approach (Bauer and Zimmermann, 1997; Moretti, 1999) we find that migration is by far the most important predictor of Mafia presence in the hosting provinces. Not only, is migration from Mafia-infested regions even more important. Contrary to the expectations, we do not find forced re-settlement significantly affecting Mafia expansion. We argue that probably what mattered was not the number of the Mafia members sent to the North, rather their rank in the hierarchy or their ability to create criminal opportunities in the new environment. Unfortunately, we do not have such information.

The last contribution is "Trust and victimization: evidence from five Caribbean countries". Trust, and social capital, have been associated with many positive socio – economic outcomes, such as development, trade and investment (Knack and Keefer, 1997; Guiso et al., 2009). However, little attention has been devoted to analyse its impact on crime levels, except for few works (Buonanno et al., 2009; Lederman et al., 2002). This is not a trivial question as social capital might have two opposite effects. On one side, it can lead to fewer crimes because it reduces transaction costs and increase social control. On the other side, high levels of social capital might lead to lower defence mechanisms. The literature found some crime reducing effects of social capital. However, these works mainly employed macro data and, so, few observations that lead to a loss of precision in estimation. Moreover, none of them focused specifically on trust. In this paper we evaluate the role of trust on crime in five Caribbean countries: Jamaica, Suriname, Guyana, Trinidad and Tobago and Dominican Republic. We use individual data taken from Americas

Barometer for 2010 which contains information on victimization experience. Our measure of trust is not the standard World Value Survey (WVS) one but it rather represents trustworthiness. In order to tackle endogeneity we employ an instrumental variable approach. We use a single instrument as the level of trust in elections that is unrelated to the endogenous regressor. The results show that our measure of trust (worthiness) exerts a crime reducing effect on property but not violent crimes. In particular, a one percent increases in our measure of trust leads to a lower probability of being victim of property crimes by 0.286%.

As we argued in the introductory chapter, these three contributions can be read through the lens of the new institutional economics approach and close theories. In fact, North and Williamson explicitly considered situations in which property rights are not secured and contract not enforced. This is an important deviation from the assumptions made by the neo classical economy. Following this approach, we reviewed those works that dealt with crime. In particular, we consider Dixit (2004), Skaperdas and Syropolous (1995), Hirshflier (1989) and Anderson (1995), amongst the others. Summarising, it was argued that organised crime emerged out of an anarchic situation to supply to the deficiencies of the state. This perfectly describes Sicily in the XIX century. In fact, at that time the state was not able to accomplish its duty. As a consequence, the Sicilian Mafia originated to offer such services. The same reasoning applied to the situation we describe in the third chapter. In this case, we do not have an anarchic situation similar to the previous one. However, organised crime could (and still does!) offer such services in the illegal sector or in some sections of the legal one. In the former, the state does not get involved by law, whereas in the second we have a situation of partial state failure that Mafia is able to exploit. Finally, North (1990) and Williamson (2000) recognised the important role played by informal agreements, such as social capital. We argue that social capital can be considered as a substitute or a complement of the state in deterring crimes. This is particularly true for developing countries as the Caribbean ones which we review in chapter four.

List of Abbreviations

CARICOM: Caribbean Community.

CIA: Central Intelligence Agency.

CPA: Palrliamentary anti mafia commission (Commissione parlamentare anti mafia).

CSF: Contest Success Function.

DIA: Anti Mafia Investigation Department (Direzione Investigativa AntiMafia).

DNA: Anti Mafia National Department (Direzione Nazionale Antimafia).

GSS: General Social Survey.

IADB: Inter-American Development Bank.

IMPACS: Implementation Agency for Crime and Security.

ICVS: International Crime Victimization Survey.

IRPPS: Research institute on population and social policies (Istituto di ricerche sulla popolazione e politiche sociali).

ISTAT: Italian National Institute of Statistics (Istituto Nazionale di Statistica).

LAPOP: Latin American Public Opinion Project.

NIE: New Institutional Economics.

NCO : Newly Organised Camorra (Nuova Camorra Organizzata).

PAHO: Pan American Health Organization.

OAS: Organization of American States.

UCR: Uniform Crime Reports (UCR) by the FBI.

UNCTS: United Nations Surveys on Crime Trend.

UNDP: United Nations Development Programme.

UNICRI: United Nations Interregional Crime and Justice Research Institute.

UNODC: United Nations Office on Drugs and Crime.

USAID: United States Agency for International Development.

UWI: University of West Indies (all campuses).

WB: World Bank.

WHO: World Health Organization.

WVS: World Value Survey.

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