HOW DOES IMMIGRATION RELATE TO CRIME PERCEPTIONS AND CRIME RATES? EVIDENCE FROM EUROPE.

by

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Abstract

This thesis analyses how immigration and migratory background relate to crime rates and crime perceptions. In order to analyse these links, two approaches have been employed. In the first approach, used in Chapters 2 and 3 of the present thesis, the link between immigration from fragile countries and crime rates have been taken into account respectively for the European context with a cross countries analysis and for the Italian context by employing province-level data. The second approach has been explored in Chapter 4 where the link between country of birth and the probability of reporting crime as a problem in the neighbourhood of residency has been analysed.

Chapter 2 has found no significant link between immigration from fragile countries and various types of crime rates in Europe, except for a negative link with robberies that, however, was not confirmed by the robustness checks. This result was contrary to the hypotheses outlined in the beginning of the chapter for which a positive and significant association of this type of immigration with violent and property crimes would have been expected.

On the other hand, Chapter 3 has found a positive, significant and robust link between immigration from fragile countries and mafia crimes. The finding does not support the hypotheses that immigration from fragile countries would have increased either violent or property crimes. However, it confirms the hypothesis, specific for the Italian case, for which immigration from fragile countries is expected to be positively and significantly associated with mafia crimes. The most likely explanation for this result – albeit not confirmed by the available data – is that immigrants are exploited by mafia organisations.

For migratory background and crime perceptions, Chapter 4 has shown that there is not a significant relationship between being born in a foreign country and reporting crime as a problem of the area of living. Moreover, the chapter has explored the link between the interactions of various measures of deprivation and concentrated disadvantage with the country of birth of the household head and the probability of self-reporting crime as a problem of the neighbourhood. Differently from the results of previous studies and contrarily to the hypotheses formulated at

the beginning of the chapter, the interaction of country of birth of the household head, namely born in an EU member country different from the country of residence, and the condition of being a single parent with children has been found to be associated with a lower probability of self-reporting crime as an issue of the neighbourhood compared to a native. The explanation of this result might relate to the perception of what is a crime for an EU migrant compared to a native and for the social support that the migrant might receive in the area where she or he resides which might be an immigrant cluster.

Further research is needed in order to explain the reasons for these results. It would also be interesting to explore in more detail the link between immigration and crime by looking, for instance, at the geographical macro areas of origin of the migrants.

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General Introduction

In the age of globalisation and increased movement of goods and people, immigration has become one of the most debated phaenomena and explored topic in the social scientific research. A large part of the literature concerns the socio-economic effects of immigration such as GDP growth, productivity, inequality, wages and labour market, but also trade and innovation.[1] A more recent and less extensive strand of research focuses on the link between immigration and crime rates.[2] The relationship between immigration and crime rates represents the main topic of Chapters 2 and 3 of this thesis. In particular, the focus of these two chapters is on a specific type of immigration that is the one from fragile countries rather than total immigration as it has been done in most of the previous literature. In Chapter 4, the research question shifts partially as the linkage between country of birth and crime perceptions is studied.

There are a number of theories concerning the link between immigration and crime. In the case of this thesis, specifically Chapter 2 and Chapter 3, which focus on immigration from fragile countries, the theoretical framework of reference is the so-called "violence breeds violence" introduced by Rohner *et al*. (2013a) and empirically tested by Couttenier *et al*. (2019) in a micro level study with asylum seekers in Switzerland. The theory states that immigrants coming from fragile, war-torn countries are more likely to have experienced directly or indirectly forms of violence in their origin countries. Due to these experiences, these migrants are predicted to be more prone to violence in the host countries. This theory is tested empirically in Chapters 2 and 3 of this thesis using respectively country level data across a pool of European countries and Italian province level data. The second perspective concerns the link between migratory background and crime perceptions, also referred to as fear of crime. As for the evidence presented by various previous studies (Ortega and Myles 1987; Fox *et al*. 2009; Callanan 2012) race and migratory background should be positively linked to fear of crime, meaning that being of another ethnic minority is associated with a higher fear of crime compared to the

[1] See, for instance, Alesina *et al*. (2016), Girma and Yu (2002), Card (2009), Borjas (2003), or Hunt and Gauthier-Loiselle (2010).
[2] See for instance Chapin (1997) or Butcher and Piehl (1998).

majority. This evidence has been bridged to the so-called Social Disorganisation Theory (SDT) following the approach of the studies by Brunton-Smith and Sturgis (2011) and Brunton-Smith *et al*. (2013). The variables that could affect crime perceptions, based on the SDT[3], other than the country of birth that proxies for migratory background, have been included in the statistical analysis in Chapter 4 of the present thesis.

For individuating the countries of origin of the migrants in Chapters 2 and 3, the definition of Fragile and Conflict-affected Situations (FCS) provided by the World Bank has been followed. FCS are defined based on the socio-economic conditions and/or the presence of an international military mission in their territories; in the next chapters, more detailed information on the definition of FCS is given.

In Chapter 2 of the present thesis, the impact of immigration from FCS on crime rates in a pool of European countries is analysed. Due to the difficulty in comparing crime statistics across countries, the chapter focused on individual types of crimes namely assaults, sexual violence acts, robberies and thefts, in order to provide a consistent definition across countries, rather than using macro categories of crimes such as property crimes or violent crimes as done in the previous literature (Couttenier *et al*. 2019, Bianchi *et al*. 2012; Bell *et al*. 2013). The study by Couttenier *et al*. (2019) that follow the same theoretical background as the one explored in the present thesis in Chapters 2 and 3, found a statistically positive and significant link between immigration from fragile countries and crime rates, specifically violent crimes, thereby confirming the theory "violence breeds violence". On the contrary, Chapter 2 of this thesis finds FCS immigration not to be a significant predictor of crime rates, and if anything, it is negatively and significantly associated to robberies, a type of crime that is in between property and violent crimes, in many but not all of the specifications. This empirical analysis constitutes the main content of Chapter 2 in this dissertation.

Chapter 3 focuses on the impact of FCS migration on crime rates in Italy with provincial level data.

[3] The SDT is discussed further in the next section related to the theoretical explanations for the link between immigration and crime.

Focusing on the Italian context is interesting because of the peculiarity of Italian regionalism. This term refers to the variety of socio-economic and institutional frameworks within Italian borders (Arban, 2015), although, historically, similarities between regions have outweighed their differences (Broers, 2003).[4] Moreover, these differences in socio-cultural attitudes are more evident across Italian provinces and are the keys of economic success in Italy during the period 1951-1991 (Peri, 2004). Italy is divided into 3 main geographical and governmental levels (except for the central government): regions, provinces, and municipalities. The first ones are the highest level and are 20 in total, provinces are the intermediate level and they are around 110 while municipalities (*comuni*) are slightly less than 8000. The provinces can be very different in terms of population even within the same region. For instance, in the region of Campania the largest province is Naples with around 3,000,000 inhabitants while the smallest province is Benevento with slightly less than 300,000 inhabitants, a difference greater than 10 times between the two. The gap in Lombardy is even bigger, the region with the highest number of provinces where the difference between the most populous province, Milan, and the least one, Sondrio, is between 20 and 30 times.[5] Also, in terms of size, measured by the area in square kilometres, it is possible to notice considerable differences across provinces and within the same regions. For example, the area of Foggia is almost double the one of Bari, although the population of the latter is much bigger than the former. This shows also notable discrepancies in population density across provinces both between and within regions. In terms of net income per family, we can observe great differences between provinces with a big gap between Northern and Southern provinces. For example, the two provinces that show the lowest level of net income, below the national average, are Enna and Agrigento located in the Southern island of Sicily with respectively 25,727 and 27,046 euro; while Milan, Bolzano and Forlì-Cesena are the provinces with the highest national records respectively equal to 55,553, 52,151 and 49,627 euro. However, there are also notable differences between provinces within the same region. For example, Lodi, located in Lombardy same as Milan, has a mean net family income equal to 33,674,

[4] In terms of economic differences between regions see Brunello *et al*. (1999).
[5] Data are taken from the website "Comuni e Città", available at: https://www.comuniecitta.it/province-italiane-per-popolazione.

slightly more than half of that of Milan (ISTAT, 2019).[6] In the present study, an attempt is made to account for these differences across provinces when assessing the link between immigration and crime rate at province-level.

The theoretical framework underpinning the analysis is the same as the one in Chapter 2. Using province-level data from the Italian National Institute of Statistics, an empirical analysis through an Instrumental Variables (IV) approach has been carried out. The results for this chapter seem to be different from the ones presented by the pre-existing literature on immigration from fragile countries and crime rates, such as Couttenier *et al*. (2019), as they show a significant impact of FCS immigration on mafia type of crimes at Italian province level. These results seem to be in line with part of the literature on border crossing and organised crime although they cannot confirm whether the increase in mafia crimes is due to a more active and voluntary participation of immigrants in organised crime, in line with the theories on international criminal networks (Wortley 2009), or to immigrants being exploited by mafia organisations as documented by Duca (2014).

In Chapter 4, the link between migratory background and crime perceptions is explored by using combined individual and household level data from the European Survey on Income and Living Conditions (EU-SILC). This restricted access database allowed to have information on crime perception, which is the dependent variable in this chapter, and on country of birth, EU born, and non-EU born where the omitted category is native (i.e., born in the country where the household reside). In order to link the SDT frameworks with fear of crime as done by Brunton-Smith and Sturgis (2011) a number of deprivation indices based on the questions asked in the EU-SILC questionnaire has been constructed. Overall, the results showed that the link between country of birth and crime perceptions is very much context and time-dependent but it's in majority associated with a lower probability of self-reporting crime as an issue of the neighbourhood at household level for a foreign-born compared to a native. In particular, the negative and significant association of the interaction between single parent household and EU born with the probability of self-reporting crime as an issue of the area of residence is robust through all the specifications. A potential explanation for this result comes from the work of

[6] These data refer to the year 2012.

Brunton-Smith and Sturgis (2011) for which an individual with a foreign background in a condition of disadvantage is less likely to report fear of crime. Moreover, an EU born that was in a condition of disadvantage in its origin country might perceive crime as less of an issue if the fear of crime was higher in the origin country compared to host country.

In terms of the contribution of this thesis to the existing literature, this can be discussed with respect to the various approaches taken in the chapters.

Chapter 2 aims at improving the current state of the research in three directions. Firstly, differently from previous studies, the focus is not on individual countries, but a cross-country comparison in Europe is made and this allow to have a broader view of the link between FCS immigration and crime rates in a multinational context. Secondly, the chapter focuses on specific types of crimes (assaults, sexual violence acts, robberies and thefts) instead of looking at crime rates in general or macro categories of crimes (violent crimes, property crimes). Although this approach may forgo some types of crimes that would usually be included in the macro categories, it yields a consistent description of crime across countries and time and it is more specific on the impact of FCS immigration on single categories of crimes.[7] Thirdly, Chapter 2 takes into account the link between immigration inflows with specific nationalities namely the FCS, as defined in the World Bank database (World Bank, 2019) on crime rates. The reason for focusing on the link between immigration from FCS and crime rates derives from the theoretical framework "violence breeds violence" (Couttenier *et al*. 2019) that predicts that immigrants from conflict-affected areas and war-torn countries are more prone to committing crimes compared to non-FCS immigrants.

For Chapter 3, the contribution to the existing literature is partially similar to the one outlined for Chapter 2. Focusing on the Italian context, and differently compared to the most directly comparable study on immigration and crime rates in Italy that is the one by Bianchi *et al*. (2012), the impact of a specific type of migration flows (based on their citizenships) namely those of immigrants coming from FCS and previously exposed to violence, instead of total immigration, is

[7] Eurostat metadata compares the legislation for some types of crimes across different countries and constructs some comparison tables. Through these tables, we know which countries have similar definitions for a crime and whether the countries have changed the legislation over time.

analysed in relation to four macro categories of crimes: homicides, violent crimes (not leading to death), criminal organisations' crimes, property crimes. This allows the chapter to go beyond the study of Bianchi *et al.* (2012) by creating a distinction among different types of immigrants following a well-established theoretical background (Rohner *et al.* 2013a). In addition, the empirical results for over 30 individual types of crime (such as kidnappings, thefts, robberies, rapes, etc.) are presented differently from most of the previous literature that took into account macro categories of crimes or the total crime rate or a notably smaller number of individual types of crimes (Bianchi *et al*. 2012, Bell *et al.* 2013, Alonso-Borrego *et al*. 2012). Measuring the impact of FCS immigration flows on individual types of crimes rather than macro categories allows to be more specific when assessing the impact of immigration on crime rates and its rationale can be traced back to the violence-breeds-violence framework as it is expected that FCS immigration could be more significantly and importantly associated to higher crime rates for types of crimes that are defined as violent (rape, blows, menaces, mass murdering) rather than other types. A third contribution to the pre-existing literature that can be found in Chapter 3 is that an innovative instrument is used in the IV procedure, alongside the most common shift-share used in the previous literature, namely the weighted average of the rate of growth of GDP in the origin countries of the migrants.[8] The rationale for this instrument is that the higher the rate of growth of GDP in the migrants' home countries the lower is the incentive to leave the country as more economic opportunities become available.[9]

For Chapter 4, the contribution to the literature unfolds in three main ways. Firstly, while most of the studies take into account the impact of migratory background, proxied by country of birth, on its own (Pearson and Breetzke 2014), the chapter also considers the joint coefficient with other factors (socio-economic background, housing deprivation, gender, etc.). Secondly, this is one of the few quantitative non-experimental studies on crime perceptions while most of the others are experimental

[8] Alesina *et al.* (2016) also used GDP growth as part of a small gravity model in the first-stage regression to instrument immigration. See also Clemens (2020) who reviewed the relationship between GDP per capita in developing countries and immigration in Europe from those countries.
[9] See also Clemens (2020) who reviewed the relationship between GDP per capita in developing countries and immigration in Europe from those countries showing when it is expected a positive or negative link between the two.

quantitative (Foster *et al*. 2016) or qualitative (Lorenc *et al*. 2012; 2013a; 2013b).[10] Finally, the analysis concerns many households across different European countries in the period 2004-10 and exploits the EU-SILC dataset, while most of the analysis are carried out within a country or in a specific context (Hipp 2010; Callanan 2012). In relation to policy-relevance, the evidence and the discussions provided are to be considered by contextualising the relevance in each of the empirical chapters.

In Chapters 2 and 3, the focus is on the impact of a specific type of migration flow on crime rates in Europe, specifically in a cross-country comparison for the former and with province level (meso level) data, in Italy, for the latter. This allows to understand whether the link between immigration and crime is different when considering a multinational context rather than a national one, and, in turn, provides evidence on whether policy efforts to tackle a potential positive link between immigration and crime should be taken specifically at the national context or at an international level, perhaps through a joint effort among different countries. It could also be the case that the potential link is present in both contexts and therefore policy approaches should be taken at both national and international levels. Moreover, given that specific types of crimes are taken into account, it also allows to understand whether a potential positive impact of immigration from fragile countries on these crimes (i.e., a potential increase in crime rates following a surge of immigration) concerns only certain types of crimes and, therefore, the effort in terms of policy and prevention should be taking into account this aspect if the case.

In Chapter 4, the question explored is whether migratory background is associated to a higher probability of being fearful of crime as was found in many previous studies investigating the impact of ethnicity and race on fear of crime (Ortega and Myles 1987; Callanan and Rosenberg 2015). Knowing what factors lead to a higher fear of crime is very important in terms of policymaking because it addresses the efforts of the policymaker towards these factors. For instance, if migratory background by itself is associated to higher fear of crime, the policymaker could investigate on the characteristics of the neighbourhoods where the migrants live or the personal characteristics of the migrants perhaps knowing more about the

[10] An analysis more similar than others to the one of the present chapter is the one by Callanan (2012), but the sample was much smaller than the one used in this chapter.

specific nationality or place of birth and to which ethnic groups they belong. Tackling fear of crime is a very relevant task for policymaking because it affects mental health and wellbeing of the population and in turn economic growth (Foster *et al*. 2016).

The rest of the dissertation is organised as follows. Chapter 1 provides a comprehensive review of the existing literature on the link between immigration and crime rates and crime perceptions. Chapter 2 investigates the impact of FCS immigration on crime rates for some specific categories of crimes in a cross-country comparison in Europe. Chapter 3 explores a similar research question as Chapter 2, but the focus is on the impact of FCS immigration on both macro categories and individual types of crimes using province level data in Italy. Chapter 4 is centred on the link between migratory background, proxied by country of birth, and crime perceptions using household level data from the EU-SILC dataset. The last section summarises the results and provides some concluding remarks including policy implications and avenues for future research.

Chapter 1: Introduction and comprehensive literature review on the link between immigration and crime and crime perceptions

1.1 Introduction and theories for the link between immigration and crime

Rational explanations for committing crimes can be traced back to the work of Becker (1968). In his seminal work, the author stated that an individual will commit crime when the marginal utility of committing crime is higher than the one that can be obtained within the legal boundaries. During time, the motivations who push individuals to commit crimes have been revised and the theory of Becker (1968) was found to be incomplete to explain changes in crime across countries and over time (Bell, 2019).

Focusing the analysis on crime is important for both sociological and economic reasons. Sociologically, the cost of crime is manifested on victims and their families (when they are not guilty of the crime) and is partially represented by the pain, suffering and fear caused by crime (Cohen, 1998). Economically, the crime has costs both in terms of expenses for crime deterrence, the cost of fear and agony and the opportunity cost of time lost due to crime (Anderson, 2012). In relation to the Italian context, Detotto and Otranto (2010) show that crime has a negative effect on economic growth as it discourages investments, reduces the competitiveness of firms and reallocates the resources thus creating uncertainty. For these and other reasons, it is worth focusing on what causes crime.

Among the factors that could contribute to changes in crimes, many authors focused on the impact of immigration on crime rates in the host countries.

While until 2012 immigration had been considered one of the most important issues by the public opinion only in the UK, it ranks as one of the three most important issues in many countries by 2014 (Eurobarometer, May 2014). The Global Attitudes Survey (2018) from the Pew Research Centre ask questions to the public opinion in 16 countries. Some re-elaborations have been made based on the findings of the survey and the statistics and are represented in Figure 1.A.1 in Appendix 1.A. The questions asked are whether the interviewees agree with the statements that "immigrants are a burden for the economy because they take jobs away from natives" and the percentage of those who agree is represented on the y axis, and that "immigrants are more responsible than others for a worse situation in terms of crimes", and the percentage of people agreeing to the latter statement is represented on the x axis. It is possible to see that for most of the countries in Europe, the

percentages of those that agree for both statements are quite high. For instance, around 55 percent of the interviewees agreed with the statement that immigrants are associated with higher crime rates in Sweden. This percentage is the second highest after Greece where the vast majority of the interviewees reported notably negative views on immigration with the percentage of those agreeing with the statement that immigrants rob jobs from natives equal to 75 percent and the percentage of those concerned about the impact of immigration on crime being equal to 59 percent.

The next section discusses some main theories predicting the impact of immigration on crime rates.

1.1.1 Theoretical backgrounds for the impact of immigration on crime rates

Wortley (2009) reviewed the most important theoretical frameworks for the link between immigration and crime. The author identified four models: the importation model, the strain model, the cultural-conflict model, and the bias model.

The importation model states that immigrants cause an increase in crime because of criminal networks and organised crime. Following this framework, individuals who decide to migrate have the specific aim of committing crimes in the destination country. This model explains the presence of transnational criminal organisations who often engage in activities such as drug trafficking, human trafficking, and so on (Wortley, 2009).

The strain model refers to the difficulties faced by the immigrants when arriving in the destination countries, somehow suggesting that migrating and integrating in the context of a country different from the origin one can be stressful for migrants. The literature on the Social Disorganisation Theory (SDT), formulated by Shaw and McKay (1942), is encompassed, together with other theoretical frameworks, in the strain model. The SDT argues that high levels of ethnic diversity and immigrant concentration are positively correlated to crime rates in neighbourhood characterised by high social exclusion and high unemployment levels. [11] A higher

[11] The SDT has been revised later by Sampson (1987), and Sampson and Groves (1989). See also Bruinsma *et al*. (2013) for an empirical analysis of various SDT theoretical models.

level of involvement of immigrants in criminal activities is not due to an “innate criminal attitude” among immigrants, rather to the high levels of residential mobility, population heterogeneity and poverty, in the so-called "Zones of Transition". These socio-economic and demographic characteristics of these zones impede social cohesion, create communication issues, and complicate the process of crime control (Feldmeyer, 2009).

A third theoretical framework is the cultural conflict model. It states that higher immigration is associated to higher crimes due to religious practices and cultural backgrounds which are different between the origin and the destination countries. As an example, Wortley (2009) mentioned the fact that some forms of domestic violence are tolerated in some countries as in line with religious practices. Similarly, the study by Reed and Yeager (1996) brought the example of gambling which was often reason of conflict between ethnic minorities and legal authorities.

Finally, the bias model explains the link between immigration and crime as the consequence of over-representation of immigrants in crime statistics and of systemic discrimination perpetrated by police forces and criminal courts. In this respect, Wortley (2009) cited the findings by Wortley and Owusu-Bempah (2009), who used data from the 2007 Canadian General Population Survey, and found that certain segments of the population, particularly Black Canadians, are more likely to perceive discrimination than other groups.

Some authors attempted explaining the link between immigration and crimes in legal terms. This refers to the debate over the intersectionality between two fields in Law, criminal law and immigration, the so-called "crimmigration". Practical examples of crimmigration are those laws created by governments with the purpose of criminalising illegal residence (i.e., illegal migration). [12] Moreover, crimmigration includes measure such as detention for unauthorised migrants and/or enforcing border control, which are described by many authors as pointless because they do not reduce crime and counterproductive because of wasting financial resources in deportation and border patrolling and creating more violence at the borders (Ewing *et al*., 2015; Orrenius and Coronado, 2005).

[12] Crimmigration is mainly a legal concept; for a more extensive explanation, see García Hernández (2015; 2018) and Arriaga (2016).

An alternative explanation for the link between immigration and crime refers to the adverse effects of immigrants on the labour market in the destination countries. Immigrants can substitute natives, or previous immigrants already residing in the destination countries on the workplaces, as they normally accept lower labour conditions (Borjas *et al*. 2010).[13] This can increase the number of underemployed or unemployed natives, or previously arrived immigrants, and in turn increase poverty, which has been found as one of the main determinants of crime (Mehlum *et al*. 2006b; Gillani *et al*. 2009; Wrigley-Asante *et al*. 2016).[14] Although not tested or explicitly formulated in the theory, an additional mechanism in relation to labour market mechanisms is that immigration, especially low-skilled one, is complementary to natives' employment because immigrants who do not speak the language as fluent as natives and are not familiar with the context and the socio-economic and cultural background as natives are, can only be employed in manual occupations or in tasks that do not require communication skills. Thus, immigrants find manual occupations, once they get into the destination country, and natives are incentivised to shift to less manual tasks (e.g., communication-related tasks or highly specialised occupations), and this process ends up increasing natives' wages and employment opportunities rather than decreasing them, thereby reducing crime rates.[15] From another perspective, immigration can reduce crimes because of the social pressure faced by immigrants. Given that migrants are living in a country that is not their home one, they have strong incentive to abide by the rules as they often find themselves under the spotlight of the criminal justice system and they face strict requirements to obtain documents such as permanent residence permits or citizenship status (Sampson, 2008). Furthermore, immigration could reduce crime by promoting the unity of family, creating solid neighbourhood institutions and enhancing the economic opportunities in enclaves, following the recent "immigration revitalisation perspective" (Lee and Martinez, 2009).

[13] In this respect, see the work by Dai *et al*. (2013) for a theoretical framework predicting a positive impact of immigration on crime rates (i.e., immigration leading to higher crime rates) through the labour market.
[14] This mechanism has been also explored by Borjas *et al*. (2010). Particularly, they found that a sizeable negative effect on wages follow an increase in immigration and this effect is particularly strong on immigrants that are already residing in the host country.
[15] See also Peri and Sparber (2009), Foged and Peri (2016) and Card (2005; 2009) for a positive or non-negative impact of immigration in the labour market.

Linking partially to both the strain and cultural conflict models (Wortley 2009), another potential mechanism for a statistically positive link between immigration and crimes, specifically in relation to immigration from fragile and war-torn countries, is the so-called "violent legacy" theorised by Rohner *et al*. (2013a) and documented for the case of asylum seekers by Couttenier *et al*. (2019) for the Swiss context. Rohner *et al*. (2013a) elaborated a model that showed the persistence of war over time thereby explaining violence spirals and escalations.[16] Couttenier *et al*. (2019) tested empirically this framework by looking at immigrants coming from fragile countries who experienced directly and/or indirectly forms of violence, war and socio-political instability at home during childhood, and found them to be more prone to violence in the host countries.

A further potential pattern for an increase in crime due to immigration is the theoretical link between immigration and criminal organisations, especially mafia-type of criminal organisations. This explanation partially traces back to the importation model introduced by Wortley (2009). Immigrants can be perpetrators or victims of organised crime; in the latter case, their presence is exploited by criminal organisations to make more money (see Duca 2014). However, immigrants may have the intent to commit crime in the destination countries thanks to links with criminal organisations and groups who operate in the destination countries. This is the case of organised drug trafficking in Mexico, where members of the criminal organisations were newly arrived or returning migrants (Garcia and Gonzalez 2009). In the specific case of Italy, the intertwining between mafia and corruption have increased the business of mafia organisations in relation to the management and reception of migrant inflows mainly from North and West Africa (Duca 2014; UN Report, 2011). Alternatively, immigrants can be members of mafia organisations and, thus, perpetrators, but this normally happens when immigrants have the same citizenship or share a cultural background as highlighted in the works concerning the link between Italian immigration and mafia crimes (Sciarrone and Storti 2014; Mastrobuoni 2015).[17]

[16] Empirically, similar conclusions were drawn also by Rohner *et al*. (2013b) in an analysis of the Ugandan context.

[17] We can also refer to the paper by Nelli (1969) who analysed the impact of Italian mafia in America.

The next section presents the literature review on migration and crime rates and on the determinants of fear of crime for which an important factor considered in many studies is the migratory background.

1.2 The review of the existing literature

This section presents the literature review of the entire thesis and is divided into 2 subsections: one that gathers and critically reviews the works on immigration and crime and one that deals with the determinants of fear of crime (crime perceptions) and considers the impact of migratory background, proxied in many cases by race and ethnicity, on crime perceptions.

For immigration and crime rates, a very prominent and one of the earliest study, focusing on the US context, is the one by Butcher and Piehl (1998).[18] More recent works include those of Bianchi *et al*. (2012), Alonso-Borrego *et al*. (2012) and Bell *et al*. (2013) respectively for the Italian, Spanish and British contexts.

For fear of crime, some studies such as Brunton-Smith and Sturgis (2011) and Brunton-Smith *et al*. (2013) linked the SDT frameworks to fear of crime, while others have focused on various determinants, mostly at individual level, to explain fear of crime. Most of these studies have found race or ethnicity to be a significant predictor of higher fear of crime (Ortega and Myles 1987; Callanan 2012).

1.2.1 Literature review on immigration and crime rates

Butcher and Piehl (1998) investigated the link between immigration and crime using data for the US context. The authors conducted two types of analysis: one at city level using data from the Uniform Crime Reports and the Current Population Survey and one at individual level using the National Longitudinal Survey of Youth (NLSY) both in the period 1980-1990. They found that at city level immigration seems correlated with higher crime rates in the cross-sectional level, however, when considering a longitudinal perspective, the impact of immigration on crime at city

[18] The work of Chapin (1997) is probably the earliest focusing on the effect of immigration on crimes in Germany.

level was not significant. For the individual level analysis using the NLSY dataset, the authors found that immigrant youth (i.e., youth born outside the US) was less likely to commit crimes compared to native-born and this effect was proven solid through a battery of robustness checks including whether the young individual was living with the mother or the father, the educational attainments of the parents, the unemployment rate in the neighbourhood of residence. Although robust to various specifications, the results presented by Butcher and Piehl (1998) may suffer of endogeneity bias because of omitted variables and/or reverse causality. This would be likely to bias upwards the coefficients and an IV would be needed to correct the potential endogeneity.

Similarly, Martinez *et al*. (2010) found a negative and significant relationship between immigration and crime, specifically homicides, using data for several neighbourhoods in San Diego, US, for the period 1980-2000. The authors advanced the work by Butcher and Piehl (1998) by using neighbourhood level data for a longer and more recent time span. However, their results, although proven to be robust to a battery of checks, are also likely to suffer endogeneity bias as a complete identification strategy is not present. Similar results, still within the US context using neighbourhood level data in Miami (Florida) and San Antonio (Texas), and with similar concerns in terms of causality inference, were reported by Martinez and Stockwell (2012).

The findings for the US seem to differ substantially from those reported for the European context. For instance, one of the earliest works on immigration and crime in Europe is the one by Chapin (1997). The author focused the analysis on the German context, using Länder level data for Berlin and West Germany from 1982 to 1994, and found that immigration, together with other factors such as unemployment, is positively correlated to crime.[19] However, the issue of endogeneity is not faced, same as the studies in the US (Butcher and Piehl 1998; Martinez *et al*. 2010). In addition, no robustness check was conducted with the results coming from an ordinary regression.

[19] Decker *et al*. (2009) argued that immigration, combined with other factors, including unemployment, caused the formation of gangs in the US and Europe.

The endogeneity issues are instead addressed by a number of more recent studies compared to the previously cited ones, focusing on the European context. For instance, Bianchi *et al.* (2012) analysed the impact of immigration on crime rates in Italy. They found no significant effect of immigration on crime rates at city level, except for a substantially small positive impact on property crimes (burglaries). Bianchi *et al*. (2012) employed province level data in Italy for the period 1990-2003 and used an IV procedure to correct for endogeneity that might be related to the decision of migrants to migrate to a certain province. They focused on the total inflow of immigration and used a shift-share excluded instrument for solving the endogeneity issues. The analysis by Bianchi *et al.* (2012) is more robust compared to the previously cited studies (Butcher and Piehl 1998; Chapin 1997) and causality can be inferred. However, their study do not take into account the potential impact from different types of migrants, for which the link with crime rates could be different in signs and magnitude.

Alonso-Borrego *et al*. (2012) made a step forward compared to Bianchi *et al* (2012) by conducting a similar analysis at provincial level in Spain from 1999 to 2009, but differentiating immigrants based on their countries of origin. They addressed issues of endogeneity in the main explanatory variable through a system GMM estimation. They found that Latin American immigrants are significantly associated with lower crime rates, and, to a lesser extent, the same results hold for EU-15 immigrants. On the other hand, other types of immigrants were found to be associated with higher crime rates, especially Romanian immigrants. However, over time the incidence on crime rates for this latter group converged to the one of Spanish nationals in the age group 20-50.

Distinction among different types of immigrants has been made also by Bell *et al*. (2013) in their analysis of the impact of immigration on crime rates in the UK. The authors focused on A8 immigrants (immigrants from the 2004 wave of EU accession) and asylum seekers from non-EU countries in the UK. They used data for 371 local authorities for the period 2002-2008 and employed an IV estimation to correct for endogeneity where the used instruments were the number of asylum seekers in dispersal accommodation and a sort of shift-share instrument based on A8 nationalities for A8 migrants. They documented a small and statistically

significant positive effect of asylum seekers on property crimes, while the same effect is not very significant for other types of immigrants. For violent crimes, the effect was not significant for both groups of immigrants. Bell *et al*. (2013) explored another avenue of research compared to Bianchi *et al*. (2012) and Alonso-Borrego *et al*. (2012) by taking into account the link between inflow of asylum seekers and crime.

Similarly to Bell *et al*. (2013), Couttenier *et al*. (2019) also took into account the impact of asylum seekers on crime rates with the aim of testing the violence-breeds-violence theory proposed by Rohner *et al*. (2013a). They used data at cohort-level for the period 2009-12 for Switzerland and employed a fixed-effects estimation which included battery of robustness checks. Given that the estimation was carried at cohort-level the variety of fixed effects were enough to solve issues of unobserved heterogeneity. They found a positive and highly significant effect of asylum seekers on violent crimes, while the same result did not hold for property crimes. In particular, the cohort of asylum seekers was found to be 40 percent more likely than the baseline to commit violent crimes.

In Chapter 2 and 3 of the present thesis, the aim is to contribute to the literature by following a similar approach to that of Couttenier *et al*. (2019) and testing the theory on war persistence by Rohner *et al*. (2013a), but using data on immigration from fragile countries, FCS, for a relatively more recent time span and using innovative excluded instruments in the IV estimations to address endogeneity issues.

1.2.2 Contribution to the literature on immigration and crime rates

For Chapter 2, the contribution is threefold, and the direct reference are the study by Couttenier *et al*. (2019) and the theoretical framework outlined by Rohner *et al*. (2013a). Firstly, instead of taking into account asylum seekers that could come from a variety of countries, the chapter focused on FCS immigrants therefore the countries of origin of the migrants are chosen following a formal definition by the World Bank. This allows to reduce the heterogeneity among the countries and to confirm that immigrants coming from FCS experienced directly or indirectly forms

of violence before migrating. Secondly, it consists of a cross comparisons between countries, and this gives the opportunity to obtain results valid for a wider area compared to previous studies (Bell *et al*. 2013; Bianchi *et al*. 2012; Alonso-Borrego *et al*. 2012) that focused on single countries. Moreover, using country level data allows to have data for a higher number of variables compared to those studies that used city level data. Thirdly, the focus is on single categories of crimes instead of macro categories, thus entering into details of which specific crimes might increase following a surge of FCS immigration. Finally, the analysis covers a more recent time span from 2008 to 2016.

For Chapter 3, the comparison can be directly made with the study by Bianchi *et al*. (2012) given that the analysis is also carried at provincial level in Italy. As mentioned in the conclusive section of their article, Bianchi *et al*. (2012) stated that a further expansion of their work could go to the direction of assessing the impact of a specific type of immigration, perhaps based on nationalities, on crime rates in Italy. This is what is done in Chapter 3 of this thesis and it constitutes an element of novelty compared to the previous literature. In addition, the chapter takes into account the link between FCS and individual types of crimes thereby entering into detail of which types of crimes are more likely to be affected by changes in immigration flows from FCS. Lastly, Chapter 3 contributes to the existing literature on immigration and crime by focusing on a more recent time period compared to previous studies (Bianchi *et al*. 2012; Alonso-Borrego *et al*. 2012; Bell *et al*. 2013; Couttenier *et al*. 2019).

The next subsection presents the literature on fear of crime and its determinants and focuses on the role played by race and migratory background.

1.2.3 Literature review on the determinants of fear of crime

Fear of crime has been associated to lower mental health that in turn affects economic growth and population's wellbeing (Foster *et al*. 2016). For this reason, many studies attempted to determine the factors that lead to higher fear of crime among the population. Among these factors, many authors have focused on migratory background and/or race. The reason for believing race or foreign

background or ethnicity as prominent factors in affecting fear of crime is given by the higher probability for ethnic minorities to be victims of crimes (Reiss 1966).

One of the first empirical studies to explore the determinants of fear of crime, including among those race as one of the most important factors, is the one by Clemente and Kleiman (1977). The authors combined two national sample in the period 1973-1974 and focused on the impact of six salient variables: sex, race, age, income, education, and community size. Through a multivariate analysis, combining data at individual and neighbourhood level data, the authors found that sex and city size were strong predictors of fear of crime, while age and race were less important.[20] Income and educational levels had small effect on fear of crime. The limitations of the study are that neighbourhood characteristics are only marginally taken into account and the study only focuses on one dimension of fear of crime, that is, "reporting to be afraid to walk alone in some areas around where the respondent lived", while many other dimensions could be explored (e.g., fear of being robbed, fear of aggressions, fear of being attacked at home, etc.). Moreover, other relevant factors such as the health status of the respondent are not taken into account.[21]

On the other hand, Ortega and Myles (1987) took into account the effect of the same set of variables as Clemente and Kleiman (1977) except for community size and the dependent variable is also identical. The authors focused on the results for race, sex, and age. As an element of novelty compared to the previous study by Clemente and Kleiman (1977), Ortega and Myles (1987) added the interaction terms of separately age and sex with race. Gender and race by themselves are not significant factors in predicting higher fear of crime, while age has a strong impact. The interactions between age and race, and gender and race are negative and significant meaning that fear of crime is reduced for elderly white population compared to black and that white women are less likely to report being afraid of walking alone at night in the neighbourhood compared to black women. Although Ortega and Myles (1987) added some other relevant factors and gauged the joint impacts among various

[20] Similar findings were presented also by Parker (1988).

[21] Different results were presented through some descriptive statistics by Braungart *et al.* (1980) where they showed that black youth was less likely to be fearful of crime, while the opposite was true for the middle age and elderly groups.

variables, they did not control for specific characteristic of the neighbourhood where the individuals live and did not take into account other relevant factors at personal level such as health, labour and marital status.

Box *et al*. (1988) explored a very similar research question to that of Clemente and Kleiman (1977) and Ortega and Myles (1987). Their dependent variable took value 1 if the reply to the question "how do you feel to walk outside in this area in the dark" the answers were "a bit unsafe" or "very unsafe" (Box *et al*. 1988). The authors took into account similar variables to the one of the previously cited studies, except education and income, using a logit model. In addition, they controlled for a number of neighbourhood characteristics such as neighbourhood cohesion, housing conditions, incivilities as a novelty in their study and they added the interaction effect between inner city (living in an area that is highly urbanised) and race (measured as non-white compared to white). Their main findings show that age reduces the gap in fear between man and women, for the gender-age interaction, and being non-white is associated with less fear of crime in inner city areas compared to being white, while it is associated to higher fear of crime in less urbanised areas.

While the studies cited so far, used only one measure of fear of crime and did not distinguish between fear of crime and perceived risk, the distinction is done by LaGrange and Ferraro (1989). They took into account perceived risk measures with respect to personal crimes and property crimes separately which is the self-assessed probability of being victimised. Fear of crime, in their setting, means the degree of fear in being victimised separately for personal and property crimes. Black respondents were found to be significantly more likely to perceive risk of being victimised compared to white respondents. For fear of crime, the impact of race was not significant. The main limitation of this study is that other variables such as neighbourhood characteristics and individual characteristics namely income, education and so on, were not controlled for while this was done in previously cited studies.

On the other hand, the impact of race, black compared to white, was found to be positive and significant, in contrast to LaGrange and Ferraro (1989), by Chiricos *et al*. (1997). The authors expanded previous studies by taking into account the effect

of news media on fear of crime together with other variables. Their approach was a survey of 2092 adults in Tallahassee, the state capital of Florida, for the period between January and March 1994 where fear of crime was measured in a scale of one to ten (i.e., ten represented most fear, and one least fear). The main limitation of the study is that it did not take into account neighbourhood characteristics about the place where the respondent lived and also it did not consider the effect of relevant personal characteristics other than age, sex and crime, such as income, health status and education.[22]

Differently from Chiricos *et al*. (1997), the study conducted by Houts and Kassab (1997) found race not to be a significant factor in predicting fear of crime using data from a telephone survey in the US from March to April 1993 where 300,000 individuals were surveyed. In comparison to the previous literature, the sample used by Houts and Kassab (1997) was bigger in terms of observations and followed the theory by Rotter (1966) on social learning to explain fear of crime. Their results, however, are hardly comparable with the literature as they estimated the impact of the various factors by dividing the sample between white and non-white respondents and this did not allow a comparison between the two groups, as it was otherwise possible in Chiricos *et al*. (1997).[23]

Fox *et al*. (2009) focused on a more detailed context than previous studies by employing a web-based survey for April and May 2007. In total 1921 individuals participated. They analysed the impact of various factors on fear of crime and distinguished between daytime and night-time fear. Compared to previous studies, the authors took into account the effect of a variety of variables concerning previous victimisation and sexual orientation. They found race (non-white) to be a significant factor in predicting higher fear of crime compared to white respondents. This result is true for females for daytime fear and for males for night-time fear. Other factors, such as health status and marital status are not taken into account, and this

[22] Through a telephone survey, Dowler (2003) found that race was not an important predictor of fear of crime, but that African-Americans were less favorable of punitiveness had a high probability of considering police as low effective.

[23] Similarly to Houts and Kassab (1997), also Reid and Konrad (2004) in their analysis on the impact of gender on fear of crime found that race was not a significant factor.

constitutes a limitation of the study. Also, the validity of this study is limited because it is difficult to generalise its findings to other contexts.[24]

Kitchen *et al*. (2010) analysed the impact of various factors on fear of violent crime using data from a telephone survey in 2001, 2004 and 2007. They used two dummy variables for race and migratory background respectively taking values 1 if the respondent is aboriginal or immigrant, and 0 otherwise. The results showed that immigrant and aboriginal respondents were more likely to report being fearful of crime. This study takes into account a number of variables including quality of life and years since living in the neighbourhood, and partially also considers the socio-economic characteristics of the neighbourhoods where the respondents lived. However, other important factors such as household characteristics (e.g., single parent families) are not taken into account in this study.

Callanan (2012) used a state-wide probability sample for California between March and September 1999. The number of interviews completed were 4245 for which the respondents were white 2500, Latino 777, and African American 435. They found that African American and Latino were more likely to report both perceived risk in the neighbourhood and fear of crime. The effect of education, income, gender age and media consumption were also controlled for. The same results were achieved by Callanan and Rosenberg (2015) for perceived risk of neighbourhood crime by gender. They found that Asian males were significantly less likely than white respondents to report fear of crime, while the coefficient was not significant for females in the same racial group. On the contrary both males and females who were Latino and black were significantly (at least 5 percent level) more likely to report higher perceived risk of crime in the neighbourhood.[25]

Most of these studies took into account many relevant factors for affecting fear of crime, but many individual and household characteristics such as health, marital and labour statuses as well as single parent families were not taken into account. Moreover, neighbourhood characteristics and deprivation conditions for the household were just partially accounted for. The next subsection introduces a part

[24] In a different perspective, Hagan *et al*. (2005) found that black students were more likely to perceive injustice and mistreatment from the police compared to white students.

[25] Similarly, Alper and Chappell (2012) found that race (non-white) was a significant predictor of higher fear of crime for both property and violent crime. They used data from a telephone survey where the respondents were providing information on behalf of the household.

of the literature that bridges deprivation conditions as listed by the SDT and fear of crime at household level. The approach followed in Chapter 4 of the present dissertation looks very much alike that of the following studies, by using household level data in Europe. A more detailed contribution of Chapter 4 compared to the literature is outlined at the end of the next subsection.

1.2.4 Literature on the role of social disorganisation, and other multi-level factors on fear of crime

The SDT is part of the strain models used normally to explain the relationship between neighbourhood characteristics, including immigrant concentration and ethnic heterogeneity, and crime rates (Wortley 2009). Bruinsma *et al*. (2013) listed the various factors and re-elaborations of the theory through time in its empirical analysis on the Dutch context. The baseline model for the SDT was formulated by Shaw and McKay (1942) and stated that neighbourhood having higher degree of socio-economic deprivation, residential stability and ethnic heterogeneity were more likely to have higher crime rates. Sampson (1987) reviewed this model by adding family disruption (i.e., single parent families) as a further factor leading to higher crime rates. Sampson and Groves (1989) enlarged this last framework by adding residential instability, urbanisation, structural density, unsupervised peer groups, and lack of local friendship networks and organisational participation as factors leading to crime rates. The theory on social capital from Coleman (1998) and Putnam (1995), adds neighbourhood distrust as a factor potentially leading to higher crime and social disorganisation. Finally, Sampson *et al*. (1997) elaborated a model on collective efficacy that states that concentrated disadvantage (a concept that puts together family disruption, low income and youth prevalence), immigrant concentration, residential instability, family disruption, and the lack of collective efficacy namely social trust and informal control in the neighbourhood could lead to higher social disorganisation and crime rates (Bruinsma *et al*. 2013).

Brunton-Smith and Sturgis (2011) used the fundamentals of the SDT to explain fear of crime together with the individual level variables used in previous studies.[26] They used data at individual level for adults older than 16 years that are living in private, residential accommodation in England and Wales for the period 2002-2005. This data has been merged with 2001 census data for England and Wales. Their findings show that socio-economic disadvantage, urbanisation and population mobility were associated to higher reported fear of crime at individual level. For individual level variables, ethnicity (Asian, Black, Mixed-other) was significantly associated to higher fear of crime compared to the reference category, white. The advantage of this study is that it took into account various neighbourhood characteristics and more individual level data such as health status, marital status, occupation. However, income (poverty risk) and family disruption were not actually captured as variables affecting fear of crime.

Other studies also took into account neighbourhood characteristics on fear of crime. For instance, Franklin *et al*. (2008) studied the effect of race on two dependent variables, perceived risk (feeling safe of walking alone in the neighbourhood) and worry of victimisation (being worried of being victimised for specific types of crimes). Using data for a survey involving 2599 citizens in 21 cities across Washington State they provide evidence that white respondents are less likely than non-white to perceive risk, while they were more worried to be victimised. This result is very interesting and points to opposed directions. Similarly, Franklin and Franklin (2009) studied the effect of various factors on fear of crime, proxied by worry of victimisation, and they found that, contrary to the theories on social vulnerability (Pantazis 2000; Will and McGrath 1995), white respondents were more likely to be worried of victimisation. However, both these studies do not take into account the effect of other relevant factors such as health and marital status of the respondent.

Interestingly, Gainey *et al*. (2011) found that non-white respondents were less likely to be fearful of crime compared to white ones. They also controlled for neighbourhood trust and organisational participation. Data were collected through

[26] In a further analysis Brunton-Smith *et al*. (2013) showed the importance of SDT models to shape crime perceptions at neighbourhood level.

a telephone survey in a city of 220000 inhabitants in the US in 2008. The main limitation of the study is that it is cross-sectional and does not take into account many neighbourhood characteristics deemed as relevant by the SDT, such as socio-economic disadvantage, and other factors such as health status and income are not controlled for.

Vauclair and Bratanova (2017) conducted a multilevel analysis, differently from what was done in previous studies, combining data at country level with individual level variables for predicting fear of crime. They found that the combined effect of income inequality and ethnic minority membership significantly reduced fear of crime. Compared to previous studies, they added other individual level predictors such as disability and they interacted country and individual level variables. However, neighbourhood characteristics were not taken into account and also income or poverty at individual level and family disruption or marital status were not included, and this was the main limitation of their study.

1.2.5 Contribution to the literature on the link between migratory background and crime perceptions

In Chapter 4 of the present thesis, the contribution to the existing literature cited so far is threefold. Firstly, measures of socio-economic deprivation, housing deprivation and environmental deprivation are taken into account using household level data from the EU-SILC dataset. Secondly, a number of individual level variables are all considered, such as labour, health and marital statuses, while at household level single parent household types and monetary poverty are controlled for, thereby accounting for concentrated disadvantage at household level. Finally, the chapter covers a recent time span 2004-2010 and include interaction terms between both individual level variables (marital status, gender), and household level (deprivation, urbanisation and single parent households) and migratory background, proxied by the country of birth of the household heads.

Appendix 1.A: Graphics on public opinion towards immigration (Jobs vs Crime)

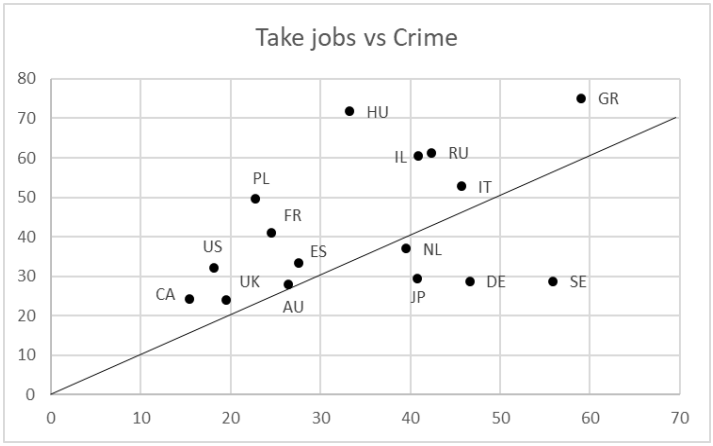

Figure 1.A.1 Public opinion about immigrants: take jobs (Y) vs more crimes (X)

Chapter 2: Immigration from fragile and conflict-affected areas and crime rates. A country-level analysis in Europe

2.1 Introduction

In this chapter, the link between immigration from fragile countries and crime rates for various types of crimes is taken into account in a cross-country comparison in Europe.

It is important to take into account the relationship between immigration from FCS immigration and crimes in Europe considering the recent increase of this type of immigration and the growing concerns among the public opinion about the potential increase in crimes, especially violent ones, as a consequence of the increase of this type of immigration (Minteh, 2016).[27] Furthermore, managing the inflow of foreign nationals or foreign-born, at times with specific regulations based on nationalities or birthplaces or groups of those, always constituted a topic of debate at the legislative level. In this perspective, we aim to provide insights in relation to two optimisation problems for the policy makers. On one hand, policy makers want to implement the soundest immigration policy in order to maximize gains and reducing economic and social costs. On the other hand, they want to improve safety (i.e., reducing crimes) while spending efficiently the resources on crime deterrence (e.g., on public order and police forces) and avoiding social costs (e.g., the psychological consequences on the families of the victims and the risk of retaliation acts following criminal acts). The deriving policy implications are not necessarily stated in terms of allowing or restricting more immigration inflows, but rather a higher attention from policy makers on the channels through which immigration might have a positive or negative impact on crime.

In relation to the contribution of this chapter to the previous literature, the aim is to improve the current state of the research in three directions. Firstly, differently from previous studies, the focus is not on individual countries, but a cross-country comparison in Europe is made. Secondly, the chapter focuses on specific types of crimes (assaults, sexual violence acts, robberies and thefts) instead of looking at crime rates in general or macro categories of crimes (violent crimes, property crimes). Although this approach may forgo some types of crimes which will be

[27] See also the survey conducted with the public opinion by the European Commission (Eurobarometer, 2014).

included in the macro categories, it yields a consistent description of crime across countries and time.[28] Thirdly, the present chapter takes into account the link between immigration inflows with specific nationalities namely the FCS, as defined in the World Bank database (World Bank, 2019) on crime rates. The reason for focusing on the link between immigration from FCS and crime rates derives from the theoretical framework "violence breeds violence" (Couttenier *et al*. 2019), which predicts that immigrants from conflict-affected areas and war-torn countries are more prone to committing crimes compared to non-FCS immigrants.

The study is organized as follows. Subsection 2.1.2 presents the hypotheses of this chapter and what is expected to be found through the empirical analysis. Section 2.2 introduces the dataset of the analysis, presents some descriptive statistics and discusses the methodological approach for the empirical estimations. Section 2.3 presents the results of the analysis and some robustness checks. Section 2.4 provides some concluding remarks.

2.1.1 Hypotheses

In the present chapter, the main theoretical framework of reference is the so-called violence-breed-violence framework introduced by Rohner *et al*. (2013a) and explored empirically for the case of asylum seekers in Switzerland by Couttenier *et al*. (2019).[29] Consequently, the hypothesis to be tested in this chapter is the following:

H1. Given the violence-breed-violence framework, it is expected that immigration from FCS is linked positively and significantly to violent crimes.

In the case of the present chapter, the violent crimes considered are sexual violence crimes and assaults. It would be so because these immigrants are likely to have

[28] Eurostat metadata compares the legislation for some types of crimes across different countries and constructs some comparison tables. Through these tables, it is possible to know which countries have similar definitions for a crime and whether the countries have changed the legislation over time.
[29] For a more extensive explanation of the framework and a discussion on the findings by Couttenier *et al*. (2019), see the previous introductory chapter.

experienced directly or indirectly forms of violence, war or terrorism or sometimes a combination of those, and therefore they are more prone to commit violent acts. Although Couttenier *et al*. (2019) found the relationship between immigration (i.e., asylum seekers) and property crimes to be not significant, other papers documented a positive and significant impact of violence exposure, in the present paper proxied by FCS immigration, on property crimes (see Farrell and Zimmerman, 2018). A second hypothesis would be the following:

H2. Given that some studies have found empirically an association between violence exposure and property crimes, it is expected a positive link between immigration from FCS and property crimes.

Where property crimes, in this chapter, refer to robberies and thefts.[30]
Overall, given the abovementioned evidence for immigration and violent or property crimes, a positive coefficient on FCS immigration for both violent and property crimes is expected.

2.2 Data and methodology

The dataset for the analysis is the result of merging different data sources. For crime rates, the data have been obtained from the Eurostat open access database (Eurostat, 2019). This chapter employs data on individual types of crimes namely assaults, sexual violence, robberies and theft. These are measured as rates per 100,000 inhabitants.[31] Table 2.A.5 in Appendix 2.A provides the definition as it can be found in the Eurostat database (Eurostat 2020), while Tables 2.B.7-2.B.10 in Appendix 2.B show the countries that are included (highlighted in yellow) and excluded from the empirical analysis for each type of crime.[32] Additional data that

[30] A similar categorisation of crimes has been adopted by previous studies such as Bianchi *et al*. (2012).
[31] For a more specific description of these crimes see the metadata of the Eurostat database (Eurostat, 2019).
[32] This approach does not exclude entirely the discrepancies between different legal systems in our sample. However, it should substantially reduce the statistical noise in the dependent variable in relation to different definitions of crimes depending on the legal framework in the different countries.

has been drawn for this chapter regard total population, the share of graduates, public expenditures on police forces and on social protection per capita, poverty rates, GDP per capita, unemployment rates, average net annual earnings and weighted average of the age of the population.

The variable of interest, immigration flow from FCS, was taken from the OECD dataset (OECD International Migration, 2019). The OECD provides data on total flows of immigrants as recorded in issued residence permits and population registers. The data are broken down in citizenship or country of birth of the immigrants. The data on immigration based on foreign citizenship has been chosen for this study mainly due to data availability. Subsequently, a variable has been created which is the sum of the immigration flows from those countries that are defined as FCS. Following the World Bank official website, a country is defined as FCS if it has a Country Policy and Institutional Assessment (CPIA) score lower than 3.2 and/or hosts a peace-building or peace-keeping UN mission in its territory. The CPIA score is an overall average score for different areas of governance, namely economic management, structural policies, policies for inclusion and equity and public sector management. For each of these areas, the World Bank assigns a score from 1 to 6. The general CPIA score used to identify a FCS is the average of the scores for the different areas of governance.[33]

The present chapter also employs data on the governance and institutional framework in the origin and destination countries. These data are available in the Worldwide Governance Indicator (WGI) section of the World Bank database. The WGI provides data on governance indicator covering different areas and is based on the work of Kaufmann *et al*. (2010). Particularly, we use data on political stability and absence of violence or terrorism and rule of law. Details of the definition of these indicators are available in the Appendix.

Data are available at country level from all the above listed sources for a pool of 19 destination countries in Europe and 8 FCS over the period 2008-2016. Table 2.A.6 in Appendix 2.A lists the 8 FCS that are included in the sample. The choice was mainly driven by data availability during the reference period of the analysis.

[33] Details about the calculation of the indicators are available from the authors upon request.

A comprehensive list of all the variables included in the analysis is presented in Table 2.C.11 in Appendix 2.C. Here, all the variables are included and for each of them the source of data and the units of measurement are provided.

2.2.1 Descriptive statistics

Tables 2.C.12-2.C.15 in Appendix 2.C present some descriptive statistics respectively for the 4 individual types of crimes included in the analysis namely assaults, sexual violence crimes, robberies and thefts.[34] The main variable of interest, FCS immigration is the one which presents the highest variability with a standard deviation higher than its mean for all the different types of crimes. Theft is the most common and recurrent type of crime. Sexual violence and robberies tend to be stable with a mean considerably higher than the standard deviation.

As it can be noticed, the number of observations is substantially small for all the types of crimes and it changes notably across different types. This is because for each type of crime a number of countries out of the total have been selected based on similar legal definition of the crime as mentioned in the previous paragraphs. Tables 2.B.7-2.B.10 in Appendix 2.B show the countries that are included (highlighted in yellow) for each type of crime. Sexual violence crimes and assaults are the two types of crimes for which the smallest number of countries (only 9 out of 19 for which data are available) shares a similar definition of the crime. The legal definition of theft crime is similar for 10 out of 19 countries for which data are available and it makes it the second most commonly defined crime on legal terms across the countries included in the sample of this chapter. Robberies are the most commonly defined type of crime with 12 countries sharing a similar definition across many countries, and that explains why the number of observations is higher than the one for the other types of crimes.[35] This also explains the small number of observations in the empirical estimation in the Tables 2.1-2.4 of the next sections.

[34] These descriptive statistics are based on the same number of observations of the ones in the empirical results, Tables 1.D.16-1.D.18 in Appendix 1.D.

[35] Missing data are present for all the types of crimes and also in the independent variables. In fact, none of the types of crimes have a number of statistical observations equal to the one that it was supposed to be (i.e., number of countries by 9, the number of years in our data from 2008 to 2016).

Tables 2.C.12-2.C.15 in Appendix 2.C show the correlation matrices for the different types of crimes. For assaults crimes, the correlation with FCS immigration rate is positive, but weak and not significant and this seems in line with what reported by Bernat (2019). On the other hand, interestingly, FCS immigration is significantly and positively correlated to sexual violence crimes with a coefficient around 0.46 indicating a partial positive correlation between the two variables. This seems in line with the findings by Bell *et al*. (2013) and Couttenier *at al*. (2019) that present evidence of a positive effect on violent crimes following an increase in the number of asylum seekers, although in the case of Bell *et al*. (2013) this effect is linked to the economic conditions in which these migrants live in the destination countries. For robberies and thefts, the correlation with FCS is respectively negative and positive, but it is not significant in line with the findings of several studies such as by Bianchi *et al*. (2012) for the Italian context. Other variables, used as control variables in the empirical estimation (see the following subsections) seem to show some significant correlation with the crime rates. For instance, total population is positively and significantly correlated, although the coefficients suggest a weak correlation, with assaults and robberies. However, total population is negatively correlated to sexual violence crimes and this seems in contrast with most of the previous literature on population size and crime rates. This seems in line with the findings by Cochran and Chamlin (2004) that found a positive relationship between population changes and violent and property crimes.[36] A strong, negative correlation is found between poverty rates and sexual violence crimes, this seems to support the findings of those studies such as Paré and Felson (2014) that found a negative effect, although not significant, of poverty on violent crimes. However, these findings are contrary to most of the previous literature that show a positive direct link between property and crimes.[37] Interestingly, although welfare spending is normally negatively linked to property crimes (Hannon and Defronzo 1998), the coefficient in Tables 2.C.17 and 2.C.19 in Appendix 2.C show a positive and significant correlation between social protection expenditure per capita and, respectively sexual violence and theft crimes and this appears to be in line with the

[36] This was true for the absolute number of crimes, while the relationship was not significant for crime rates (Cochran and Chamlin, 2004)
[37] See, for instance, Iyer and Topalova (2014) and Hooghe *et al*. (2011).

findings by Foley (2011). A positive and significant correlation is noticed between unemployment and robberies and this is line with several studies.[38] The weighted average age of the population is correlated negatively and significantly to robberies in line with the age-crime curve (Farrington 1986).[39] Immigration rates not from FCS is positively and significantly correlated to sexual violence crimes and this seems in line with the findings by Knight and Tribin (2020) for violent crimes.[40] For FCS rates' correlations, the Tables show a negative coefficient between poverty and FCS immigration in the subsamples for assaults and robberies and this may signal a positive effect of immigration on economic growth and GDP per capita as found by Boubtane *et al*. (2016). The same holds for the positive and significant correlation coefficient between FCS and GDP per capita and a negative and significant one on unemployment rates in Table 2.C.19 in Appendix 2.C of the present thesis. Immigration not from FCS is positively and significantly correlated to FCS immigration and this is true for all the correlation matrices. This is in line with the evidence that areas experiencing high immigration are characterized by high immigration rates in previous periods (Bianchi *et al*. 2012; Jaeger *et al*. 2019). A positive and significant correlation can also be seen between social protection expenditure and immigration in line with evidence by Boeri (2010) that shows that a high-level of welfare attracts more immigration. Interestingly, FCS immigration is positively and significantly correlated to the weighted average of population age and this might be related to an increase in dependency rate as found by Denton *et al*. (1999). On the other hand, a negative and significant correlation between FCS immigration on total population can also be noticedand this might highlight the mechanism of low-fertility rates in developed countries characterized by high immigration (Espenshade 1986).

2.2.2 Trends in FCS immigration and crime rates

[38] Evidence can be found in Elliott and Ellingworth (1998), Raphael and Winter-Ebmer (2001), Edmark (2005) and Lin (2008).
[39] See also the evidence provided by McCall *et al*. (2013).
[40] They found that the victims of violent crimes, mainly homicides, were migrants rather than natives perhaps suggesting evidence of hate crimes.

Trends' comparisons between crime rates and FCS immigration rates, both measured per 100000 inhabitants, are shown in the following Figures 2.2-2.5. The sample of countries selected for the figures are those having similar definitions for the types of crimes same as in the descriptive statistics and correlation matrices. For assaults crimes and FCS immigration, Figure 2.2 does not show much similarity in the trends. FCS immigration tends to increase in many countries, markedly Austria, Germany and Sweden, respectively reaching a peak at 600 immigrants per 100000 inhabitants in 2015 (for the first two countries) and 2016. For Austria and Germany, a sharp drop can be observed from 2015 to 2016 moving from around 600 to 300-400 FCS immigrants per 100000 inhabitants. The same cannot be seen in other countries. On the other hand, assault crimes follow different trends for the various countries. The variations are generally less dramatic than the one for FCS immigration indicating a sort of consistency of these crime rates over time. It is possible to observe a sudden drop in Germany at the beginning of the period shifting from around 600 to 200 assaults per 100000 inhabitants. Similarly, the Netherlands display a substantial drop in assault crimes at the end of the period, 2015-2016, moving from around 250 to 30 assaults per 100000 inhabitants.

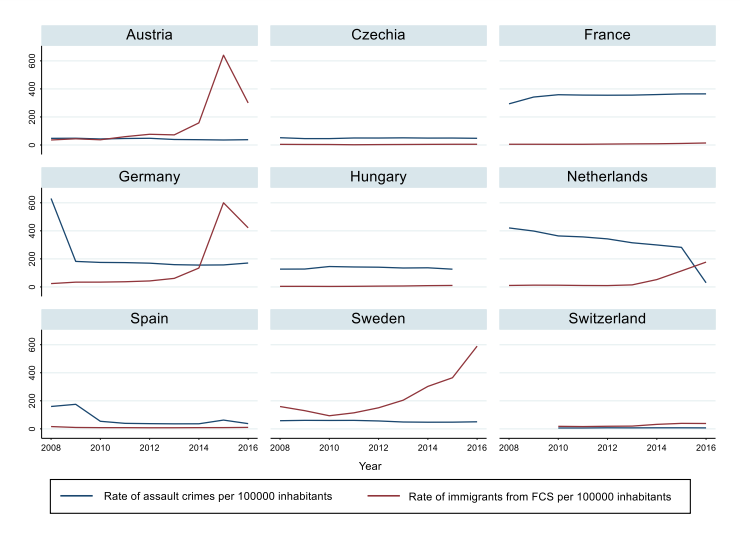

Figure 2.2 Assaults and FCS immigration, trends confrontation

Sexual violence crimes tend to present more stability over time, showing much consistency in the trends as it can be seen in Figure 2.3 that displays the trends for the two variables. In France and Norway, both sexual violence crimes and FCS immigration rates increase towards the end of the period. On the contrary, opposite trends can be seen for the Netherlands where FCS immigration increases and sexual violence crimes decrease from 2014 to 2016. Overall, no clear relationship can be noticed by looking at the two trends.

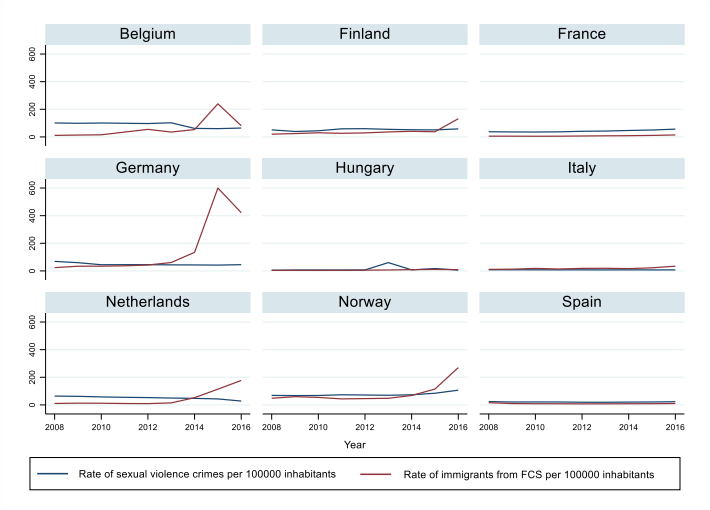

Figure 2.3 Sexual violence crimes and FCS immigration, trends confrontation

Figure 2.4 displays the variations over the reference period for robberies and FCS immigration. Although, it is not possible to establish any clear link between the two variables, it is possible to see that the trends are divergent between the two variables, especially in the last 2-3 years of the reference period where FCS immigration rates rose and robberies decreased. This inverse relationship seems in line with the findings of Stowell *et al*. (2009).

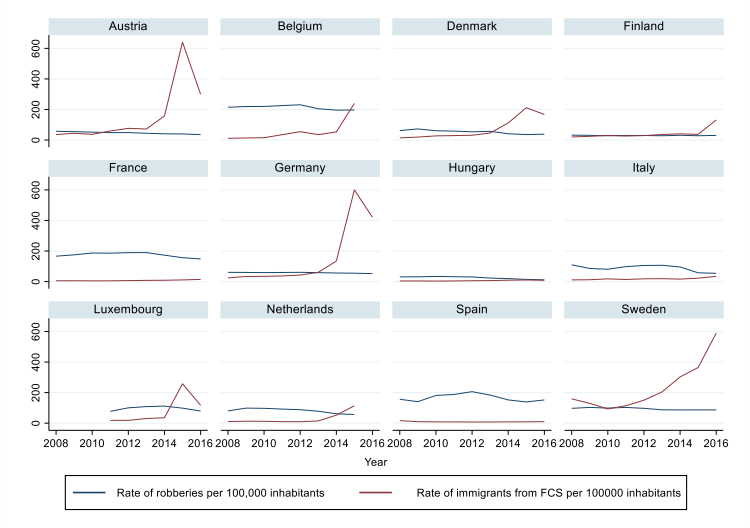

Figure 2.4 Robberies and FCS immigration, trends confrontation

Figure 2.5 shows the trends comparison between theft crimes and FCS immigration. Not much correlation can be noticed between the two variables, although, given the considerable difference in magnitudes between the two, it is not possible to draw important conclusions from this graph. In general, theft crimes present some oscillations throughout the period and the overall trend seems a decreasing one, while FCS immigration remains stable for much of the period and starts rising in the last years of the reference period.

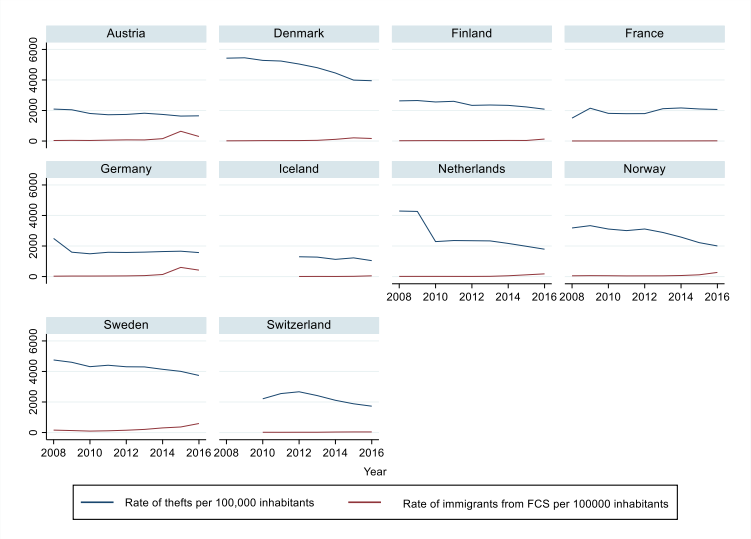

Figure 2.5 Thefts and FCS immigration, trends confrontation

The explanation for the general drop in crimes in Europe can be probably seen as a continuation of the trend started in 1990, documented by Farrell *et al*. (2014), for which the most important factor seemed to be an improved security against property crimes.[41] In relation to FCS immigration, it is possible to notice an increase in immigration from FCS over time. The sharp increase started in 2011 and continued until the end of the period for most of the countries. As pointed out by Minteh (2016), the recent mass migration of refugees has been referred to as the second largest movement of people since the end of the Second World War. As for its causes, they are attributable to the anarchic situations created by armed groups who operate as central authorities under terror regimes (Minteh, 2016). In Belgium, Austria and Germany, FCS immigration dropped sharply in the last year of the reference period namely from 2015 to 2016 and this might be due to tougher immigration policies in these countries, to the closure of the Balkan route and the

[41] A similar drop has been described also by Tonry (2014).

deal between the EU and Turkey in the first half of 2016.[42] The Central-Eastern European countries, namely Czechia and Hungary in the sample of this chapter, present lower values for FCS immigrants compared to the Western European countries. This might be due to the strict immigration policies enacted in those countries following the surge of immigration from fragile countries towards the Central and Eastern European countries (Geddes and Scholten 2016).

As it is possible to notice, trends in crime rates and FCS immigration can vary substantially across countries and potential outliers can be spotted in the graphics. In some cases, outliers can be worrying for researchers (Osborne and Overbay 2004). There are several ways to deal with outliers and the three most commonly used are keeping them as they are thereby treating them as other data points, winsorizing them (i.e., assigning them a different weight or modifying their values) or removing them (Ghosh and Vogt 2012).[43] In the present chapter, the sub-selections of countries, out of the entire dataset, based on similar definitions of crimes (refer to Tables 2.B.7-2.B.10 in Appendix 2.B) already reduce the impact that outliers can have on the empirical estimation. Given the small dimension of the sample, removing them from the sub-selections based on similar definitions of crimes would compromise the generalisation and consistency of the results, while a winsorization would affect the validity of the results, therefore any outlier remaining after the sub-selections have been made will have to be treated as the other data points, thereby accepting a small bias.

2.2.3 Baseline specification

In this subsection, the empirical strategy for investigating the impact of FCS immigration on crime rates is discussed. Given the panel data nature of the dataset, the units are countries and the variables change over time, the choice is whether to

[42] Austria passed the new rule on immigration and international protection in June 2016, detailed information in the European Migration Issues Bulletin (EMI). Available at the following link: https://ec.europa.eu/home-affairs/sites/homeaffairs/files/01_austria_country_factsheet_2016_en.pdf.

[43] For additional explanations about how to detect and deal with outliers see some earlier contributions such as Andrew and Pregibon (1978), Rousseeuw and van Zomeren (1990) and Davies and Gather (1993).

use a random or fixed-effects estimator to estimate the benchmark model. A random-effects estimator can be chosen in the case that one can rule out the assumption that unit-specific effects may be correlated with the explanatory variables. Vice versa, one should use a fixed-effects estimator (Wooldridge 2010). In the case of the present chapter, the country-specific effects cannot be ignored as they might affect the explanatory variables, thus, a fixed-effects estimator is employed.

The main model is estimated using a fixed-effects Ordinary Least Squares (OLS) estimator for exploring the link between crime rates and immigration from FCS. The model is the following in Equation 2.1:

$$Cr_{it} = \beta_0 + \beta_1 FCS_{it} + \beta_2 C_{it} + \delta_i + \gamma_t + \epsilon_{it}, \qquad 2.1$$

where Cr_{it} is the log of crime rate per 100,000 inhabitants for the host country i at time t. FCS_{it} is our variable of interest and it is the log of the rate of immigrants from FCS countries out of the total population per 100,000 inhabitants, while C_{it} is a vector of control variables that poverty rates, immigration not from FCS, the weighted average of population age (where the weights are the number of people by age), the total population, the public expenditure on social protection per capita, GDP per capita, the share of graduates out of total population, the unemployment rate in the receiving country i at time t. The remaining elements of the model are δ_i and γ_t, which are respectively country-fixed effects and time dummies, and ϵ_{it} the residual term. Separate regressions are performed for different types of crimes namely assaults, sexual violence crimes, robberies and thefts.[44]

The main hypotheses, highlighted in the hypotheses subsection 2.1.1, are that immigration from FCS is positively and significantly associated to both violent and property crimes (Couttenier *et al*. 2019; Farrell and Zimmerman 2018). Therefore,

[44] These crimes have been selected based on similar definitions across the different countries in our sample. Further information are provided in the Tables in Appendices 2.A and 2.B. The number of statistical observations changes based on the type of crime that is analysed as well as the control variables included in the various specifications. See Tables 2.C.8-2.C.11 respectively in Appendices 2.C.

a positive and significant coefficient is expected for FCS_{it} due to the violence-breed-violence framework.

The first four of these variables are included in all the specifications for the different types of crimes. Public expenditure on social protection is included in the specifications for assaults, robberies and thefts, but not for sexual violence crimes. GDP per capita is controlled for in the estimations for robberies and thefts, while the graduate rate and the unemployment rate are included only in the specification for robberies. This is done based on referring to the previous literature (e.g., Butcher and Piehl, 1998; Martinez and Lee, 2000; Bianchi *et al*. 2012) and because of data availability. Moreover, the procedure for correcting any endogeneity bias pose some limits on the number of variables that can be included as controls; therefore, it is not possible to have the same exact set of variables (ideally controlling for as many factors as possible as in the specifications for robberies) for all the different types of crimes. This last point is further discussed in the next subsection and in the section related to the empirical results.

The chosen variables used as controls are in line with what is normally done in the literature on immigration and crime. Poverty rates are considered a determinant of crime and their effect has been studied in much of the previous literature finding a positive effect on various types of crime rates (Williams 1984; Mehlum *et al*. 2006a).[45] As the impact of immigration, a specific type of migration, is the focus of the present thesis, it would not be possible to exclude the rest of migratory flows from the empirical estimation. Immigration and crime has been studied and deemed as an important factor in many previous studies (Bianchi *et al*. 2012; Couttenier *et al*. 2019).[46] The sign could be either positive or negative, but the significance should generally be low if any and present mostly for property crimes. Age also matters as a factor influencing crime. In fact, previous studies have determined the existence of an age-crime curve for which crime increases with age in the early years of life reaching a peak in teenage years and declines afterwards (Farrington 1986). A negative impact of the variable used in this chapter is expected, considering especially the prevalence of elder population in the countries included

[45] See also Traxler and Burhop (2010), Hooghe *et al*. (2011) and Paré and Felson (2014).
[46] See also Bell *et al*. (2013) and Alonso-Borrego *et al*. (2012).

in the sample. Population size is also relevant in affecting crime rates and for this reason total population is included as a control variable. Following the evidence and predictions of previous studies, a positive relationship between the two variables is expected (i.e., a positive coefficient).[47] Public expenditure on social protection has been deemed as relevant in affecting crime by several previous studies (Foley 2011; Rudolph and Starke 2020).[48] The expected sign is negative as an increase in expenditure for social protection should reduce the incentive to commit a crime. GDP per capita accounts for economic growth that is expected to have a negative effect on crime (i.e., a reduction of crime following an increase in economic growth). Thus, GDP per capita should show a negative coefficient following the evidence of the previous literature (Fajnzylber *et al*. 2002; Miguel 2005).[49] The share of graduates is also included as a control variable and a negative coefficient is expected given the findings of the previous literature (Buonanno and Leonida 2006; Groot and van den Brink 2010; Lochner 2020).[50] The unemployment rate effect on crime has been studied extensively in the previous literature and a positive estimate is expected in the empirical results for robberies (Cook and Zarkin 1985; Carmichael and Ward 2001; Ajimotokin *et al*. 2015).[51]

Endogeneity issues are expected to originate from the variable of interest. There are at least two good reasons to assume their presence for immigration from FCS. Firstly, immigrants can choose the country where they migrate, especially in the case of regular migration (i.e., not refugees or asylum seekers) and their decision might be affected by the degree of safety in the host country, thus, the crime rates. This may lead to reverse causality bias. Secondly, there could be unobserved factors in the labour market that could affect the level of immigration and this could lead to an omitted variable bias (Bianchi *et al*. 2012; Bratti and Conti 2018). These two factors would lead to bias in the estimates of the variable of interest, therefore, an Instrumental Variables (IV) procedure is used to address this issue and is explained in the next subsection.

[47] See Nolan (2004), Braithwaite (1975) and Rotolo and Tittle (2006).
[48] See also Hannon and Defronzo (1998) and Rogers and Pridemore (2013).
[49] See Klaer and Northrup (2014) and Islam (2014) for a study on developing countries.
[50] See also Hjalmarsson and Lochner (2012), Lochner and Moretti (2004) and Steurer and Smith (2003).
[51] See also Khan *et al*. (2015), Cantor and Land (1985; 2001) and Tang (2009; 2011).

2.2.4 The IV procedure

In order to deal with the endogeneity issues related to the main variable of interest and introduced in previous paragraphs, an IV procedure is used and a model for correcting the endogeneity has been estimated through a Two-Stage Least Squares (2SLS) estimator.

Two excluded instruments, novel compared to the previous literature, have been chosen: the governance indicators referring respectively to the degree of political stability and the rule of law in the origin countries of the migrants. These indicators are taken from the work of Kaufmann *et al.* (2010) and are available in the Worldwide Governance Indicator (WGI) database on the website of the World Bank. The indicator of the degree of political stability speaks to "the perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional means", while the one about the rule of law concerns "the extent to which agents have confidence and abide by the rules of the society" (Kaufmann *et al.*, 2010).

As mentioned above, these indicators have not been used in the previous literature as instruments for immigration flows. Most previous studies, in fact, used demand-pull instruments that reflect the characteristics of the host countries. In this perspective, many authors have used pseudo-gravity models for immigration in their first-stage regressions of their IV procedure. Variables normally used as excluded instruments in these models are measures of geographical distance, cultural-linguistic distance, host country GDP per capita (Gebremedhin and Mavisakalyan 2013; Alesina *et al*. 2016). In the literature about the link between immigration and crime, the common practice is to use another pull factor which is the share of immigrants in previous periods or the year differentials in these shares over time, the so-called shift-share indicators (Bianchi *et al*. 2012; Alonso-Borrego *et al*. 2012; Bell *et al*. 2013). The use of these indicators led to small and not highly significant effect of immigration on property crimes and no significant effects on other types of crimes. In this thesis, the instruments refer more specifically to the origin countries of the immigrants and can be considered as push factors causing

emigration, rather than attracting immigration. The instruments reflect the governance situation in the origin countries of the migrants, and these factors have been found to be relevant in many previous studies (Dutta and Roy 2011; Cooray and Schneider 2016; Auer *et al*. 2020).[52] The results obtained by using these instruments are expected to be different from those of the previous literature considering that the focus of this chapter is on a specific type of immigration.

The governance indicators for each specific country are available in two forms: estimates or percentile ranks. Both originate from re-elaborations of the information the authors obtained about the governance indicators from various different sources including surveys, multilateral agencies assessments and non-governmental organisations' (NGOs) ratings. These sources provide a numerical value for the different governance dimensions namely corruption control, regulatory quality, political stability, rule of law and voice and accountability. The numerical values have been aggregated together and rescaled to run from 0 to 1 with higher values indicating better outcomes (Kaufmann *et al*. 2010). From a linear function, the authors worked out the estimates that are aggregated measure of governance specific to each county and range -2.5 to 2.5 (the higher the estimate the better the governance) and percentile ranks ranging from 0 to 100 (the same applies here: the higher the better). Countries with aggregated numerical values close to 1 will get estimates close or equal to 2.5 and a percentile rank of 100. Vice versa, if the aggregate measure is close to zero, the estimate will be -2.5 and the percentile rank close to 0.[53] In this paper, the governance indicators that have been extracted and used to build the instruments are in the form of percentile indicators as they are easy to be linearised and interpreted when taking logarithms of their values (otherwise all negative estimates will disappear once the log is calculated).

Built from these data, the weighted averages of the percentile ranks of each FCS country have been for both of the indicators; the weights are the inflow of immigrants from each of the FCS country. In total, there are two instruments, one for political stability and one for rule of law and they are calculated in the same

[52] See also Okey (2016) for the relationship between corruption and emigration of physicians from Africa.

[53] For more methodological and mathematical details of the estimation process of the governance indicators, see the work of Kaufmann *et al*. (2010).

way. The mathematical definition of the instruments is the following in Equation 2.2:

$$GI_{it} = \frac{\sum_{j=1}^{m}(FCS_{ijt} * GI_{jt})}{\sum_{j=1}^{m} FCS_{ijt}} \qquad 2.2$$

where GI_{it} stands for governance indicator and is the weighted average for host country i at time t. The use of a weighted average allows the indicator, which refers to the origin countries of the immigrants j, to vary both through time t and host country i. FCS_{ijt} is the inflow of immigrants from FCS country j to host country i at time t, while GI_{jt} is the percentage rank of the governance indicator (political stability or rule of law) for origin FCS country j at time t.

The expectation is for the instruments to be negatively correlated to the inflow of immigrants from FCS countries to receiving European countries. The rationale is the better the governance and political situation in the home countries of the migrants, the lower the outflow of migrants from those countries will be. For the sake of a sound IV procedure, the instruments satisfy the conditions that are required for excluded instrumental variables, that is, to be exogenous with respect to our dependent variable, the crime rates in the host countries, and highly correlated to the variable that is instrumented.[54]

The first-stage regression is, thus, expressed through the following model of Equation 2.3:

$$FCS_{it} = \beta_0 + \beta_1 GI_{it} + \beta_2 C_{it} + \delta_i + \gamma_t + \epsilon_{it} \qquad 2.3$$

where FCS_{it} is the inflow of immigrants from FCS in host country i at time t, and GI_{it} is the 1x2 vector of governance indicators namely political stability and rule of law, measured as described above. The vector of control variables is C_{it} and δ_i, γ_t and ϵ_{it} are respectively country fixed-effects, year dummies and the residual term.

[54] The results of the first stage regression, presented in the next section, show that the instruments meet all the requirements from the methodological side.

The effect of the variable of interest, corrected for the endogeneity issue, is estimated by the second-stage regression. The model is the following:

$$Cr_{it} = \beta_0 + \beta_1 \widehat{FCS}_{it} + \beta_2 C_{it} + \delta_i + \gamma_t + \epsilon_{it} \qquad 2.4$$

where the inflow of foreign citizens from FCS, which is $\widehat{FCS}_{it}$ in the above Equation 2.4, is now instrumented through the governance indicators. The remaining variables are the same as in the baseline fixed-effects model.

2.3 Empirical results

In this section of the analysis, we present the results of the empirical analysis, the OLS and IV approaches. As mentioned above, due to the different legislations between the countries included in our sample, 4 types of crimes have been chosen for which the definition is the same. These crimes are: Assault, Sexual Violence, Robberies and Theft.

The following Table 2.1 presents the results OLS estimation for crime rates and FCS immigration. The coefficients for FCS immigration are negative and significant for sexual violence and robbery crimes. However, the significance is low for the coefficient on sexual violence crimes, while it is high (5 percent level) for robberies. They are positive and negative respectively for assault and theft crimes, but not statistically significant. Specifically, a 10 percent increase in FCS immigration is associated to a 0.6 percent decrease in robberies. The results seem in line to those of Bianchi *et al*. (2012) that found statistically insignificant results of immigration on different types of crimes in Italy and partially to Lee and Martinez (2009) that documented a negative link between immigration and crime in the US, thus supporting evidence for an "immigration revitalisation perspective". These results indicate a generally not significant effect of the variables of interest on most of crime rates considered in this Chapter and a negative link with robberies. The OLS estimates are believed to suffer endogeneity bias, thus, the IV procedure is expected to provide more reliable results.

Table 2.1 OLS country fixed-effects regression for FCS immigrants and crime rates

	Assault	Sexual Violence	Robbery	Theft
FCS immigration	-0.138	-0.100	-0.057**	0.022
	(0.136)	(0.059)	(0.024)	(0.025)
Poverty rate	-1.921	0.505	1.155***	-0.525
	(1.096)	(1.240)	(0.253)	(0.382)
No FCS rate	0.084	0.005	0.289**	0.105
	(0.235)	(0.360)	(0.113)	(0.131)
Weighted av. Pop.	-10.59**	8.916	-19.08***	-17.06***
	(4.225)	(8.373)	(2.792)	(2.400)
Total population	4.527	2.777	-0.270	-0.381
	(2.805)	(6.160)	(1.427)	(1.591)
Public exp. on soc. prot.	-0.661	-0.912	1.281**	-0.210
	(1.370)	(1.334)	(0.479)	(0.199)
GDP per capita			1.453***	0.409
			(0.329)	(0.323)
Graduate rate			0.055	
			(0.105)	
Unemployment rate			-1.259*	
			(0.696)	
R-squared	0.326	0.077	0.656	0.594
Year dummies	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	78	80	102	84

The Table above presents the results of the OLS fixed-effects model for crime rates and FCS immigration.
The R-squared seems quite low especially in the case of sexual violence crimes and this may indicate that the model does not fit the data as good as other types of crimes.
All the equations include country fixed-effects and year dummies.
Cluster-robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For the control variables included in the estimation, the OLS results show that for sexual violence crimes none of the control variables used is significant. For assaults, robberies and thefts, it is possible to notice that the coefficients for the weighted average of population age are negative and significant. This is in line with the evidence and theory about the relationship between age and crime. Following the age-crime curve theorised by Farrington (1986) crime will peak in teenage age and decline as the person gets older. Considering that the population in most of the European countries is relatively old, the weighted average of population age would reflect this characteristic and be negatively associated with crime. This is also in line with the evidence provided by McCall *et al*. (2013). For robberies, as expected,

the coefficient on poverty rates is positive and significant. This is in line with most of the literature who found a positive and significant effect of poverty rates on crime rates (Hooghe *et al*. 2011; Dong *et al*. 2020). Immigration not from FCS also exhibits a positive and significant coefficient on robberies. This seems to support the evidence that new immigration has a positive impact on property crimes (Zhang 2014; Andersen and Ha 2020), but it is against other studies who found no evidence or a negative link between immigration and crime rates (Stansfield *et al*. 2013; Adelman *et al*. 2017). Public expenditure on social protection shows a positive and significant coefficient on robberies in line with the findings by Foley (2011). However, this result seems contrary to the evidence in many other studies (Hannon and Defronzo 1998; Fishback *et al*. 2010). GDP per capita is negatively and significantly associated with robberies. This seems to confirm the findings of most of the previous studies (Fajnzylber *et al*. 2002; Miguel 2005; Klaer and Northrup 2014). The share of graduates has a positive and significant coefficient on robberies. This seem quite odd and in contrast with most of the previous literature (Buonanno and Leonida 2006; Groot and van den Brink 2010; Lochner 2020). This might be due to some collinearity between the independent variables used in the estimation. Further specification tests might be able to show the inconsistency of this odd result. The next paragraphs are dedicated to the IV estimation through 2SLS. First, the results of the first stage regression are presented and discussed, then the same is done for the second stage results.

The following Table 2.2 presents the results of the first-stage regressions. As expected, the indexes of political stability and rule of law are negatively correlated to the rate of immigration from FCS; that is, the better the situation in the sending countries of the migrants, in terms of political stability, absence of violence or terrorism and law enforcement (i.e., a higher value of the indicator), the lower the incentive for the migrant to leave their home country should be. This evidence is in line with most of the literature about political stability in the home countries and emigration rates (Auer *et al*. 2020; Cooray and Schneider 2016; Okey 2016; Dutta and Roy 2011).[55]

[55] See also Poprawe (2015) and Rowlands (1999) respectively for corruption and quality of public administration links with emigration.

Table 2.2 First stage regressions for FCS immigration and governance indicators

FCS immigration[56]	(Assaults)	(Sexual Violence)	(Robbery)	(Theft)
Political Stability	**-0.577*** **	**-0.822*** **	**-0.264*** **	**-0.406*** **
	(0.125)	**(0.095)**	**(0.087)**	**(0.134)**
Rule of Law	**-0.431** **	**-0.564*** **	**-0.901*** **	**-0.344** **
	(0.199)	**(0.116)**	**(0.165)**	**(0.159)**
Poverty rate	0.551	0.108	1.049	2.018
	(0.534)	(0.684)	(0.759)	(1.220)
No FCS rate	1.240***	0.544	0.925***	1.111
	(0.103)	(0.405)	(0.306)	(0.714)
Weighted av. Pop.	7.928	3.829	17.11**	29.13
	(8.542)	(4.329)	(7.750)	(18.23)
Total population	3.135	-0.627	4.398*	5.459
	(4.000)	(6.208)	(2.574)	(6.333)
Public exp. on soc. prot.	-0.220	2.117	-0.627	1.002
	(0.876)	(1.469)	(0.972)	(0.870)
GDP per capita			4.372	-1.078
			(1.694)	(1.431)
Graduate rate			-1.234	
			(0.272)	
Unemployment rate			4.372**	
			(1.694)	
Kleibergen-Paap F-stat	11.91	89.74	22.83	11.51
Kleibergen-Paap LM stat	5.45*	6.11**	7.80**	6.58**
Cragg-Donald Wald F stat	30.54	67.09	38.44	14.67
Country fixed-effects	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Observations	78	80	102	84

The first stage regression shows negative and significant coefficients of the excluded instruments in rule of law and political stability (in bold). This confirms the expectations about the link between the excluded instruments and the variable of interest.
The number of observations is different for each type of crime because the countries included are different based on similar definitions of crime (see Tables 2.B.7-2.B.10 in Appendix 2.B).
The Kleibergen-Paap F test on the excluded instruments is higher than 10 as righteously predicted by Staiger and Stock (1997).
The Kleibergen-Paap LM test shows that in 3 out of 4 cases, the null hypotheses that the equation is unidentified or underidentified can be ruled out (columns 3-5). For assaults crime (column 2) this hypothesis cannot be ruled out at 95 percent level meaning that there is some probability that the equation is unidentified and results should be interpreted carefully.
The Cragg-Donald F-test is higher than the critical values provided by Stock and Yogo (2005) in 3 out of 4 models signalling that the equation is not weakly identified. However, for theft crimes the evidence show that the equation may be weakly identified.
All the equations include country fixed-effects and year dummies.
Cluster-robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[56] In brackets, there are the dependent variables of the reduced form.

There are 4 different first stage regressions due to the different samples and numbers of observations for each type of crime. The coefficients of the excluded instruments are negative and highly significant (at least at 5 percent level) and are sizeable. At least, a 10 percent increase in the governance indicator on political stability in FCS is linked to a 2-3 percent decrease in immigration from FCS. For the rule of law indicator, the smallest coefficient shows that following a 10 percent increase in rule of law, immigration from FCS is likely to reduce by 3-4 percent. The Kleibergen-Paap F-stat on the excluded instruments is higher than 10 for all the specifications, meaning that the equation is not weakly identified following the rule of thumb by Staiger and Stock (1997).[57] The Kleigerben-Paap LM statistics for unidentification or underidentification cannot reject the null hypothesis at 95 percent level only in the case of assaults, while it is significant at 5 percent level of p-value for all the other types of crimes thereby providing evidence that the equation is identified (Baum *et al*. 2007).[58] The Cragg-Donald Wald F stat is above the critical values formulated by Stock and Yogo (2005) in all the specifications except for thefts. Thus, most of the models are not weakly identified. However, given the presence of autocorrelation and clustering as in the case of this chapter, the most reliable measure is the Kleibergen-Paap F stat mentioned above.

Table 2.3 displays the results of the second stage regressions for the different types of crimes. The results of the reduced form of the IV estimation confirm the consistency of those presented in the OLS regression; the coefficient on robberies is negative and significant at 1 percent level. Specifically, an increase by 10 percent in the immigration from FCS is associated with a reduction in robberies by 0.8-0.9 percent. The Anderson-Rubin Wald test is not significant in many specifications (Anderson and Rubin 1949). It presents a value equal to 3.8 and is significant only at 10 percent level for robberies only. This means that although the equation is not underidentified (Kleibergen and Paap 2006) and identification is not weak (Stock and Yogo 2005), the inference is not robust and it is not possible to reject the null hypothesis that the coefficient of the main variable of interest is not statistically

[57] The first stage also respect the conditions posed by Stock and Yogo (2005) in their critical values and is also consistent with Bound *et al*. (1995).
[58] See Kleibergen and Paap (2006).

different from 0 (Baum *et al*. 2007). Therefore, the conclusions must be drawn carefully in relation to the link between the variable of interest and the crime rates. All the models are overidentified as the Hansen J statistics about overidentification is substantially small (Baum *et al*. 2007).

Table 2.3 Second stage results for the different types of crimes

	Assaults	Sexual Violence	Robberies	Theft
FCS immigration	-0.023	-0.119	-0.086***	0.004
	(0.135)	(0.077)	(0.027)	(0.038)
Poverty rate	-1.936**	0.549	1.179***	-0.475
	(0.948)	(1.046)	(0.227)	(0.394)
No FCS rate	-0.110	0.042	0.330***	0.143
	(0.280)	(0.350)	(0.091)	(0.135)
Weighted av. Pop.	-15.59***	9.689	-17.80***	-15.98***
	(4.100)	(7.139)	(2.778)	(3.026)
Total population	2.267	3.312	0.343	-0.062
	(3.820)	(5.774)	(1.291)	(1.367)
Public exp. on soc.	-0.534	-0.957	1.251***	-0.217
prot.	(1.234)	(1.176)	(0.410)	(0.173)
GDP per capita			-1.587***	0.380
			(0.443)	(0.296)
Graduates share			0.221***	
			(0.076)	
Unemployment rate			-0.046	
			(0.130)-	
R-squared	0.315	0.076	0.741	0.593
Anderson-Rubin Wald	0.07	1.43	3.67*	0.01
F-test				
Hansen J overid. test	0.161	0.859	0.046	0.012
Year dummies	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	78	80	102	84

The Table above displays the results of the second-stage regressions for the 4 different types of crimes. The coefficient of FCS immigration is significant only in the case of robberies. Namely, an increase by 10 percent in FCS immigration is associated with lower robberies by 0.8-0.9 percent.
The Anderson-Rubin test is only significant in the case of robberies but the significance level is low, denoting that it is not possible to stably rule out the hypothesis that the estimate of FCS immigration is not statistically different from 0.
The Hansen J statistics is not significant meaning that the null hypothesis that the equation is overidentified can be accepted.
All the equations include country fixed-effects and year dummies.
Cluster-robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Although the focus is slightly different, the results seem to oppose to those obtained by Couttenier *et al*. (2019) for which immigration from fragile countries (in their case the focus was on asylum seekers at cohort-level) increase violent crimes in the host countries. Specifically, Couttenier *et al*. (2019) found that the cohort of individuals exposed to violence in their home countries during childhood was 40 percent more prone to commit violence than the average cohort.

For the control variables in the IV estimation, it is possible to notice that the coefficient of the weighted average of population age is negative and significant in

all specifications except the one on sexual violence crimes where it is positive, but not significant. This is in conformity with the OLS results and is in line with most of the literature regarding the link between age and crime (Farrington 1986; McCall *et al*. 2013). In contrast with many previous studies, and partially in line only with Paré and Felson (2014), the coefficients of poverty rates on assaults is negative and significant suggesting that poverty does not increase violent crimes perhaps provoking a shift from violent to property crimes as the latter are more incentivised in a situation of economic deprivation. On the other hand, poverty rates are positively and significantly linked to robberies in line with most of the studies presenting a positive effect of poverty on crime (Hooghe *et al*. 2011; Dong *et al*. 2020). The IV findings also confirm the OLS results about public expenditure on social protection and crime. As in Foley (2011), the results of this chapter show a positive and significant coefficient of social expenditure on robberies. However, this is contrary to the findings of many other studies (Fishback *et al*. 2010; Rogers and Pridemore 2012).[59] GDP per capita has a negative and significant impact on robberies and this is in line with many previous studies (Fajnzylber *et al*. 2002; Miguel 2005; Klaer and Northrup 2014). The share of graduates remain positive and significant as in the OLS specification for robberies. This is quite in contrast with most of the previous evidence (Buonanno and Leonida 2006; Groot and van den Brink 2010; Lochner 2020). Further robustness checks conducted in the next subsection might provide different outcomes.

The findings of this chapter show that there is no significant link between immigration from fragile countries and violent crimes and thefts; moreover, they provide evidence of a statistically negative impact on robberies. These results do not confirm the hypotheses made in subsection 2.1.1 that FCS immigration would have been positively and significantly associated to violent and property crimes (Couttenier *et al*. 2019; Farrell and Zimmerman 2018). An explanation for the actual results to differ from the expected ones lays partially on the finding by Bell *et al*. (2013) that showed that, when controlling for socio-economic background, immigration from fragile countries (in their case measured by the number of asylum seekers) did not have a significant impact on violent crimes. On the other hand, the

[59] See also Hannon and Defronzo (1998).

authors found that asylum seekers are more likely than other groups of immigrants to commit property crimes, while in the present studies it is rather the contrary as FCS immigration is negatively associated with property crimes. The explanation for the negative results of FCS immigration on property crimes seem to be in line with what predicted by Sampson (2008) for which immigrants, being under the spotlight in the host countries, are more likely to behave correctly in order to avoid issues with the criminal justice, given their fragile position for which they could be sent back to their origin countries.

2.3.1 Robustness checks

The IV results presented in the previous paragraphs showed a negative link between FCS immigration and robberies at country-level. In this subsection, the results are verified through some robustness checks.

Although the IV procedure aims at correcting the endogeneity of the main variable of interest, there could be other omitted factors that affect crime rates. For instance, the main estimations did not control for two factors that are likely to influence crime rates, and these are the log of the per capita public expenditure on public order and police services, and the log of the average annual net earnings.[60] The importance of controlling for the impact of police expenditure on crime rates has been deemed as important by many previous studies (Swimmer 1974; Lin 2009);[61] similarly earnings have been found to have an impact on crime rates in the literature (Mocan and Unel 2011; Narayan and Smith 2004). The results of the robustness checks controlling for these two factors are shown in columns 2-4 of Table 2.4. Column 3 of Table 2.4, other than including the police expenditure per capita and the average annual earnings as additional controls, also includes the so-called "resistance factors", that are the interactions between macro areas fixed-effects, namely Central-Eastern and Western Europe, and year dummies. It is important to control for these interactions because crimes may happen in a specific area and year due to

[60] See Table 2.C.7 in Appendix 2.C for a description of the two variables added in the robustness checks of this chapter.

[61] See also Bove and Gavrilova (2017) for the effect of police militarisation on crime rates in the US.

the joint effect of place and time. Column 4 includes the same set of regressors as Column 3, but they are all lagged by one year. This is because the impact of the included regressors on crime rates might happen with a delay, and this is especially true for the variable of interest as argued by Spenkuch (2014) who stated that migration may affect crime with some lag.

Due to the small dimension of the sample, the inclusion of further control variables causes the number of clusters to be lower than the total number of instruments (exogenous variables + excluded instruments) and this is a problem in terms of the estimation of coefficients and standard errors as the covariance matrix is not full rank (Baum *et al*. 2007). In order to overcome this issue, the additional controls have been "partialled out" as suggested by Baum *et al*. (2007). Partialling out the variables allows to obtain the same coefficients for the other variables that would be obtained were the variables not partialled out (Baum *et al*. 2007). However, this comes at a cost of not getting the estimates and standard errors for the partialled out variables. In the case of this chapter, the partialled out variables are the log of police expenditure, average annual net earnings and the interaction terms between macro-areas fixed-effects and year dummies.

Table 2.4 presents the results of the robustness checks. Column 1 shows the main estimation presented in previous Table 2.3. Columns 2-4 constitute the actual robustness checks. The addition of the two further control variables, police expenditure and net earnings, as well as the interaction terms, does not alter the significance of results obtained in the main IV estimation (columns 2 and 3 of Table 2.4). When using the one year-lag of the independent variables, the variable of interest is not any more significant, showing that the results found in the main OLS and IV estimations are not robust to the various tests carried out in this chapter. The Anderson-Rubin Wald F test also shows that the inference is not robust and it is not possible to rule out the hypothesis that the coefficient on the variable of interest is not statistically different from 0 (Anderson and Rubin 1949).

Although in most of the specifications the coefficient remains negative and significant (except only for column 4 of Table 2.4), thus supporting the statement and evidence provided by Sampson (2008) and Lee and Martinez (2009), it is not possible to confirm the robustness of the results under all the specifications

presented in this chapter. The Anderson-Rubin test is very different in magnitude and significance across all the specifications displayed by Table 2.4 showing an unstable estimation and that is not possible to have a robust inference. The Hausman J overidentification test is sufficiently small to guarantee that the equation is overidentified.

The results present evidence contrary to the hypotheses H1 and H2 formulated in subsection 2.1.1 for which it was expected to see a positive and significant coefficient of FCS immigration on violent and property crimes. Part of the reasons why the results of this chapter differ from the hypotheses verified by previous studies, is that the data considered are different between the studies. For instance, Couttenier *et al*. (2019) used data at cohort level for asylum seekers while the analysis of this chapter is carried out at country level and using data on immigration (i.e., not asylum seekers) from fragile countries. Compared to Farrell and Zimmermann (2018), the analysis is also carried out at a different level. The authors took into account an individual-level dataset for students controlling for a range of characteristics and also school-level predictors.

Table 2.4 Robustness checks for robberies

	IV (1)	IV (2)	IV (3)	IV (4)
FCS immigration	-0.086***	-0.080***	-0.097***	-0.055
	(0.027)	(0.030)	(0.035)	(0.039)
Poverty rate	1.179***	1.013***	1.060***	0.912***
	(0.227)	(0.286)	(0.240)	(0.316)
No FCS rate	0.330***	0.277***	0.190	-0.051
	(0.091)	(0.105)	(0.121)	(0.086)
Weighted av. Pop.	-17.80***	-17.69***	-13.42***	-12.04***
	(2.778)	(3.883)	(4.691)	(3.057)
Total population	0.343	-0.818	0.481	-1.810
	(1.291)	(1.452)	(1.247)	(1.440)
Public exp. on soc. prot.	1.251***	1.612***	1.528***	1.757***
	(0.410)	(0.203)	(0.202)	(0.279)
GDP per capita	-1.587***	0.427	0.195	0.120
	(0.443)	(0.831)	(0.773)	(0.688)
Graduates share	0.221***	0.151**	0.189**	0.097*
	(0.076)	(0.071)	(0.074)	(0.059)
Unemployment rate	-0.046	0.103	0.001	-0.237
	(0.130)	(0.125)	(0.087)	(0.149)
Police expenditure per capita	No	Yes	Yes	Yes
Net earnings	No	Yes	Yes	Yes
Interactions country FE*year dummies	No	No	Yes	Yes
Lag of all the independent variables	No	No	No	Yes
R-squared	0.741	0.491	0.365	0.458
Anderson-Rubin Wald F-test	3.67*	2.70	3.18*	1.24
Hansen J overid. test	0.046	0.191	0.521	0.767
Year dummies	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	102	99	99	90

The Table above displays the results of the robustness checks for robberies.
The Anderson-Rubin test is only significant in the case of robberies but the significance level is low, denoting that it is not possible to stably rule out the hypothesis that the estimate of FCS immigration is not statistically different from 0.
The Hansen J statistics is not significant meaning that the null hypothesis that the equation is overidentified can be accepted.
All the equations include country fixed-effects and year dummies.
Cluster-robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

On the other hand, the results achieved in this paper are in line with most of the empirical literature on immigration and crime that found little or no support for the theories predicting a positive impact of immigration on crime (Chalfin 2014; Reid *et al*. 2005). If anything, the results show a negative link between FCS immigration and crime, consistently with the immigration revitalisation perspective (Lee and

Martinez 2009). [62] The immigration revitalisation perspective states that immigration may have positive impact in terms of job creation and reduction of crime rates because of the employment opportunities that are created in enclave economies where there is a relatively higher concentration of immigrants (Lee and Martinez 2002). Partially, the results of this chapter are in line with the evidence provided by Bianchi *et al*. (2012) and Bell *et al*. (2013) that found a non-significant effect of immigration on crime, although they also found a small positive and significant impact on property crime. If anything, the results presented here show a negative link between FCS immigration and robberies although this does not hold under all the specifications. In general, the evidence of this chapter is contrary to the hypotheses H1 and H2 stated in subsection 2.1.1 for violent and property crimes and to all the theories that predict a positive impact of immigration on crime summarised by Wortley (2009).

Surely, the results of this chapter contrast those presented by Couttenier *et al*. (2019) that found a positive, sizeable and highly significant impact of asylum seekers on violent crimes. However, the comparison between the present analysis and other studies should be made carefully because of the different level at which the empirical estimation is made in this chapter compared to previous studies. Perhaps, using data on asylum seekers would be very helpful in facilitating the comparison between the two studies and it could constitute a way of improving the analysis presented in this chapter.

2.4 Concluding remarks

This study presents the effect of FCS immigration on crime rates as a country-level comparison. In order to have consistent definition across different criminal laws, 4 types of crimes are considered: assaults, sexual violence acts, robberies and thefts. The OLS fixed-effects estimations show a negative and highly significant impact of our variable of interest on the rate of robberies per 100,000 inhabitants. Namely,

[62] The results of this chapter also show some similarities with the ones obtained by Light and Miller (2018).

an increase by 10 percent in FCS immigration was shown to be linked with a decrease by 0.5-0.6 percent in robberies.

The results were believed to suffer an endogeneity bias due to multiple causes. Firstly, FCS immigrants may choose the country where to migrate based on its safety; thus, higher crime rates might provide disincentive to relocate in a certain country; this bias is called reverse causality. Secondly, there might be other factors included in the error term that might affect the link between FCS immigration and crime rates and this issue is referred as omitted variable bias. Finally, official statistics does not usually count informal or illegal migration flows and this bias derives from the so-called measurement error in the independent variable. Given these causes of bias, an IV procedure has been used through a 2SLS estimator to correct the endogeneity related to the variable of interest.

Two excluded instruments have been used that refer to the governance situation in the origin countries of the FCS immigrants. An increase in these governance indicators namely denoting the level of political stability and rule of law, is expected to decrease FCS immigration to the European countries in the sample of this chapter. These expectations are confirmed by the first-stage regression in Table 2.2 that shows a negative and highly significant impact of the excluded instruments on the variable of interest.

The second-stage results in Table 2.3 show a consistency with respect to the OLS estimation as the coefficient on FCS immigration remains negative and significant on robberies crimes while there is no significant association with the other 3 types of crimes, assaults, sexual violence crimes and thefts. These results seemed in line with many studies finding little or no significance of immigration on most crime rates (Bianchi *et al*. 2012; Ousey and Kubrin 2018). Partially they are also in line with the evidence documented by Lee and Martinez (2009) on the "immigration revitalisation perspective" meaning that immigration creates opportunities in enclave economies and thereby reduces crime and social disorganisation.[63]

Given that there might be other relevant factors affecting the rate of robberies, some robustness checks have been carried out where two variables have been included in

[63] See also a previous literature review of the evidence of immigration on crime by Martinez and Lee (2000).

the estimation due to their relevance in affecting the level of crimes namely the public expenditure on police forces per capita and the annual average net earnings. They are expected to be negatively linked to crime. In addition, the robustness checks have controlled for the so called "resistance factors", namely the interaction terms between macro areas fixed-effects and year dummies, and for the lags of the independent variables. The results of these checks show the inconsistency of the results of the OLS and IV estimations. Although most of the specifications (see the various columns in Table 2.4) show that the negative coefficient of FCS immigration on robberies remain highly significant, it is possible to see that the model with the lags of the independent variables shows a not significant coefficient. Moreover, the Anderson-Rubin test is often significant only at 10 percent level and this shows that the inference is not robust and the null hypothesis that the coefficient on the main variable of interest is not statistically different from 0 cannot be ruled out in these estimations.

Overall, the results of this chapter support the case for little or no evidence of immigration on crime rates (Bianchi *et al*. 2012; Ousey and Kubrin 2018). There is no strong evidence supporting the immigration revitalisation perspective, that is, a negative and significant association between immigration and crime (Lee and Martinez 2009; Martinez *et al*. 2010). Given that this chapter takes into account immigration from FCS that is more likely to increase violent crimes given the experienced violence by the FCS immigrants in their origin countries, the initial hypothesis, stated in sub-section 2.2.2, was to find a positive effect of this type of immigration on violent crimes following the theory violence-breeds-violence by Rohner *et al*. (2013a) and the evidence provided by Couttenier *et al*. (2019) and Farrell and Zimmerman (2018). The findings show rather a contrary case; immigration from fragile countries is at most non-significantly associated with crime rates and, in some specifications, it is negatively and significantly linked to robberies. These findings provide some new insights on immigration from fragile countries and crime rates in the destination countries. However, the results should be compared carefully with those obtained in previous studies given the different levels at which the analyses are run (i.e., this chapter explores the link at country

level while other studies analyse it at a more micro level such as cohort or regional level).

In terms of the policy implications of the present chapter, the results do not support the need for a tough immigration policy in order to reduce crimes. If anything, immigration may have a negative effect on some time of crime in support of the immigration revitalisation perspective (Lee and Martinez 2009) and given that immigration can be expected to promote family unit thereby reducing crime rates (2008). However, the negative results are not significant throughout all the sensitivity checks, therefore this chapter does not provide evidence that more immigration might mean lower crime rates.

Further research could consider the same impact at a more micro level, city or regional level in different European countries, in order to make direct comparison with the findings obtained in the US (see, for example, Martinez *et al*. 2010). Moreover, the analysis could be extended by using asylum seekers data instead of the inflow of foreign citizens to see whether the same results hold and could also investigate the impact of immigration also on other crime-related variables such as the rate of prisoners per 100,000 inhabitants.

Appendix 2.A List of the crimes and of countries included in the analysis

Table 2.A.5 List of included crimes and their formal (legal) definition from Eurostat

Type of crime	Definition from Eurostat Metadata (Eurostat, 2020)
Assault	Physical attack against the body of another person resulting in serious bodily injury, wounding, aggravated assault, inflicting bodily harm under aggravating circumstances, battery, acid attacks, female genital mutilation, poisoning, assault with a weapon, forced sterilization, taking human blood, organs or tissues by use of violence. It excludes 'Assault' leading to death, indecent/sexual assault, threats, torture and slapping/punching.
Sexual violence	Unwanted sexual act, attempt to obtain a sexual act, or contact or communication with unwanted sexual attention without valid consent or with consent as a result of intimidation, force, fraud, coercion, threat, deception, use of drugs or alcohol, or abuse of power or of a position of vulnerability. It should exclude acts of abuse of a position of vulnerability, power or trust, or use of force or threat of force, for profiting monetarily, socially or politically from the prostitution or sexual acts of a person, coercion, prostitution offences, pornography offences and other acts against public order sexual standards such as incest not amounting to rape and exhibitionism, assaults and threats, slavery and exploitation not amounting to injurious acts of a sexual nature, trafficking in human beings for sexual exploitation, harassment and stalking.
Robbery	Theft of property from a person, overcoming resistance by force or threat of force. Where possible, it should include muggings (bag-snatching) and theft with violence but should exclude pick pocketing and extortion.
Theft	Unlawfully taking or obtaining of property with the intent to permanently withhold it from a person or organization without consent and without the use of force, threat of force or violence, coercion or deception. It excludes possession of stolen goods or money; receiving, handling, disposing, selling or trafficking stolen goods; using stolen parts for producing other goods; concealment of stolen goods, obtaining money or other benefit or evading a liability through deceit or dishonest conduct, robbery, property damage , theft after unauthorized access to premises, theft of intellectual property, identity theft. It excludes also burglary, housebreaking and robbery, which are recorded separately.

Table 2.A.6 List of the host and origin countries included in the sample

Host countries	Origin countries (FCS)
Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Hungary, Iceland, Italy, Luxembourg, Netherlands, Norway, Spain, Sweden, Switzerland	Afghanistan, Georgia, Iraq, Lebanon, Libya, Nigeria, Syria, Yemen

Appendix 2.B Tables of consistency of the crime definition among the different countries

Table 2.B.7 Table of consistency for 'Assault' crime

Country	Serious assault leading to death	Injurious acts of sexual nature	Serious threat	Minor assault
Austria	Excluded	Excluded	Excluded	Excluded
Belgium	Included	Excluded	Excluded	Excluded
Czechia	Excluded	Excluded	Excluded	Excluded
Denmark	Excluded	Included	Included	Excluded
Estonia	Included	Excluded	Excluded	Excluded
Finland	Included	Excluded	Excluded	Excluded
France	Excluded	Excluded	Excluded	Excluded
Germany	Excluded	Excluded	Excluded	Excluded
Hungary	Excluded	Excluded	Excluded	Excluded
Iceland	Included	Excluded	Excluded	Excluded
Italy	Excluded	Included	Excluded	Included
Luxembourg	:	:	:	:
Netherlands	Excluded	Excluded	Excluded	Excluded
Norway	Included	Excluded	Excluded	Excluded
Poland	Excluded	Excluded	Excluded	Included
Slovakia	Included	Excluded	Included	Excluded
Spain	Excluded	Excluded	Excluded	Excluded
Sweden	Excluded	Excluded	Excluded	Excluded
Switzerland	Excluded	Excluded	Excluded	Excluded

Table 2.B.8 Table of consistency for 'Sexual violence' crime

Country	Sexual exploitation	Coercion	Prostitution offences	Human trafficking for sexual exploitation
Austria	Excluded	Included	Excluded	Excluded
Belgium	Excluded	Excluded	Excluded	Excluded
Czechia	Included	Excluded	Excluded	Included
Denmark	Included	Included	Excluded	Excluded
Estonia	Included	Included	Excluded	Excluded
Finland	Excluded	Excluded	Excluded	Excluded
France	Excluded	Excluded	Excluded	Excluded
Germany	Excluded	Excluded	Excluded	Excluded
Hungary	Excluded	Excluded	Excluded	Excluded
Iceland	Included	Included	Included	Excluded
Italy	Excluded	Excluded	Excluded	Excluded
Luxembourg	Included	Excluded	Included	Excluded
Netherlands	Excluded	Excluded	Excluded	Excluded
Norway	Excluded	Excluded	Excluded	Excluded
Poland	Included	Included	Included	Excluded
Slovakia	Included	Included	Excluded	Excluded
Spain	Excluded	Excluded	Excluded	Excluded
Sweden	Included	Included	Excluded	Excluded
Switzerland	Excluded	Included	Excluded	Excluded

Table 2.B.9 Table of consistency for 'Robbery' crime

Country	Robbery of a car or vehicle	Robbery of an establishment	Theft without violence	Burglary without violence against the person
Austria	Included	Included	Excluded	Excluded
Belgium	Included	Included	Excluded	Excluded
Czechia	Excluded	Included	Excluded	Excluded
Denmark	Included	Included	Excluded	Excluded
Estonia	Excluded	Excluded	Excluded	Excluded
Finland	Included	Included	Excluded	Excluded
France	Included	Included	Excluded	Excluded
Germany	Included	Included	Excluded	Excluded
Hungary	Included	Included	Excluded	Excluded
Iceland	Included	Included	Included	Excluded
Italy	Included	Included	Excluded	Excluded
Luxembourg	Included	Included	Excluded	Excluded
Netherlands	Included	Included	Excluded	Excluded
Norway	Included	Included	Included	Excluded
Poland	Included	Included	Included	Excluded
Slovakia	Excluded	Excluded	Excluded	Excluded
Spain	Included	Included	Excluded	Excluded
Sweden	Included	Included	Excluded	Excluded
Switzerland	Included	Included	Included	Excluded

Table 2.B.10 Table of consistency for 'Theft' crime

Country	Burglary/breaking and entering	Theft with force or the threat of force (robbery)	Theft of a motorized land vehicle
Austria	Excluded	Excluded	Included
Belgium	Excluded	Included	Included
Czechia	Included	Excluded	Included
Denmark	Excluded	Excluded	Included
Estonia	Included	Excluded	Included
Finland	Excluded	Excluded	Included
France	Excluded	Excluded	Included
Germany	Excluded	Excluded	Included
Hungary	Included	Excluded	Included
Iceland	Excluded	Excluded	Included
Italy	Included	Excluded	Included
Luxembourg	Excluded	Excluded	Excluded
Netherlands	Excluded	Excluded	Included
Norway	Excluded	Excluded	Included
Poland	Excluded	Excluded	Excluded
Slovakia	Included	Excluded	Included
Spain	Included	Excluded	Included
Sweden	Excluded	Excluded	Included
Switzerland	Excluded	Excluded	Included

Appendix 2.C: Variables list, descriptive statistics, and correlation matrices

Table 2.C.11 Comprehensive list of all variables used in the empirical analysis in Chapter 2

Variables (all measured at province-level)	Source	Unit of measurement
Crime rates Types: Assaults, sexual violence acts, robberies, thefts.	Eurostat Open Access Database. Section on *Crime and criminal justice* under the main section *Population and social conditions*.	Rate per 100000 inhabitants
FCS immigration Inflow of foreign citizens from countries categorised as FCS by the World Bank during the reference period 2008-16.	International Migration Database (IMD), OECD Open Access Databank.	Rate per 100000 inhabitants
GDP per capita	Eurostat Open Access data. Section on *National Accounts* under the main section *Economy and finance*.	Euro per capita
Weighted average of population age It is calculated by averaging the different classes up to 100 years old (due to data availability) where the weights are the numbers of people in that age.	Eurostat Open Access data. Section on *Demography and migration* under the main section *Populations and social conditions*.	Number
Total population	Eurostat Open Access data. Section on *Demography and migration* under the main section *Populations and social conditions*.	Number
Unemployment rate	Eurostat Open Access data. Section on *Labour market* under the main section *Populations and social conditions*.	Percentage of total population

Table 2.C.11 (Continue)

Variables (all measured at province-level)	Source	Unit of measurement
Public expenditure on social protection It is calculated by dividing the public expenditure in social protection as measured in million euros by the total population of the country in that year.	Eurostat Open Access data. Section on *Government statistics* under the main section *Economy and finance*.	Euro per capita
Poverty rate It is the rate of people at risk of poverty following the standards defined by the Eurostat database.	Eurostat Open Access data. Section on *Living conditions and welfare* under the main section *Populations and social conditions*.	Percentage
Non-FCS immigration Stock of foreign citizens who are not from a country defined as FSC during the reference period 2010-17.	International Migration Database (IMD), OECD Open Access Databank.	Rate per 100000 inhabitants
Public expenditure on police services It is calculated by dividing the public expenditure in public order and safety as measured in million euros by the total population of the country in that year.	Eurostat Open Access data. Section on *Government statistics* under the main section *Economy and finance*.	Euro per capita
Share of graduates It is the share of graduates in tertiary education (mainly university degrees) out of the total population.	Eurostat Open Access data. Section on *Education and training* under the main section *Populations and social conditions*.	Percentage
Political stability indicator for FCS A weighted average, where the weights are the annual inflows of foreign citizens from each of the FCS included in the sample multiplied by the relative percentile rank of the indicator on political stability and absence of violence/terrorism (following Kaufmann *et al*. 2010) in that FCS.	Worldwide Governance Indicators (WGIs), World Bank Open Access Database. Combined with Eurostat data on the inflow of foreign citizens from FCS living in the European countries included in the sample.	Percentage

Table 2.C.11 (Continue)

Variables (all measured at province-level)	Source	Unit of measurement
Rule of law indicator for FCS A weighted average, where the weights are the annual inflows of foreign citizens from each of the FCS included in the sample multiplied by the relative percentile rank of the indicator on rule of law (following Kaufmann *et al*. 2010) in that FCS.	Worldwide Governance Indicators (WGIs), World Bank Open Access Database. Combined with Eurostat data on the inflow of foreign citizens from FCS living in the European countries included in the sample.	Percentage
Annual net earnings The annual average net earnings of the average worker who is single, without children, and has a gross earning equal to 67 percent of the earning of the average worker.	Eurostat Open Access data. Section on *Labour market* under the main section *Populations and social conditions*.	Euros

Comprehensive list all the variables used in the empirical estimation.

Table 2.C.12 Descriptive statistics when the dependent variable is the log of the rate of assault crimes per 100,000 inhabitants

Variable	Obs	Mean	Std. Dev.	Min	Max
Assault crimes	78	141.16	136.68	6.19	630.64
FCS immigration rate	78	73.81	136.79	1.92	640.72
Poverty rate	78	20.02	5.12	13.3	34.8
Non-FCS immigration rate	78	816.52	510.71	195.22	1913.50
Wgt. avg. of population age	78	39.02	1.00	37.36	41.47
Total population	78	29200000	27200000	7785806	82200000
Public exp. on social protection	78	5914.14	2633.74	1644.06	9857.30

Descriptive statistics for all the variables included in the main estimations with assaults.

Table 2.C.13 Descriptive statistics when the dependent variable is the log of the rate of sexual violence acts per 100,000 inhabitants

Variable	Obs	Mean	Std. Dev.	Min	Max
Sexual violence crimes	80	48.82	27.14	4.62	106.7
FCS immigration rate	80	47.70	89.99	3.58	600.06
Poverty rate	80	21.30	5.58	13.5	34.8
Non-FCS immigration rate	80	695.54	381.92	199.06	1883.07
Wgt. avg. of population age	80	38.97	1.37	36.5	41.47
Total population	80	33700000	28300000	4737171	82200000
Public exp. on social protection	80	6621.88	2922.52	1644.062	13707.39

Descriptive statistics for all the variables included in the main estimations with sexual violence crimes.

Table 2.C.14 Descriptive statistics when the dependent variable is the log of the rate of robbery crimes per 100,000 inhabitants

Variable	Obs	Mean	Std. Dev.	Min	Max
Robb. crimes	102	91.67	58.58	11.23	230.81
FCS imm. rate	102	73.28	123.84	3.58	640.73
Pov. rate	102	20.95	4.82	14.9	34.8
Non-FCS imm. rate	102	890.82	797.70	310.33	3789.11
Wgt. av. of pop. age	102	38.97	1.14	37.29	41.47
Total pop.	102	27800000	27500000	511840	82200000
Publ. exp. on soc. prot.	102	7351.18	3284.31	1644.06	16809.42
GDP per capita	102	36042.16	15958.69	9400	91500
Univ. grad. (% pop.)	102	7.97	2.37	2.46	14.94
Unempl. rate (% pop.)	102	8.65	4.47	3.7	26.1

Descriptive statistics for all the variables included in the main estimations with robberies.

Table 2.C.15 Descriptive statistics when the dependent variable is the log of the rate of theft crimes per 100,000 inhabitants

Variable	Obs	Mean	Std. Dev.	Min	Max
Theft crimes	84	2664.85	1172.64	1044.12	5452.55
FCS immigration rate	84	88.79	131.10	5.03	640.73
Poverty rate	84	17.20	2.06	11.2	20.6
Non-FCS immigration rate	84	945.58	491.93	310.33	2315.29
Wgt. avg. of population age	84	38.44	1.42	34.94	41.47
Total population	84	28800000	27600000	319575	82200000
Public exp. on social protection	84	8432.71	2188.74	3672.06	13707.39
GDP per capita	84	44103.57	12779.01	99000	79100

Descriptive statistics for all the variables included in the main estimations with thefts.

Table 2.C.16 Correlation matrix for assault crimes

	Assault cr.	FCS imm.	Pov. rate	Not FCS imm.	Wgt. age pop.	Tot. pop.	Soc. exp.
Assault crime rate	1						
FCS immigration rate	0.0955	1					
Poverty rate	-0.0453	-0.1585	1				
Not FCS immigration rate	-0.2367	0.7040*	-0.2270	1			
Weighted average of the age of the population	-0.2813	0.2529	0.1964	0.2889	1		
Total population	0.4595*	-0.1066	0.2027	-0.0603	0.1564	1	
Public expenditure in social protection per capita	0.2676	0.6776*	-0.3624*	0.6989*	-0.1917	0.1507	1

* indicates a level of significance (.01)

The variables are expressed in logs as in the empirical estimation.

Table 2.C.17 Correlation matrix for sexual violence crimes

	Sex viol. cr.	FCS imm.	Pov. rate	Not FCS imm.	Wgt. age pop.	Tot. pop.	Soc. exp.
Sexual violence crime rate	1						
FCS immigration rate	0.4613*	1					
Poverty rate	-0.7819*	-0.4612*	1				
Not FCS immigration rate	0.4829*	0.6374*	-0.4128*	1			
Weighted average of the age of the population	-0.4864*	0.1170	0.5633*	-0.0756	1		
Total population	-0.3144*	-0.1959	0.3743*	0.0625	0.4030*	1	
Public expenditure in social protection per capita	0.6978*	0.5899*	-0.8230*	0.5168*	-0.3723*	-0.1444	1

* indicates a level of significance (.01)

The variables are expressed in logs as in the empirical estimation.

Table 2.C.18 Correlation matrix for robbery crimes

	Robberies	FCS imm.	Pov. rate	Not FCS imm.	Wgt. age pop.	Tot. pop.	Soc. exp	GDP per cap.	Grad. rate	Unempl. rate
Robberies crime rate	1									
FCS immigration rate	-0.1683	1								
Poverty rate	-0.0244	-0.4278*	1							
Not FCS immigration rate	0.2511	0.5470*	-0.3232*	1						
Weighted average of pop. age	-0.3916*	0.1361	0.4609*	-0.1004	1					
Total population	0.3115*	-0.2721*	0.3299*	-0.3761*	0.4030*	1				
Public exp. in soc. protect. per cap.	0.2133	0.5638*	-0.7635*	0.5854*	-0.3612*	-0.4027*	1			
GDP per capita	0.2521	0.5682*	-0.7514*	0.7178*	-0.3731*	-0.4472*	0.9677*	1		
Graduates' rate	0.0074	0.0004	-0.1659	-0.4810*	-0.0837	0.2689*	-0.0389	-0.1826	1	
Unemployment rate	0.3615*	-0.4151*	0.5850*	-0.4154*	0.0351	0.3667*	-0.3923*	-0.4364*	0.2217	1

* indicates a level of significance (.01)

The variables are expressed in logs as in the empirical estimation.

Table 2.C.19 Correlation matrix for theft crimes

	Thefts	FCS imm.	Pov. rate	Not FCS imm.	Wgt. age pop.	Tot. pop.	Soc. exp	GDP per cap.
Thefts crime rate	1							
FCS immigration rate	0.1891	1						
Poverty rate	0.0671	0.2368	1					
Not FCS immigration rate	-0.2525	0.3975*	-0.1743*	1				
Weighted average of pop. age	-0.0903	0.3891*	0.7710*	0.0685	1			
Total population	0.0602	-0.0215	0.7392*	-0.2685	0.6237*	1		
Public exp. in soc. protect. per cap.	0.5492*	0.4154*	0.0926	-0.0094	0.0220	-0.0133	1	
GDP per capita	0.2333	0.2442	-0.4502*	0.5648*	-0.2920*	-0.4262*	0.5968*	1

* indicates a level of significance (.01)

The variables are expressed in logs as in the empirical estimation.

Chapter 3: Immigration from fragile countries and crime rates in Italy. An analysis with province-level data

3.1 Introduction

In this chapter, the link between FCS immigration and crime rates is analysed in the context of Italian provinces.[64]

The contribution to the existing literature is threefold. Firstly, the impact of a specific type of migrants, those coming from FCS and previously exposed to violence, on four macro categories of crimes: homicides, violent crimes (not leading to death), criminal organisations' crimes, property crimes is taken into account. Secondly, the empirical results for over 30 individual types of crime (such as kidnappings, thefts, robberies, rapes, etc.) are presented while, to the best of my knowledge, most of the previous literature took into account macro categories of crimes or the total crime rate or, anyway, a small number of individual types of crimes (e.g., Bianchi *et al*. 2012 took into account 4 individual types of crimes namely robberies, thefts, car thefts and drug-related crimes).[65] The reason for our variable of interest to impact upon different types of crimes can be traced back to previous studies about violence exposure and crimes (Couttenier *et al*. 2019). Thirdly, I use a different instrument for the IV procedure, alongside the most common shift-share used in the previous literature, namely the weighted average of the rate of growth of GDP in the origin countries of the migrants. The rationale for this instrument is that the higher the rate of growth of GDP in the home countries of the migrants the lower the incentive is to leave the country as more economic opportunities become available. Finally, the data employed in the present study cover a recent time span compared to other studies, and the link between violence exposure (proxied by FCS immigration) and crime rates is explored at province-level for the Italian context, somehow merging the approaches used by Bianchi *et al*. (2012) and Couttenier *et al*. (2019).

The remaining of the chapter is organised as follows. Subsection 3.1.1 outlines and discusses the hypotheses in relation to the empirical analysis. Section 3.2 describes the data and the methodology used in the chapter for assessing the link between immigration and crime rates. Section 3.3 presents and discuss the results of the

[64] The details on how to define a country as FCS are given in the section on data and methodology.
[65] See, for instance, Bianchi *et al*. (2012), Bell *et al*. (2013) and Alonso-Borrego *et al*. (2012).

empirical analysis, including the robustness checks. Section 3.4 provides some concluding remarks and discusses the policy implications of the results while outlining potential developments in future works.

3.1.1 Hypotheses section

The theoretical framework, which this chapter directly refers to, is the violence-breed-violence framework followed by Couttenier *et al*. (2019). Given this, the first hypothesis to be tested in Chapter 3 of the present thesis is the following:

H1. Following the theory of violence-breed-violence presented by Rohner *et al*. (2013a), the expectation is for FCS immigration to be positively and significantly associated with violent crimes.

The link might potentially be sizeable as documented by Couttenier *et al*. (2019).[66] For a list of violent crimes see Table 3.B.30 in Appendix 3.B, lethal and non-lethal violent crimes have been separated.
A second hypothesis originates from the study by Farrell and Zimmermann (2018). The authors found that violence exposure is associated with higher property crimes, and this was partially confirmed by Bianchi *et al*. (2012) for the Italian context. The hypothesis is the following:

H2. Violence exposure is associated with higher property crimes. Therefore, a positive and significant association of immigration from FCS with property crimes is expected.

The property crimes included in the analysis of the present chapter are listed in Table 3.B.30 in Appendix 3.B and they are similar to the ones analysed by Bianchi *et al*. (2012).

[66] The authors found asylum seekers who experienced violence during childhood in the origin countries are 40 percent more likely to be prone to violence compared to other cohort groups in Switzerland.

A third hypothesis, given the qualitative evidence for the Italian context where there is a clear link between immigration and criminal organisations' crimes, specifically mafia-related crimes (Duca, 2014), suggests a positive impact of FCS immigration on these crimes. The third hypothesis is the following:

H3. FCS migration is expected to be positively and significantly associated with mafia crimes and migrants could be either perpetrators thanks to their criminal networks most definitely built before the migration (Wortley, 2009) or the subject of exploitation by mafia-type of criminal organisations (Duca, 2014).

Although these three are the main channels that I aim to explore in this chapter, other outcomes are also possible, and these are either predicted by the literature or confirmed by the evidence presented in previous studies. For instance, immigration might be negatively linked to crime rates following the so-called "immigration revitalisation perspective". This mechanism has been empirically documented by Lee and Martinez (2009) who found negative and robust effects of immigration on various types of crime rates, mainly violent ones, and theoretically explained by Sampson (2008) who stated the importance of immigration in promoting family values and unity thereby preventing violence and crimes.
The following section presents the dataset used in the empirical analysis and discusses the methodology used for assessing the impact of FCS immigration on crime rates in the Italian provinces.

3.2 Data and methodology

The dataset of this study is constructed by using data from the National Institute for Statistics in Italy (ISTAT). The data cover the period 2010-2017 and are recorded at province-level. The main information that has been extracted for this study concerned the number of foreign residents by nationality and crime rates data, specifically the crimes reported by the police to the judicial authority at province-level, for different types of crimes. Four macro categories of crimes have been constructed: homicides (including both intentional and unintentional ones) and

manslaughters, criminal organisations' crimes, violent crimes and property crimes. These macro categories are used mainly in the first part of the empirical estimation.[67] In the second part, the analysis is conducted on individual types of crimes. Differently from other studies such as Couttenier *et al*. (2019) and Bianchi *et al*. (2012), the present chapter focuses on the effect of a specific type of immigration and the effect may differ depending on the individual type of crime that is considered. A list of the individual types of crimes for which data have been gathered is presented in the Table 3.A.28 in Appendix 3.A.

The variable of interest is the rate of foreign residents from 8 FCS countries, following the classification of the World Bank, per 100000 inhabitants. FCS are defined as those countries that either have a Country Policy and Institutional Assessment (CPIA) score lower than 3 or host a political peace-keeping or peace-making mission from the UN (WHO, 2017). The CPIA scores range from 0 to 6 and cover the following areas: Economic Management, Structural Policies, Policies for Social Inclusion/Equity and Public Sector Management and Institutions.[68] The overall score is an average of each individual score for the various areas. Using the CPIA score is a systemic and well organised way to define a country as fragile. This is because the CPIA gauges the quality of institutional framework of a country where quality indicates the ability of the institutions to reduce poverty, foster sustainable growth and effectively use the development assistance (World Bank, 2017). Moreover, the mechanism for the elaboration of the CPIA score has been revised frequently by the World Bank and refined through the revisions. The employment of a team of experts for each country allows for the rating to be robust and country-specific based on a number of sources including country teams' proposals, World Bank-wide comments, available external indicators and other supporting documentation (World Bank, 2017).

Table 3.C.31 in Appendix 3.C provides a comprehensive list of the variables used in all empirical estimations. ISTAT data on crime and immigration and other variables have been merged with Eurostat data at province level. From the Eurostat database, data has been taken about GDP per capita and population density for the

[67] Details of the crimes included in these categories can be found in Table 3.B.21 in Appendix 3.B.
[68] Further explanations about the criteria for the calculation of CPIA scores can be found in a work of the World Bank (World Bank, 2017).

Italian provinces. From the World Bank databases, specifically the World Development Indicators (WDIs), data have been obtained on indicators for push factors causing immigrants to move to other countries (WDIs, 2020) namely the GDP per capita annual growth rate in the home countries of the immigrants. For the pull-factor instrument, the shift-share instrument that is outlined in further detail in the next section, data on migration inflows at national level, taken from the International Migration Database (OECD 2020), have been used.[69] Specifically, the annual data on the total inflow of migrants to France during the period of analysis 2010-17 have been obtained.

Table 3.20 below shows the descriptive statistics for the variables included in the main specifications. The table shows that property crimes are the most numerous crimes among the macro categories of crimes while homicides are the least ones. For the individual types of crimes, the three most numerous types of crimes are thefts, damage crimes and cyber frauds. Other crimes such as cyber-crimes, money laundering crimes, attacks, criminal association crimes, mafia crimes and smuggling present a higher variability across space and through time. FCS immigration presents a high variability given that the standard deviation is higher than the mean and the same is true for population density and total population. The political index shows that on average local governments in Italy tend to be of a centre or centre-left political orientation with a mean value between -0.5 and 0. Oddly, GDP per capita and unemployment rate show minimum values equal to 0. This is not likely, and it might reflect an error in reporting this variable from the original dataset. However, this does not pose a threat in the empirical estimation because the log of all the variables, except for the political index and the push factor instrument for the IV estimation, is taken and used in the various specifications.

[69] The pull and push factors are thoroughly discussed in the next subsection related to the IV procedure.

Table 3.20 Descriptive statistics for all variables in the main estimations

Variable	Obs.	Mean	Std. Dev.	Min	Max
Macro-categories of crime rates					
Total crimes	578	4054.59	1141.31	1982.26	8619.22
Violent crimes	578	387.11	109.83	146.82	909.53
Cr. org. brimes	578	359.28	91.59	146.79	767.88
Homicides	578	6.54	2.83	1.42	22.72
Property crimes	578	2104.42	862.85	643.40	5592.15
Individual types of crimes					
Mass murdering	578	0.02	0.08	0	0.62
Intent. hom.	578	0.77	0.84	0	8.18
Attempted hom.	578	1.94	1.39	0	11.04
Infanticides	578	0.01	0.04	0	0.45
Manslaughtering	578	0.050	0.124	0	1.15
Unintent. hom.	578	3.13	1.68	0	18.17
Blows crimes	578	26.07	8.19	9.49	64.03
Culpable injuries	578	110.20	24.66	55.31	213.58
Menaces	578	143.79	44.05	57.19	345.69
Kidnapping	578	2.00	1.13	0	7.40
Offences	578	96.09	52.71	0	274.29
Rapes	578	7.02	2.54	1.84	23.44
Sex with minors	578	0.83	0.64	0	5.08
Corruption minor	578	0.25	0.32	0	2.09
Exploitation pros.	578	1.94	1.46	0	11.99
Child pornography	578	0.83	0.75	0	4.61
Theft	578	2063.49	842.78	633.20	5483.26
Robbery	578	40.94	33.79	1.91	275.42
Extortions	578	12.51	5.29	2.37	32.34
Cyber fraud	578	218.86	58.37	91.45	482.78
Cyber crime	578	17.41	18.53	1.77	153.47
Count. goods	578	12.01	11.87	0	133.14
Intellectual prop.	578	1.72	2.65	0	18.89
Receiv. stol. goods	578	37.39	16.79	5.22	233.08

Table 3.20 (Continue)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Money launder.	578	2.50	3.08	0	41.09
Usury	578	0.64	0.80	0	11.61
Damage crimes	578	477.55	216.97	128.48	1527.03
Arson crimes	578	17.18	18.37	0.44	149.08
Damage w. Arson	578	16.82	20.84	1.43	137.78
Drug trafficking	578	51.99	20.53	12.34	113.99
Attacks	578	0.62	0.64	0	5.51
Crim. assoc. crime	578	1.34	2.12	0	31.11
Mafia crime	578	0.09	0.28	0	3.04
Smuggling	578	0.88	2.65	0	18.82
Other crimes	578	685.69	141.80	328.94	1300.52
Variable of interest and other variables					
FCS imm.	578	159.52	166.80	1.83	862.05
GDP per capita	578	22315.74	9800.55	0	52400
Pop. density	578	262.76	332.85	0	2687.4
Pop total	578	571435.1	605825.5	86828	4353738
Unempl. rate	578	11.41	5.65	0	31.46
Political index (no log)	578	-0.26	0.61	-1	1
Clear-up rate	578	22.32	5.66	10.35	42.43
No FCS immigr.	578	74.93	33.94	12.35	159.03
Males aged 15-39	578	14.27	1.29	11.27	17.35

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Table 3.21 Correlation matrix with macro categories of crimes, variables of interest and other variables

	Total crimes	Homicides	Crim. org.	Violent min.	Property cr.	FCS imm.	GDP per cap.	Pop. dens.	Pop. tot.	Unempl.
Total crimes	1									
Homicides	0.1451*	1								
Crim. org.	0.4043*	0.0367	1							
Violent min.	0.3615*	0.4106*	0.0893	1						
Property cr.	0.9272*	-0.0030	0.2551*	0.1106*	1					
FCS imm.	-0.0298	-0.2995*	-0.0397	-0.4079*	0.1065	1				
GDP per cap.	0.2143*	0.0711	-0.1626*	0.3980*	0.1931*	-0.1359*	1			
Pop. dens.	0.4077*	-0.0665	0.1681*	-0.0728	0.4607*	0.0498	0.1837*	1		
Pop. tot.	0.3606*	-0.0447	0.0120	-0.1894*	0.4809*	0.0520	0.0115	0.4935*	1	
Unempl. rate	-0.1422*	0.3001*	0.0801	0.2683*	-0.2293*	-0.5144*	0.0948	0.2079*	0.0008	1
Pol. index	-0.0859	0.0531	-0.0966	0.0286	-0.0963	0.0483	-0.0936	0.0233	-0.0474	0.0110
Non-FCS imm.	0.3006*	-0.2592*	0.0423	-0.3131*	0.4215*	0.6911*	-0.0273	0.1212*	0.0753	-0.6623*
Clear-up rate	-0.6308*	0.2476*	-0.0581	0.2816*	-0.8070*	-0.2348*	-0.0798	-0.3749*	-0.4768*	0.3773*
Males 15-39 rate	-0.2264*	0.3172*	-0.3709*	0.2565*	-0.2585*	-0.3555*	0.1061	-0.0057	0.2068*	0.4890*

Table 3.21 (Continue)

	Pol. index	Non-FCS imm.	Clear-up	Males 15-39
Pol. index	1			
Non-FCS imm.	0.0197	1		
Clear-up	0.0659	-0.5055*	1	
Males 15-39	0.1246*	-0.5788*	0.2997*	1

* indicates a level of significance p<0.01

Variables are all expressed in natural logarithms except for the index of political orientation.

Table 3.21 displays the correlation matrix between macro categories of crimes and the other variables used in the main estimation. FCS immigration shows a negative and significant correlation (although not strong in magnitude) with violent crimes and this seems to suggest an evidence contrary to the hypothesis outlined in Section 3. The correlation is significant and positive between property crimes, violent crimes and criminal organisations' ones showing that, to some extent, crimes follow similar paths. Unemployment appears to be significantly and positively correlated to violent crimes and this is in line with the predictions of the theory such as the SDT and it was also found in the work by Bell *et al*. (2013). In line with the idea of the shift-share instrument used by Bianchi *et al*. (2012), FCS immigration and non-FCS immigration are positively and significantly correlated, and the coefficient is substantially high meaning that immigrants tend to cluster in multicultural areas where the presence of other immigrants is considerable.

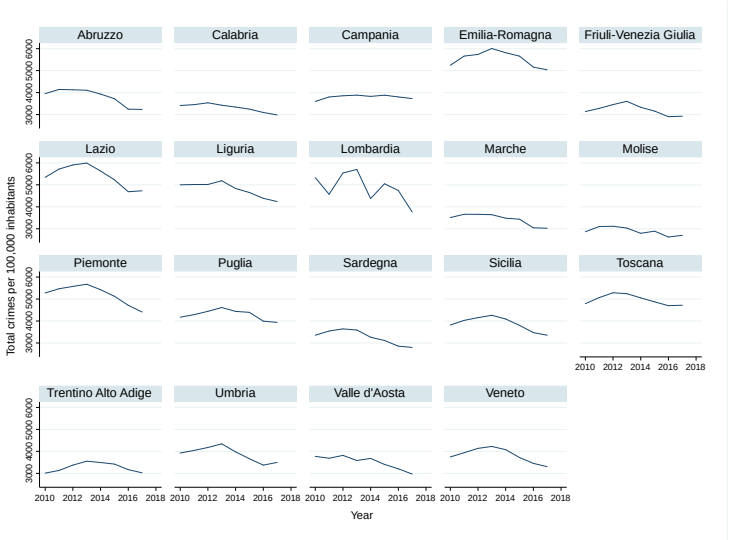

Figure 3.6 Total crimes rate per 100000 inhabitants

Figure 3.6 shows the trend of total crimes per 100000 inhabitants in the different Italian NUTS-2 regions. The use of regional trends instead of province-level ones

is due to the clarity of the figure and is a better indicator for the overall trend of crime rates in Italy at local level. Total crimes increased in most of the regions from 2010 to 2013-14 and this trend is confirmed also by a report from the Hume Foundation (2015). The regions that present the higher crime rates over the whole period are Lazio, Emilia-Romagna, Lombardia and Piemonte. Particularly, Lazio and Emilia-Romagna show the record of total crimes with around 6000 crimes per 100000 inhabitants at the peak in 2014. High variability is presented by Lombardia, where the rate of total crimes per 100000 inhabitants decreased from 2010 to 2011 and then increased in 2012 through 2013 reaching a peak of around 5800 crimes per 100000 inhabitants. The relatively safer regions, presenting the lowest rates of total crimes are the southern regions of Calabria and Molise, the northern regions of Friuli-Venezia Giulia, Trentino Alto Adige, and Valle d'Aosta, and Marche for the centre-north as well as the island of Sardegna. All these regions display rates of total crimes well below 4000 per 100000 inhabitants.

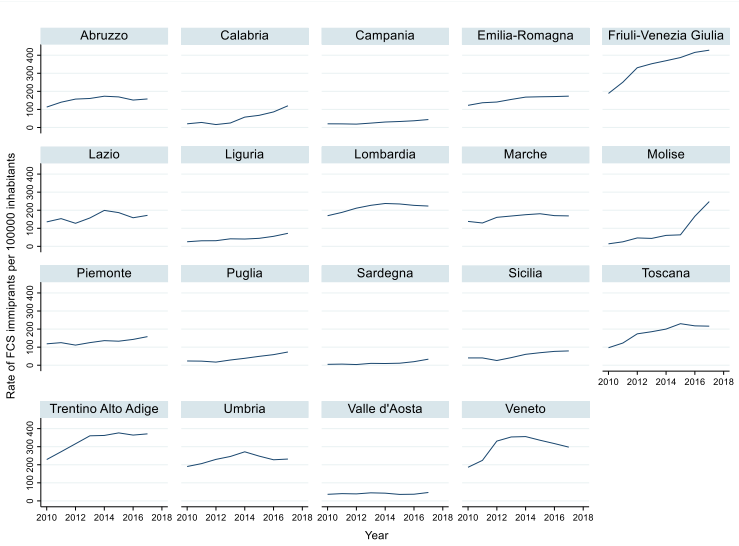

Figure 3.7 Rate of FCS immigrants per 100000 inhabitants

As for the rates of FCS immigrants per 100000 inhabitants, the overall picture is shown by Figure 3.7 at regional level. The trend is increasing for most of the regions, except for the Veneto region where there is an increase from 2010 to 2014 reaching a peak of around 350 FCS immigrants per 100000 inhabitants, and then a decrease until 2017 with a rate of 300 FCS immigrants per 100000 inhabitants. Although increasing, the trends across the 19 regions of the sample are substantially different from one another. In the southern region of Campania and in the island of Sardegna, the increase in FCS immigrants' rate is continuous, but modest compared to the rest of the regions. The rates for Campania and Sardegna moved respectively from around 2 and 1 immigrants per 100000 inhabitants in 2010 to around 40 and 30 in 2017. In Calabria and Molise, both southern regions, the rate of FCS immigrants shifted respectively from around 2 and 1 immigrants per 100000 inhabitants in 2010 to 105 and 250 in 2017. Particularly striking is the increase in Molise from 2015 to 2017 passing from 80 to 250 per 100000 inhabitants, and this might be explained by the several integration projects launched in the region and financed through the European Fund for Integration (EFI).[70] The highest rates of FCS immigrants per 100000 inhabitants are shown by Friuli-Venezia Giulia and Trentino Alto Adige where the rates shifted respectively from slightly less than 200 and around 220 in 2010 to around 410 and 380 in 2017. The highest oscillations in the rate are displayed by the region of Lazio where the capital, Rome, is located.

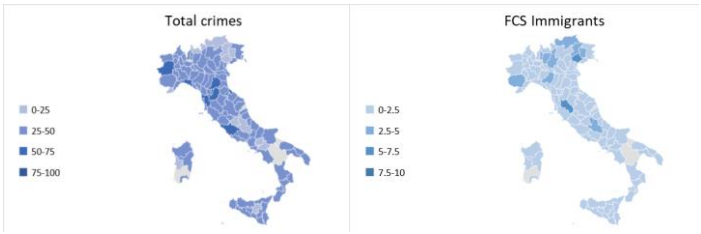

Figure 3.8 Total crimes and FCS immigration comparison

Figure 3.8 displays the spatial distribution of total crimes and FCS immigration. Although, at a first look, there does not seem to be any correlation between the two

[70] Archive News of Molise Region (2014). Funds for the reception of migrants and refugees.

variables, the link is worth exploring. A similar figure was shown by Bianchi *et al.* (2012) who found a null effect of immigration on total crimes.

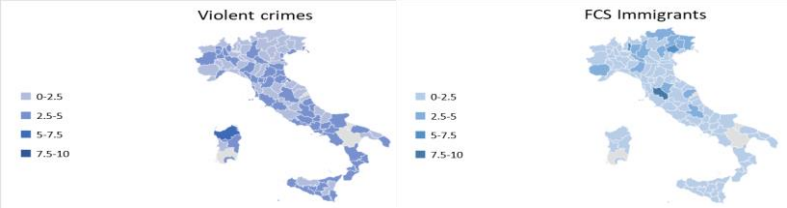

Figure 3.9 Violent (non-lethal) crimes and FCS immigration comparison

Figure 3.9, similarly, does not seem to suggest much correlation between violent (non-lethal) crimes and FCS immigration as documented instead by Couttenier *et al*. (2019). Some parts of central Italy and of Lombardy show relatively high FCS immigration and violent crimes, but this is not the case for the rest of the provinces.

Figure 3.10 Homicides and FCS immigration comparison

The scenario presented by Figure 3.10 does not show an evident link between FCS immigration and homicide rates, and this seems in line with the findings of the studies for which there is no direct effect between immigration and homicides (see, for instance, Feldmeyer 2009).

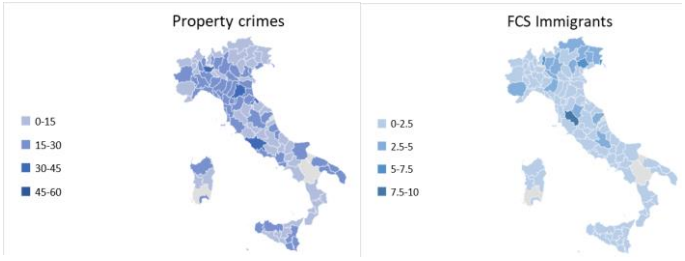

Figure 3.11 Property crimes and FCS immigration comparison

Figure 3.11 displays the geographical heat maps for property crime and FCS immigration. Here it is possible to see that the higher rates of property crimes and FCS immigration are jointly registered in Lombardy, but the association is not very strong. This seems in line with Bianchi *et al*. (2012) who found a weak but positive and significant relationship between total immigration and property crimes. However, this is just a picture of the two variables across provinces and does not capture an effect through time. Analyses who have explored the link between immigration and property crimes found evidence of a reduction in property crimes from immigration (Chalfin, 2015).

3.2.1 Baseline specification

In the first part of the empirical analysis, the impact of immigration from FCS on different crime rates is estimated through an Ordinary Least Squares (OLS) estimator. The baseline specification is the following:

$$Crm_{it} = \beta_0 + \beta_1 FCS_{it} + \beta_2 C_{it} + \delta_i + \gamma_t + \varepsilon_{it} \qquad 3.1$$

In the Equation 3.1, the dependent variable Crm_{it} is the log of the crime rate for each macro category of crime, violent crimes, criminal organisations' crimes, property-related, homicides and manslaughters per 100000 inhabitants. In the specifications with the individual types of crimes, instead of macro categories, Crm_{it} is the log of each individual type of crime rates listed in Table 3.A.28 in

Appendix 3.A. The main explanatory variable is FCS_{it}, which is the log of the rate of foreign residents who are FCS citizens per 100000 inhabitants (the list of the FCS in this analysis is shown in Table 3.B.30 in Appendix 3.B).

Coherently, with hypotheses H1, H2, and H3, a positive and significant coefficient is expected for the variable of interest FCS_{it} respectively on violent, property and mafia crimes.

The element C_{it} is a vector of control variables that includes GDP per capita, population density, total population, unemployment rate, index of political orientation, clear-up rate, and the percentage of males aged 15-39 out of the total population.

All the specifications include time constant fixed-effects δ_i at province level and year dummies γ_t to check respectively for the effects of place and time on crimes. The stochastic error term is given by ε_{it}.

The coefficient related to the variable of interest FCS_{it} is equal to β_1 in the above equation 3.1 and is expected to be positive and significant for the different types of crimes, especially mafia and violent crimes, following the hypotheses H1 and H2 made in above subsection 3.1.1

Following the approach of Bianchi *et al*. (2012), the log of the GDP per capita has been included as a proxy for socio-economic status at the province level. It is expected to have a negative impact on crime following the seminal paper of Becker (1968) and the theories on social disorganisation (Shaw and McKay, 1942; Sampson and Groves 1989). However, if income is not equally distributed across the population, economic growth can provide an incentive for higher crimes (Klaer and Northrup 2014).

Population density and total population by province, both also expressed in logarithmic terms, have been deemed relevant in determining the level of criminal activities, provided that province fixed-effects are controlled for in each of the specifications, by several authors (see Glaeser and Sacerdote 1999; Sampson *et al*. 2002). Thus, both population density and total population have been included and data are obtained respectively from Eurostat NUTS-3 and ISTAT databases.

The log of the unemployment rate is expected to have a statistically positive impact on crime as it indicates a worsening in the socio-economic status of the population

and for this reason it has been included (Raphael and Winter-Ebmer 2001; Fallahi *et al*. 2012 for theft crime).[71]

Following Bianchi *et al*. (2012), the log of the clear-up rate has been included in the empirical analysis which is given by the share of crimes with known offender (police forces know and identified who committed the crime) out of the total number of crimes.[72]

The log of the share of males aged 15-39 years out of the total population is another relevant control variable. The percentage of young males is expected to have a positive effect on crimes as young males are more prone to be engaged in criminal activities (Freeman 1991; Levitt 1998; Grogger 1998).

A political orientation index has been constructed to be used as a control variable in the analysis. This is because the attitude towards justice and security is different depending on the political orientation of the local government. It was not possible to use the same index as the one employed by Bianchi *et al*. (2012) because the data did not cover the reference period for the analysis of the present study. Instead, an index with four values, -1, -0.5, 0.5, 1 depending on whether the government is oriented to the Left, Centre-Left, Centre-Right and Right has been used (details in Table 3.C.31 of Appendix 3.C).

A simple OLS regression might suffer from endogeneity bias and provide inconsistent estimates. The next subsection on the IV procedure deals with this estimation issue to solve the bias and obtain reliable coefficients.

3.2.2 The IV procedure

The hypothesis is that the model employed in the empirical analysis of the present study may suffer from endogeneity issues. The fixed-effects estimation partially corrects for this issue, but there is still the need to deal with the potential link between the explanatory variable and the error term in our model. There are three potential reasons behind this assumption. Firstly, immigrants might choose where

[71] See also Lin (2008), Ajimotokin *et al*. (2015) and Torruam and Abur (2014).

[72] Unfortunately, after 2004, this value is not anymore available by individual type of crime, therefore the clear-up rate in each of the specifications is the same and is calculated for the total number of crimes.

to migrate based on the safety of the country, that is, higher crime rates might negatively affect immigration inflows. Secondly, immigration is often underestimated in general statistics as it does not take into account undocumented migrants, the use of natural log as done by Bianchi *et al*. (2012) partially solves this problem, but there are still discrepancies that need to be addressed. For these reasons, an IV procedure has been employed in order to correct for the endogeneity bias related to the main variable of interest.

Although not leading to endogeneity, an additional issue in empirical analyses is the measurement error in the dependent variable, the crime rates in the case of this chapter, especially if the discrepancy from the true value is substantial and could then lead to inconsistent estimates (De Haan *et al*. 2018). In the case of this chapter, crimes could be underestimated in official statistics and this is due to under-reporting of certain types of crimes, such as mafia-crimes where the fear of retaliation often prevents reporting the crime to the police by potential witnesses (Di Bella, 2011). The way to partially overcome the issue of underestimation of crime rates is the same one followed by Bianchi *et al*. (2012), that is, taking the logarithmic value of the crime rates.

Two instruments have been employed for correcting the endogeneity related to the variable of interest. The first is the classic instrument that is used in the analysis concerning the socio-economic effects of immigration and is the so-called shift-share instrument. Taken from Bianchi *et al.* (2012), this instrument is built as a weighted average of migratory flows and works as a demand-pull factor for immigration. The formulation is the following presented in Equation 3.2:

$$SSR_{it} = \sum_{n} \omega_{it-1}^{n} \times \Delta lnMIGR_{jt}^{n} - \Delta lnpop_{it} \qquad 3.2$$

where SSR_{it} stands for shift-share instrument for province i at time t; $\Delta lnMIGR_{jt}^{n}$ is the log change of migrants of nationality n between period t and $t-1$ at country-level to country j; $\Delta lnpop_{it}$ is the log change between t and $t-1$ in total population per province i and ω_{it-1}^{n} is the weighting factor, which is the share of immigrants from nationality n out of the total stock of foreigners at province i at

time $t-1$. The expectation for this demand-pull factor instrument is to be positively correlated to migration, that is, the higher the number of immigrants in an area the higher the incentive for other migrants to settle in the same area is (Bianchi *et al*. 2012). The instrument used in the present empirical analysis is also expressed in logarithmic value in order to facilitate the interpretation of its coefficient on FCS.

The second instrument refers to the living condition of the migrants in their countries of origin and it is the weighted average of the annual GDP per capita rate of growth in the FCS countries included in the sample, where the weights are the inflow of immigrants from these countries to the Italian provinces. Specifically, the instrument has been built as the following in Equation 3.3:

$$SEI_{it} = \frac{\sum_{j=1}^{m}(FCS_{ijt} * SEI_{jt})}{\sum_{j=1}^{m} FCS_{ijt}} \qquad 3.3$$

where SEI_{it} stands for socio-economic indicator and is the weighted average for host country i at time t. The use of a weighted average allows the indicator, which refers to the origin countries of the immigrants, to vary both through time and host country. FCS_{ijt} is the inflow of immigrants from FCS j to host country i at time t, while SEI_{jt} is the rate of growth of per capita GDP for origin FCS j at time t.

Using the annual rate of growth of the GDP per capita might be tricky because there is not a general consensus in the literature on whether the emigration decreases as GDP per capita increases and vice versa (negative statistical association) or they move in the same direction (positive statistical association). However, GDP per capita in the origin countries of the migrants have been deemed as relevant for predicting immigration flows by many authors and has been used both in first-stage regressions and gravity models for immigration (Alesina *et al*. 2016; Borjas, 2019). Clemens (2020) studied both theoretically and empirically the relationship between GDP per capita and emigration focusing on developing countries. Given that all the FCS included in the present study can be defined as developing countries (both low income and lower middle income), the study by Clemens (2020) is crucial for knowing what relationship between economic growth and emigration can be

expected for these countries. The author shows that the relationship between emigration and GDP per capita is non-linear and, for levels of per capita GDP lower than $1000, is negative. Thus, as GDP increases emigration decreases under that threshold. Given that 8 out of the 13 FCS included in this study present a GDP per capita lower than $1000 (WDIs, 2020), the expectation is that the SEI_{it} is negatively associated with the inflow of immigrants from FCS country to the European receiving countries. The rationale is that the better the economic situation in the home countries of the migrants, the lower the outflow of migrants from those countries is expected to be. This instrument is not expressed in log terms in the estimation of the present study; this is due to the fact that the rate of growth can often be negative, therefore the logarithmic transformation would alter many of the values and generate many missing values.

The chosen instruments for this chapter are different from those used in Chapter 2 and the motivation is threefold. Firstly, the analysis of the present chapter is very similar to the one conducted by Bianchi *et al*. (2012) and therefore there was the need of making it easy to compare between the results obtained in this chapter with those of the authors. For this reason, a shift-share instrument similar to the one used by Bianchi *et al*. (2012) has been employed. Finally, the use of GDP per capita growth rate as a socio-economic indicator to be intended as a push factor for immigration from FCS referred to the findings by Clemens (2020) who revealed the hump-relationship between GDP per capita in the origin countries and immigration from those countries. Testing this relationship with IV was not possible in Chapter 2 as the number of observations was too low.[73]

In the IV approach, the impact of the excluded instruments on FCS immigration is shown in the model of the first-stage regression expressed in the following Equation 3.4:

$$FCS_{it} = \rho_0 + \rho_1 SEI_{it} + \rho_2 SSR_{it} + \rho_3 C_{it} + \theta_i + \omega_t + r_{it} \qquad 3.4$$

[73] Clemens (2020) showed evidence of this link using various samples and the minimum number of observations (N) was equal to 283, much higher than N used in Chapter 2 of the present thesis.

where SEI_{it} is a weighted average of the values of the push-factor indicator, the annual rate of growth of per capita GDP in the case of this study for each of the countries.[74] The demand-pull factor is SSR_{it} and it measures the weighted flow of immigrants; for the present study, the total immigration flow to Italy's neighbouring country of France has been chosen. The control variables are the same used in the OLS estimation.

In the second-stage equation, the instrumented data on FCS migrant inflows is used to estimate its effect on the crime rates. The regressions are repeated for the various types of crimes. The model is the following presented in Equation 3.5:

$$Crm_{it} = \beta_0 + \beta_1 \widehat{FCS}_{it} + \beta_2 C_{it} + \delta_i + \gamma_t + \varepsilon_{it} \qquad 3.5$$

the variables are the same as in the model estimated through OLS, but $\widehat{FCS}_{it}$ is now corrected from the endogeneity bias. The remaining set of control variables and fixed-effects are the same used in the OLS estimation. The coefficient of interest is β_1 and, once solved the endogeneity bias, it is expected to be positive and statistically significant in line with hypotheses H1 and H2 made in subsection 3.1.1 especially for violent and mafia crimes.

3.3 Empirical results

In this section, the results of the OLS and IV estimations are presented and discussed. Firstly, Table 3.22 displays the results for FCS immigration on the macro categories of crimes. Each of the regressions includes both year dummies and province fixed-effects. Except for the regression with homicides and manslaughters, all the specifications present relatively high R-squared signalling that the model fits well the data.

The OLS results show that FCS immigration has a positive, though small in magnitude, impact on criminal organisations' crimes. Specifically, a 10 percent

[74] This is a way that allow the instrument to vary, not only through time, but also across the different provinces. The weights are the number of immigrants measured from each country of origin towards each of the provinces.

increase in FCS migrants is associated with a 0.4 percent increase in criminal organisations' crimes. However, the coefficient is only significant at 10 percent level. This seems consistent to the hypothesis H2 made in above subsection 3.1.1 for which FCS immigration increases criminal organisations' crimes, mainly mafia crimes, in line with the literature that explained the link between immigration and criminal organisation crimes (Duca, 2014), a result that is specific for the Italian case.[75] It is statistically insignificant for other types of crimes, thus, the results are contrary to hypothesis H1 stated in subsection 3.1.1, the one of a violence-breed-violence link, empirically confirmed by Couttenier *et al*. (2019) and they are also contrary to hypothesis H2 that was verified by Farrell and Zimmermann (2018). Table 3.22 does not provide evidence that FCS immigrants, who are supposed to have experienced directly and indirectly violence, given the fragile political and social situation in their origin countries, are more likely to be prone to be violent in the host countries.

[75] The results do not tell us whether immigrants increase mafia crimes as they are victimised by the criminal organisations or they are members of those. However, given the qualitative evidence and the ethnical and cultural homogeneity aspects related to mafia organisations, it is likely that the former channel (immigrants as victims) would explain better the results. Further research would need to be conducted to confirm or reject this explanation, perhaps using data on arrests and offenders or victims which was not available in the present analysis.

Table 3.22 OLS for macro categories of crimes and FCS immigration

	Tot. Crime		Homicides		Crim. Org.		Viol. Crime		Prop. Crime	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
FCS immigration	0.0153	0.0038	0.0800	0.0907	0.0406*	-0.0940	0.0101	-0.0264	0.0212	0.0110
	(0.0119)	(0.0407)	(0.0605)	(0.2184)	(0.0215)	(0.1083)	(0.0244)	(0.0583)	(0.0128)	(0.0527)
GDP per capita	0.0061**	0.0060**	0.0310***	0.0137**	0.0033	0.0027	0.0102	0.0100**	0.0043**	0.0042**
	(0.0026)	(0.0026)	(0.0063)	(0.0056)	(0.0034)	(0.0030)	(0.0041)	(0.0041)	(0.0019)	(0.0019)
Population density	0.0910	0.0897	-1.295	-1.346	0.0285	-0.0136	0.3551	0.3511	0.1407	0.1396
	(0.1446)	(0.1412)	(1.798)	(1.052)	(0.5165)	(0.4739)	(0.3109)	(0.3178)	(0.1594)	(0.1553)
Total population	-0.3817	-0.4849	-0.5389	0.0378	-1.750*	-2.955**	-1.320	-1.648*	0.3042	0.2127
	(0.4813)	(0.5979)	(2.365)	(2.417)	(0.9018)	(1.251)	(0.8582)	(0.9148)	(0.4714)	(0.6883)
Unempl. rate	0.0046	0.0028	0.0594	0.0616	0.0235	0.0026	0.0223	0.0166	0.0153	0.0137
	(0.0192)	(0.0202)	(0.1376)	(0.1329)	(0.0400)	(0.0465)	(0.0315)	(0.0304)	(0.0248)	(0.0248)
Political index	-0.0059	-0.0057	0.0181	0.0108	-0.0055	-0.0024	-0.0175	-0.0166	-0.0091	-0.0089
	(0.0065)	(0.0065)	(0.0299)	(0.0248)	(0.0126)	(0.0130)	(0.0118)	(0.0120)	(0.0075)	(0.0074)
Non-FCS imm.	0.0757	-0.2940***	-0.0571	0.1891	-0.5399***	-0.1118	0.3423***	0.1043	0.1441**	-0.5529***
	(0.0562)	(0.0933)	(0.3005)	(0.2342)	(0.1266)	(0.1305)	(0.1197)	(0.1946)	(0.0634)	(0.0587)
Clear-up rate	-0.2921***	0.1058	0.2763	-0.0864	-0.0903	-0.1895	0.1101	0.4375***	-0.5513***	0.1707
	(0.0972)	(0.1093)	(0.2441)	(0.6108)	(0.1321)	(0.3301)	(0.2040)	(0.1663)	(0.0602)	(0.1358)
Males aged 15-39	0.4231	0.4784	-1.865	-1.634	0.4235	1.068	1.698**	1.873**	0.2542	0.3031
	(0.3885)	(0.4307)	(1.178)	(1.643)	(0.7277)	(0.9799)	(0.7247)	(0.7732)	(0.3878)	(0.4465)
R-squared	0.7130	0.7123	0.1281	0.1478	0.6696	0.6421	0.8252	0.8238	0.7610	0.7607
Hansen J test		5.043**		0.003		3.780*		1.144		6.250**
Endogeneity test		0.591		0.004		1.740		0.919		0.096

The Kleiberg-Paap rk LM Statistics and the Anderson-Rubin Wald F test are respectively equal to 16.89 and 3.18 and they are significant at 5 percent level. This means that the second-stage regression is not underidentified (LM Stat) and inference is robust to weak instruments (Wald F test). The endogeneity tests is not significant, thus signalling that it is hard to reject the null hypothesis that the suspected endogenous regressor is instead exogenous. The overidentification test fails in two estimations, with total crimes and property crimes, and is at the limit for criminal organisation crimes (10 percent level). In the remaining specifications the test shows that the excluded instruments are not correlated with the error term of the main equations and the instruments are valid.

Each of the specifications has the same number of observations (N=578) and includes province fixed-effects and year dummies.

All the variables are expressed in logs except only for the index of Political orientation. Cluster-robust standard errors in parentheses

The analysis of this chapter is carried out in a similar way to what was done by Bianchi *et al*. (2012). In the OLS specification, Bianchi *et al*. (2012) found a positive and significant association of total immigration on total crimes and the effect seemed to be driven by a positive and significant impact on property crimes, specifically theft. In the case of the present chapter, the effect on total crimes and property crimes in the OLS specifications shown in Table 3.22 is positive but it is not statistically significant.

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Table 3.23 First-stage regression for FCS immigration

	FCS immigration
GDP p.c. growth (%)	**-0.0311*** **
	(0.0085)
Shift-share instr.	**0.0237** **
	(0.0102)
GDP per capita	-0.0036
	(0.0063)
Population density	-0.0767
	(0.5783)
Total population	-8.418***
	(1.427)
Unemployment rate	-0.1561*
	(0.0829)
Political index	0.0257
	(0.0226)
Clear-up rate	-0.1875
	(0.1828)
Non-FCS immigration	2.544***
	(0.3424)
Males aged 15-39	3.745*
	(2.225)
Kleibergen-Paap F-test	11.81
Cragg-Donald Walf F-test	14.99
Kleibergen-Paap LM Stat	16.89***
Anderson-Rubin Wald F-test	3.19**
Observations	578
Prov. fixed-effects	Y
Year dummies	Y

The Kleibergen-Paap F-test is higher than 10 as prescribed in the rule of thumb by Staiger and Stock (1997). A 0.1 percentage points increase in the weighted average of GDP per capita growth rate is associated with a lower FCS immigration by 0.3 percent and the effect is significant at 1 percent level. A 10 percent increase the shift-share is associated with a higher FCS immigration by 0.2 percent and the coefficient is significant at 5 percent level.
All the variables are expressed in logs except only for the index of Political orientation.
Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

The first-stage regression, displayed in Table 3.23, shows that the excluded instruments, highlighted in bold, satisfy the requirements as they are statistically significant in predicting changes of our variable of interest. Specifically, a 10 percent increase in the rate of growth of per capita GDP, in the home FCS countries of the migrants, decreases FCS migration by 1 percent. F-stat is higher than 10 as it is required for a good instrument (Staiger and Stock, 1997).[76] Moreover, the equation is not underidentified and the inference is robust to weak identification as it is shown respectively by the Kleibergen-Paap LM test and the Anderson-Rubin Wald F-test both being statistically significant at 5 percent level.

The IV results for the macro categories of crimes are presented also in Table 3.22 next to the OLS estimates. No statistically significant effect is found for any macro category of crimes and this seems contrary to hypotheses H1 and H2 made in subsection 3.1.1 of the present chapter. These results seem in line with the strand of literature that found no significant impact of immigration on crime (Chalfin 2014; Reid *et al*. 2005; Light and Miller 2018) and partially with Bell *et al*. (2013) and Bianchi *et al*. (2012) who found no significant impact of immigration on violent crime. However, both Bell *et al*. (2013) and Bianchi *et al*. (2012) found a small but significant positive effect of immigration on property crimes. The Hansen J statistics failed to accept the null hypothesis (J=0) in two out of five specifications, namely with total crimes, criminal organisations' crimes, and property crimes showing that the over-identification restrictions are failed to be met. Nonetheless, it is accepted in the other three specifications and the effect of FCS immigration is not statistically significant.

When the comparison is made between the IV estimates of this chapter and the ones obtained by Bianchi *et al*. (2012), it is possible to note some similarities and some discrepancies at the same time. The authors found that total immigration in the Italian provinces was positively and significantly associated with an increase in robbery crimes both in the OLS and IV specifications using ten-year differences instead of exploiting the panel data dimension of the data. In the present chapter,

[76] It also satisfies the requirements of Stock and Yogo (2005) and Bound *et al*. (1995).

the focus is on FCS immigration, therefore only a part of the total, and both OLS and IV are estimated by employing a panel data structure. This is done in order to take into account both time and space variables as well as resistance factors (details of the latter will be discussed in the next subsection 3.4.1 on robustness checks). The results show no significant impact of FCS immigration on the macro categories of crimes in the IV specifications.

For the control variables in the OLS and IV specifications with the macro categories of crimes, shown in Table 3.22, it is possible to see that GDP per capita has a small but significant effect on total crimes, homicides, property crimes, and violent crimes (the latter only in the IV estimation). This seems in line with most of the literature including Klaer and Northrup (2014) who found a positive impact of GDP per capita on crime rates. A negative coefficient for total population on criminal organisations' crimes and violent crimes can also be noticed. It is significant at 5 percent level in the IV specification for criminal organisations' crimes. It is only significant at 10 percent level in the OLS estimations for violent and criminal organisations' crimes. This evidence contrasts with the findings of the literature that predicts a positive impact of population size on crime rates such as Braithwaite (1975), Glaeser and Sacerdote (1999) and Chang *et al*. (2013). However, studies such as Nolan (2004) found both negative and positive impacts of total population on crime rates depending on the type of crime. The effect of non-FCS immigration is mixed, it is negative and significant in the IV specifications for total and property crimes, and in the OLS specification for criminal organisations' crimes. It shows a positive coefficient for violent and property crimes in the OLS specifications. All these coefficients are significant at 1 percent level. The mixed signs of the coefficients on non-FCS immigration seem in line with the mixed evidence on the effect of immigration on crimes as found by Bell *et al*. (2013), Alonso-Borrego *et al*. (2012) and Bianchi *et al*. (2012). This coefficient might also capture some reverse causality therefore we should be cautious when interpreting it. As expected, the coefficient of the clear-up rate, the share of total crimes with known offender, is negative. This is in line with the predictions and findings by Bianchi *et al*. (2012). It is also possible to notice a positive and significant impact of this rate on violent crimes in the IV specification and this seems in contrast with the predictions and

findings of the previous literature. For the impact of the log of the share of young males aged 15-29 and crime rates, the general predictions of the literature are that young males are associated with higher crime rates (Blumstein, 2002). The findings of this chapter are in line with these predictions as it is possible to see a positive and significant coefficient of males aged 15-29 years old for violent crimes in both the OLS and IV specifications. Further mechanisms should be explored, such as dealing with endogeneity issues and referring more extensively to specific literature in order to draw more robust conclusions on these variables, but it is not the direct interest of this study.

The following Table 3.24 presents the results of the OLS estimation for individual types of crimes. It is shown that FCS is positively correlated to mass murders, rapes, cyber frauds and receiving stolen goods. A 10 percent increase in FCS immigration would cause mass murders, rapes, cyber frauds, receiving stolen goods crimes to increase respectively by 2.8, 1.1, 0.4 and 0.7 percent. However, these coefficients are only significant at 10 percent level. These results seem to suggest that FCS immigration increase violent and property crimes in line with Couttenier *et al*. (2019) and Bianchi *et al*. (2012), but they suffer of endogeneity as hypothesised and thus they need to be compared with those of the IV method. In the OLS estimations by Bianchi *et al*. (2012), the impact of immigration appeared to be positive for theft crimes, in the case of this chapter this link is found instead, for some individual types of violent crimes.

Table 3.24 OLS and IV results for individual types of crimes

Dependent var.	FCS coeff. (OLS)	FCS coeff. (IV)	R2 (OLS)	R2 (IV)	Hansen J overid. test	Endogen. test
Mass murder	0.2795*	0.5802	0.0373	0.0476	3.317*	1.009
	(0.1562)	(0.4398)				
Intent. hom	0.0643	0.6257	0.0681	-0.0058	0.470	1.107
	(0.1150)	(0.5014)				
Attemp. Hom.	0.0861	-0.6280	0.0792	0.0014	0.058	2.444
	(0.0971)	(0.4816)				
Infanticides	0.0952	-0.0799	0.0209	0.0290	3.529*	0.179
	(0.0893)	(0.1499)				
Man slaught	0.0402	0.0437	0.0336	0.0246	0.786	0.004
	(0.1398)	(0.4112)				
Unint. Hom.	0.1461	0.5283	0.0638	0.0393	1.167	1.573
	(0.1051)	(0.3229)				
Blows	0.0031	-0.0204	0.1443	0.1527	0.809	0.007
	(0.0428)	(0.1784)				
Culp. injuries	0.0064	0.0200	0.2604	0.2711	1.654	0.044
	(0.0199)	(0.0718)				
Menaces	0.0167	-0.0470	0.4352	0.4323	1.449	1.813
	(0.0257)	(0.0710)				
Kidnapping	-0.0797	0.2266	0.1480	0.0976	0.192	0.651
	(0.1029)	(0.3683)				
Offences	0.0071	-0.0512	0.9636	0.9653	0.551	0.012
	(0.0610)	(0.1472)				
Rapes	0.1129*	0.0219	0.1219	0.0945	1.596	0.861
	(0.0624)	(0.2373)				
Sex w. minor	0.0809	-0.2360	0.0395	0.0327	2.853*	0.401
	(0.1230)	(0.4273)				
Corr. minor	-0.1726	0.4201	0.0258	-0.0135	0.012	1.689
	(0.1302)	(0.5102)				
Expl. Prost.	0.0681	0.5786	0.2041	0.1057	0.737	0.970
	(0.1275)	(0.5262)				
Child pornogr.	-0.0675	-0.2228	0.0951	0.0742	0.529	0.054
	(0.1339)	(0.5540)				
Theft	0.0197	0.0165	0.7301	0.7578	5.797**	0.025
	(0.0130)	(0.0531)				
Robbery	0.0402	-0.2051	0.3285	0.2804	2.472	3.030*
	(0.0483)	(0.1987)				
Extortions	-0.0535	-0.3851	0.4750	0.4493	0.682	1.432
	(0.0575)	(0.2933)				
Cyber fraud	0.0434*	-0.1373	0.7554	0.6768	5.343**	1.568
	(0.0256)	(0.1195)				
Cyber crime	-0.0833	0.0835	0.2812	0.2343	0.963	0.180
	(0.1046)	(0.3564)				
Count. goods	-0.0517	-0.1674	0.1794	0.1188	0.124	0.128
	(0.1060)	(0.3586)				
Int. property	0.1442	-0.0533	0.2297	0.0925	0.004	0.113
	(0.1559)	(0.6088)				

Table 3.24 (Continue)

Dependent var.	FCS coeff. (OLS)	FCS coeff. (IV)	R2 (OLS)	R2 (IV)	Hansen J overid. test	Endogen. test
Rec. st. goods	0.0656*	0.1701	0.2202	0.2404	0.077	0.670
	(0.0382)	(0.1390)				
Money laund.	-0.2137	-0.4922	0.0778	0.0878	2.498	0.197
	(0.1563)	(0.4912)				
Usury	0.0975	-0.2379	0.0640	0.0465	0.467	0.683
	(0.1293)	(0.4163)				
Damage crime	0.0324	-0.1638**	0.8969	0.8481	1.073	8.973***
	(0.0242)	(0.717)				
Arson crime	0.0398	0.2495	0.3900	0.4628	2.220	1.093
	(0.0771)	(0.2976)				
Dam. from arson	-0.0802	-0.1254	0.1610	0.1852	3.423*	0.173
	(0.0666)	(0.2910)				
Drug trafficking	0.0113	0.1841	0.2204	0.1495	0.869	0.933
	(0.0438)	(0.1943)				
Attacks	-0.0079	-0.3187	0.0579	0.0506	1.961	0.348
	(0.1075)	(0.5194)				
Crim. assoc.	0.1396	0.2886	0.0445	0.0673	1.706	0.005
	(0.1306)	(0.6413)				
Mafia crime	0.1630	0.9098**	0.0225	-0.0830	0.716	4.314**
	(0.1085)	(0.3972)				
Smugg. crime	-0.1322	-0.0522	0.1311	0.0201	1.817	0.030
	(0.1710)	(0.4805)				
Oth. crime	-0.0039	0.0552	0.2814	0.2888	2.691	0.350
	(0.0176)	(0.0660)				

The Kleiberg-Paap rk LM Statistics and the Anderson-Rubin Wald F test are respectively equal to 16.89 and 3.18 and they are significant at 5 percent level. This means that the second-stage regression is not underidentified (LM Stat) and inference is robust to weak instruments (Wald F test). The endogeneity test shows that endogeneity concerns arise significantly when estimating the effect of FCS immigration on damage and mafia crimes. The endogeneity tests for the two types of crimes are respectively equal to 8.973 and 4.314 and are significant at 1 and 5 percent level. The overidentification tests fails with theft crimes and cyber frauds suggesting that the instruments may not be appropriate in these specifications, but it shows that overidentification restrictions are not violated in most of the other specifications (i.e., the test is not significant or only at 10 percent level) especially in those cases where the variable of interested presents a significant link with the dependent variables, damage and mafia crimes.
Each of the specifications has the same number of observations (N=578) and includes province fixed-effects and year dummies.
All the variables are expressed in logs except only for the index of Political orientation.
Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

The IV results are also shown in Table 3.24 next to the OLS ones. They suggest that the results of the OLS are not consistent once corrected for the endogeneity bias and they present evidence of a statistically significant association between FCS immigration and both damage crimes and mafia crimes, but with opposite sign. A 10 percent increase in FCS immigration is associated with a 1.6 percent decrease in damage crimes and the coefficient is significant at 5 percent level. For mafia crimes, a 10 percent increase in FCS immigration is associated with a 9.1 percent increase

in mafia crimes and this effect is also significant at 5 percent level. The coefficient on damage crimes seems to suggest evidence of an immigration revitalisation perspective as supported by Lee and Martinez (2009) and outlined in the previous hypotheses section. On the other hand, the results seem in line with the qualitative evidence provided by Duca (2014) who suggested that immigrants may be exploited by mafia organisations for their illegal activities and this link was also included in the previous hypotheses section. The Hansen J test failed to meet the over-identifying restrictions in two specifications namely those of thefts and cyber frauds while it shows evidence of their validity in all the other specifications. The endogeneity test is not significant at 5 percent level in all the specifications except for those showing a significant impact of FCS immigration on crime rates. The non-significance of the endogeneity test shows that the variable of interest is not endogenous in most of the specifications but is endogenous in the cases of damage and mafia crimes.

For damage crimes, FCS is significantly associated with a lower incidence of damage crimes. This would be in favour of an immigration revitalisation perspective as pointed out by Lee and Martinez (2009) and theorised by Sampson (2008).[77] Following the authors' studies, immigrants have strong incentives to behave correctly in a country different from their origin one where they are likely to be under the spotlight of criminal justice and to be discriminated. Moreover, immigration promotes family unity, thereby reducing crime and violence.

On the other hand, the results show that immigration has a positive effect on mafia-type of crimes. Specifically, a 10 percent increase of FCS immigration would increase mafia-type of crimes by 9.1 percent. As data on the nationality of the perpetrators by type of offence are not available, it cannot be established that high immigration means a higher rate of mafia crimes committed by immigrants. In fact, it is possible that in the context of an increase in mafia crimes, immigrants are victims rather than perpetrators. In this perspective, an explanation for the positive link between immigration and mafia crimes is given by the intertwining of mafia and corruption in the management of immigrants' inflows. The higher the inflow of

[77] See also Martinez *et al.* (2010) for additional evidence on the immigration revitalisation perspective.

immigrants the higher the funds that are spent for reception and management of inflows and the higher the interests of mafia-type of organisation in making money out of this context (UN Report 2011). In other cases, immigrants are actually involved in criminal activities sponsored by organised crime (Garcia and Gonzalez 2009).

3.3.1 Robustness checks

Although the IV estimations served for correcting the endogeneity issues related to the main variable of interest, some robustness checks need to be conducted in order to verify the consistency of the estimates. There are two main problems here. One consists of the so-called "resistance factors" which are factors that affect crime rates because of them happening in specific provinces and years. The second problem is due to the spill over effects on crime rates that might take place from one province to another, for example because migrants move from one province to another. For dealing with these two estimation issues, three specifications have been run.

Table 3.25 2SLS results for FCS and damage type of crimes

Damages crime	IV (1)	IV (2)	IV (3)	IV (4)
FCS immigration	-0.1638**	-0.0597	-0.0572	-0.0534
	(0.0717)	(0.0594)	(0.0631)	(0.0588)
GDP per capita	-0.0114***	-0.0101**	-0.0100**	-0.0086*
	(0.0041)	(0.0045)	(0.0045)	(0.0044)
Population density	0.1089	0.2472	-0.2430	0.2056
	(0.1998)	(0.2121)	(0.2121)	(0.2119)
Total population	-2.669***	-1.979**	-1.945***	-1.841**
	(1.004)	(0.8516)	(0.8672)	(0.8097)
Unempl. rate	-0.0472	-0.0360	-0.0355	-0.0258
	(0.0393)	(0.0330)	(0.0334)	(0.0318)
Political index	0.0013	0.0016	0.0013	-0.0005
	(0.0102)	(0.0091)	(0.0092)	(0.0092)
Clear-up rate	-0.4202***	-0.3855***	-0.3843***	-0.3744***
	(0.1021)	(0.1057)	(0.1042)	(0.1016)
No FCS imm.	0.4637**	0.2993	0.2907	0.1988
	(0.1995)	(0.1887)	(0.1931)	(0.1771)
Males aged 15-39	2.006**	1.658**	1.641**	1.607**
	(0.9054)	(0.7559)	(0.7224)	(0.6465)
Tot. Imm. North			0.0072	
			(0.1063)	
Ita. Imm. North				-0.0750
				(0.0755)
Fgn. Imm. North				0.0860***
				(0.0297)
Tot. Imm. Centre			-0.0240	
			(0.0441)	
Ita. Imm. Centre				0.0309
				(0.0303)
Fgn. Imm. Centre				-0.0724*
				(0.0385)
Tot. Imm. South			0.0122	
			(0.0635)	
Ita. Imm. South				0.0055
				(0.0649)
Fgn. Imm. South				-0.0046
				(0.0256)
Centred R2	0.8481	0.8864	0.8869	0.8932
Hansen J stat	1.073	1.539	1.581	2.302
Endogeneity test	8.973***	3.929**	3.674*	3.783*
Observations	578	578	578	577
Macro Reg*Time	N	Y	Y	Y

The Kleiberg-Paap rk LM Statistics is significant with a p-value lower than 5 percent, therefore the null can be rejected, and the equation is identified. The Anderson-Rubin Wald F test is not significant, and this means that the coefficient of the variable of interest is not statistically different from 0, thus the inference is not robust to weak identification. When adding the variables related to internal migration, the endogeneity test becomes significant only at 10 percent level, showing that it is harder to reject the null hypothesis of exogeneity of the main variable of interest.
All the variables are expressed in logs except only for the index of Political orientation.
Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 3.26 2SLS results for FCS and mafia-type of crimes

Mafia-type crime	IV (1)	IV (2)	IV (3)	IV (4)
FCS immigration	0.9098**	1.232***	1.275***	1.227**
	(0.3972)	(0.4570)	(0.4885)	(0.4884)
GDP per capita	-0.0185	0.0034	0.0024	0.0057
	(0.0135)	(0.0128)	(0.0128)	(0.0135)
Population density	0.3632	0.0680	0.2599	0.2421
	(1.907)	(1.878)	(1.872)	(1.785)
Total population	10.01*	10.69*	10.54*	9.775*
	(5.105)	(5.643)	(5.616)	(5.592)
Unempl. rate	0.3173	0.3227	0.3113	0.2691
	(0.2148)	(0.2453)	(0.2483)	(0.2408)
Political index	0.0042	-0.0071	0.0121	-0.0081
	(0.0536)	(0.0563)	(0.0567)	(0.0546)
Clear-up rate	0.4128	0.6229	0.6350	0.5934
	(0.4264)	(0.4891)	(0.5046)	(0.4911)
No FCS imm.	-3.150**	-2.906**	-3.075**	-2.815
	(1.286)	(1.340)	(1.431)	(1.386)
Males aged 15-39	-3.297	-5.427	-5.360	-5.130
	(3.539)	(3.995)	(4.026)	(4.009)
Tot. Imm. North			0.1080	
			(0.5092)	
Ita. Imm. North				0.1249
				(0.4329)
Fgn. Imm. North				-0.2782
				(0.1855)
Tot. Imm. Centre			-0.4510*	
			(0.2708)	
Ita. Imm. Centre				-0.3304
				(0.2066)
Fgn. Imm. Centre				-0.0808
				(0.1893)
Tot. Imm. South			-0.2685	
			(0.2909)	
Ita. Imm. South				-0.3077
				(0.3014)
Fgn. Imm. South				0.0642
				(0.1410)
Centred R2	-0.0830	-0.1336	-0.1413	-0.1172
Hansen J stat	0.716	0.364	0.379	0.343
Endogeneity test	4.314**	7.794***	7.386***	6.983***
Observations	578	578	578	577
Macro Reg*Time	N	Y	Y	Y

The Kleiberg-Paap rk LM Statistics is significant with a p-value lower than 5 percent, therefore the null can be rejected, and the equation is identified. The Anderson-Rubin Wald F is also significant at 5 percent level meaning that H0 (the coefficient of the variable of interest is not statistically different from 0) can be rejected with a probability not lower than 95 percent. When adding the variables related to internal migration, the endogeneity test becomes more significant, thereby confirming the potential endogeneity with respect to the variable of interest FCS immigration.
All the variables are expressed in logs except only for the index of Political orientation.
Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

In the first, the interactions between macro regions (NUTS-1 level) fixed-effects and year dummies are added to the main estimation. This is done in order to control for the multilateral resistance factors and allow each macro region to have its own trend. Secondly, given that immigrants might move between provinces thereby generating spillover effects, the variables on the total internal migration from the North, Centre and South to the province of reference are added to the specifications.[78] Finally, the internal migration is divided into migration of Italian citizens and of foreign citizens from North, Centre and South. Internal migration has been considered as an important factor to be taken into account when analysing the determinants of crime rates in many previous studies (Debnath and Roy 2013; Kollamparambil 2019).[79]

The results are presented in the above Tables 3.25 and 3.26 respectively for damage and mafia crimes.

For damage crimes (Table 3.25 above), the addition of the interaction terms between macro regions and time dummies sweeps out the significance of the coefficient on FCS immigration. When internal migration is added, the endogeneity test becomes significant only at 10 percent level suggesting that it is more difficult to reject the exogeneity hypothesis related to the main variable of interest. This result seem contrary to the hypothesis H1 that FCS immigration would increase violent crimes although damage crime could be unintentional and is not normally included in the violent crimes category.

For mafia crimes (Table 3.26 above), the coefficient remains significant through the different checks and becomes even more sizeable. A 10 percent increase in FCS immigration is found to increase mafia crimes by 12 percent. The endogeneity test becomes more significant shifting from 5 to 1 percent level showing that the null hypothesis can be rejected with 99 percent of probability and, thus, the regressor is endogenous and the IV estimation is an appropriate approach to be used. This result is in line with hypothesis H3 that FCS migration is positively and significantly

[78] Internal migration is also expressed as a rate per 100000 inhabitants and I took the log of it when adding it to the empirical estimation. Further details are provided by Table 3.D.23 in Appendix 3.D where the comprehensive list of variables is presented.

[79] See, also, Egger (2021) for an account of internal migration and crime.

associated with mafia crimes. It confirms the link between immigration and mafia crimes as reported in the qualitative paper by Duca (2014).

As a further robustness check, the rate of hospitality facilities per 100000 inhabitants is controlled for. The reason for including this variable is that it could be a confounding factor given that mafia reinvest part of the proceedings of the criminal activity in the hospitality and tourism sector, as found by Schneider (2008). The results of the specification that includes this variable are shown by Table 3.27 in the next page. It can be noticed that the coefficient of FCS remains positive and significant in so confirming hypothesis H3 stated in subsection 2.1.1 above that immigration from FCS is positively linked to mafia crimes.

Table 3.27 2SLS robustness checks results for FCS and mafia-type of crimes

Mafia-type crime	IV - Hotels
FCS immigration	1.195**
	(0.4757)
GDP per capita	0.0157
	(0.0155)
Population density	0.3696
	(1.723)
Total population	8.418
	(5.380)
Unempl. rate	0.2413
	(0.2341)
Political index	-0.0046
	(0.0539)
Clear-up rate	0.5918
	(0.4791)
No FCS imm.	-2.810**
	(1.368)
Males aged 15-39	-4.847
	(4.028)
Tot. Imm. North	
Ita. Imm. North	0.1155
	(0.4103)
Fgn. Imm. North	-0.2560
	(0.1802)
Tot. Imm. Centre	
Ita. Imm. Centre	-0.3633
	(0.2099)
Fgn. Imm. Centre	-0.0715
	(0.1838)
Tot. Imm. South	
Ita. Imm. South	-0.2834
	(0.2970)
Fgn. Imm. South	0.0563
	(0.1364)
Hospitality facilities rate	0.4260
	(0.3006)
Centred R2	-0.0988
Hansen J stat	0.515
Endogeneity test	6.929***
Observations	577
Macro Reg*Time	Y

The Kleiberg-Paap rk LM Statistics is significant with a p-value lower than 5 percent, therefore the null can be rejected, and the equation is identified. The Anderson-Rubin Wald F is also significant at 5 percent level meaning that H0 (the coefficient of the variable of interest is not statistically different from 0) can be rejected with a probability not lower than 95 percent. When adding the variables related to internal migration, the endogeneity test becomes more significant, thereby confirming the potential endogeneity with respect to the variable of interest FCS immigration.
All the variables are expressed in logs except only for the index of Political orientation.
Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

The results presented in the robustness checks show that FCS immigration is not significantly linked to damage crimes and these seems partially contrary to hypothesis H1, although damage crime is normally not included among the macro category of violent crimes (Bianchi *et al*. 2012; Bell *et al*. 2013). Also, no support has been found for hypothesis H2. FCS immigration does not seem to be associated with higher rates of property crimes as instead found by Farrell and Zimmermann (2018). On the other hand, the findings for FCS immigration and mafia crimes seem to confirm hypothesis H3 of a positive and significant link between immigration from fragile countries and mafia crimes. Immigrants could be both offenders and victims of mafia crimes (Spencer *et al*. 2006). The mechanism of exploitation of immigration that increases economic opportunities for mafia organisations and, thus, immigrants being victims of mafia, seems in line with the qualitative evidence provided by Duca *et al*. (2014) and also with the stories of exploitation reported in some news articles (The Guardian 2018). The criminal-network model, introduced by Wortley (2009) and verified empirically by Mastrobuoni (2015) and Sciarrone and Storti (2014) sees immigrants as offenders and members of mafia organisations, thereby explaining a positive link between immigration and crime. However, in the case of this chapter, the explanation that seems more plausible is that immigrants are victims and exploited by mafia organisations. The reason why this might be the case is that pre-immigration connections that push immigrants to move in order to join a criminal network in the host country normally happen when the cultural background is the same. In other words, mafia organisations tend to be linguistically and culturally homogeneous where members come from the same country and even the same region in a country (see Mastrobuoni 2015 for the connections in Italian-American mafia; Nožina 2004 for Chinese and Albanian mafias in the Czech Republic). Because FCS immigrants, in this chapter, come from 13 different countries, there is no common cultural or linguistic background that would explain a direct link with the organised crime within the same ethnic and cultural groups. However, it could also be that the explanation can be found in the increase collaboration among criminal organisations with different ethnical background (Italian Interior Ministry 2019).

Overall, the data available for this chapter do not provide a precise explanation of the mechanism for which a significant and positive link between FCS immigration and mafia is observed. Further research could potentially exploit more detailed data in terms of what type of mafia organisations the data refer to (i.e., Italian mafia or other nationalities) and the specific crimes that are committed by these criminal organisations. With this setting, a more precise explanation of the link could be provided, thereby understanding whether the link is due to criminal networks or increased victimisation of immigrants by mafia organisations.

3.4 Concluding remarks

In this chapter, the link between FCS immigration and crime rates, for various types of crimes, is taken into account in the context of the Italian provinces.

At first, the link with different macro categories of crimes has been estimated through OLS fixed-effect regressors. FCS has been found having a significant association with an increase in criminal association crimes, but the result is only significant at 10 percent level. After the correction of the suspected endogeneity through the IV procedure, FCS has been found to have no significant association with any macro category of crimes.

The same estimation has been repeated but with individual types of crimes. Some significant impacts are spotted for mass murders, rapes, cyber frauds and receiving stolen goods crimes. The results of the 2SLS regressions for solving the endogeneity bias show that FCS immigration does not have a significant impact when considering macro categories of crimes (violent crimes, property crimes, etc.), but it is significant when considering individual types of crime. Specifically, the 2SLS estimation show a negative effect on damage crimes and a positive effect on mafia-type of crimes. After carrying some robustness checks namely the inclusion of resistance factors and checking for the presence of spill over effects, as well as for the rate of hospitality facilities, which represent a way for mafia organisation to launder money by investing the proceedings of criminal activities, the findings

show that FCS immigration significantly affects mafia-type of crimes, by causing them to rise.

These results suggest that the theory of the importation model (Wortley 2009) could explain the link between immigration from FCS and mafia crimes. However, this effect may also be explained by the exploitation of immigrants by mafia. A perspective that sees immigrants as victims of mafia exploitation in order to increase the organisation's business (Duca 2014). The data used in the present study do not allow to understand whether immigrants have committed crimes or are victimised by others, but given that countries defined as FCS in the data of this study are very different one another in terms of cultural background, language and so on, it is less likely that a potential positive link between FCS immigration and mafia crimes is driven by an active and voluntary participation in the mafia's illegal activities of these migrants as members of the criminal organisations. Mafia crimes conventionally includes activities such as drug trafficking, human trafficking and smuggling, exploitation of prostitution, extortions, and the exploitation of illegal work paid under the minimum guaranteed wages (Interior Ministry, 2011). An article published on the British newspaper The Guardian (2018), written by Barbie Latza Nadeau, explains how the recruitment of immigrant girls, mainly Nigerians, to be trafficked as prostitutes, works. They are lured to a life as hairdressers or other jobs though these jobs do not exist and are simply a trap to make them work as prostitutes. Similarly, immigrant males are selected from the reception centres and farmers look for those who are the strongest physically in order to make them work on the fields harvesting tomatoes and citrus fruits for a very low pay.[80] In this perspective, immigration would increase the criminal business of mafia organisation whilst immigrants are victims rather than perpetrators.

There are some policy implications associated to the findings of this chapter. Given the statistically positive and significant association between FCS immigration and mafia-type of crimes, the first thought that could come to mind would be one of using a restrictive migration policy towards these migrants in order to avoid crime rates to increase. However, it could also be suggested that, rather than reducing immigration *tout court* policy makers might consider tackling the channels through

[80] The article is "The long read" of The Guardian as of February 2018.

which the connection between FCS migrants and mafia-type of criminal organisations manifests itself. In the case in which FCS migrants are the perpetrators, operating as members of the mafia-type of organisation (here more detailed data than the one available for this study might help in better identifying this channel), one could imagine that the link between the organisation and the member was active before the migration took place (Wortley, 2009), and therefore it would be important to prevent the communications between these imported criminals and the organisations they belong to. On the other hand, migrants could be "employed" by the mafia-type of organisations and in this perspective, they would be rather subjected to exploitation by the organisation (Duca, 2014). Effective policies, in this case, might act in the direction of increasing the opportunities for migrants to land jobs in the formal sector (e.g., the issuance of a residence permit giving the right-to-work), as well as programs for the integration of migrants' labour in the internal market.

Further research might investigate the effect of immigration from macro geographical areas on crimes, in order to give a broader view of the impact of different cultural backgrounds of the immigrants on the various types of crimes. It might also consider the impact at regional level or for a longer time span. Alternatively, if data are available, one could use similar cohort data such as those used by Couttenier *et al*. (2019) for replicating the analysis at a more micro and detailed level.

Appendix 3.A: Definitions of the individual types of crimes (Articles from Italian Criminal Law)

Table 3.A.28 List of the crimes included in the analysis with short definitions from Italian Criminal Law

Name of the crime	Short definition
Mass murder	Article 422 – the intention to kill many people
Intentional homicide	Article 575 – the prior intention to kill one or more targeted people
Attempted homicide	Article 56 – the intention to kill one or more targeted people without managing to do it
Infanticide	Article 578 – Killing a new-born or the foetus
Manslaughter	Article 575 – the killing of one or more people (no prior intention)
Unintentional homicide	Article 589 – the killing without any intention and without being able to avoid it
Blow	Article 581 – beating physically another person
Culpable injuries	Article 590 – damaging another person without intention
Menace	Article 612 – threatening somebody
Kidnapping	Article 630 – kidnapping someone
Offence	Article 594 – offending the honour of a person
Rape	Article 609 – Forcing someone to commit sex acts
Sex with minors	Article 609 quater – Perpetrating sexual acts with a minor who is not capable to express her/his consent
Corruption of minor	Article 609 quinquies – Having sex in front of a minor in order to force him/her to watch the sexual act
Exploitation of prostitution	Article 3 – Earning the proceedings of prostitution activities done by third parties
Child pornography	Article 4 – Owning pornographic material where the subjects are children or however minor
Theft	Article 624 – Stealing things from somebody without face to face contact with the victim
Robbery	Article 628 – Stealing things from somebody through face to face contact with the victim and use of violence or other means
Extortion	Article 629 – Forcing someone to do something or omit doing something in order to have a monetary gain
Cyber fraud	Article 640 ter – Intervening illegally on cyber content (data, programs, information)
Cyber crime	Article 635 – destroying or damaging cyber content belonging to other people
Counteractions on goods	Article 473 – changing the logo or distinctive sign of the industrial property of a product in order to resell and make profit and other cases
Intellectual property violations	Article 473 – changing the logo or distinctive sign of the industrial property of a product in order to resell and make profit and other cases

Table 3.A.28 (Continue)

Receiving stolen goods	Article 648 – Selling or anyway hiding things obtained through criminal activities
Money laundering	Article 648 bis – Intention of hiding and making more difficult to trace money or other goods in order to swipe a crime
Usury	Article 644 – Someone asking anybody to promise to repay a loan with an excessively high and illegal interest rate
Damaging	Article 635 – Anyone who destroys others' belongings or properties
Arson	Article 423 – Anyone who burn someone else goods in an illegal manner
Damaging after arson	Article 424 Anyone who wants to damage others' belongings through burning and causes an arson for his/her conduct
Drug trafficking	Article 73 – Anyone who sell illegal drugs
Attacks	Article 283 – Anyone who wants to change the Constitution of the State through violent means
Criminal association	Article 416 – When three or more people organise themselves together in association in order to commit crimes
Mafia crimes	Article 416-bis – Whichever crime who derives from forcing someone in committing a crime due to the association rules and the submission and silence in relation to all the criminal activities linked to the mafia organisation. The aim is to obtain directly or indirectly the control on economic activities.
Smuggling	Article 601 - Introduce people inside the territory of a State with cheating and violence or anyway abuse of the condition of the victims.

Appendix 3.B: Countries of the FCS list and macro categories of crime

Table 3.B.29 Individual countries included in the FCS list over the reference period

Geographical units	FCS over the period 2010-17
91 out of 122 Italian Provinces due to data availability	Afghanistan, Burundi, Central African Republic (CAR), Côte d'Ivoire, Democratic Republic of Congo (DRC), Guinea-Bissau, Haiti, Kosovo, Liberia, Palestine, Sierra Leone, Somalia, Sudan

Table 3.B.30 Types of crimes and macro groups

Macro crime group	Individual crimes included
Homicides and manslaughters	Intentional homicides, attempted homicides, mass murders, manslaughters, infanticides, attacks, unintentional homicides
Criminal association[81]	Mafia crimes, other criminal organisations crimes, cyber and internet crimes, intellectual property crimes, money laundering, extortions, exploitation of prostitution, usury, drug trafficking, receiving stolen goods, counteractions of goods and industrial products, smuggling crimes
Violent and minor-related crimes	Blows, menaces, culpable injuries, kidnapping, offences, rapes, sexual act with minors, child pornography, corruption of a minor
Property crimes	Robberies and thefts

[81] In the "criminal association" category, we include those crimes committed by criminal organisations excluding homicides that are included in the category "homicides and slaughters".

Appendix 3.C: List of variables, descriptive statistics and correlation matrix

Table 3.C.31 Comprehensive list of all variables used in the empirical analysis

Variables (all measured at province-level)	Source	Unit of measurement
Crime rates Macro categories: Total crimes, Homicides and manslaughters, Criminal organisations' crimes, Violent crimes, Property crimes. Individual types: Mass murders, Intentional homicides, Attempted homicides, Infanticides, Manslaughters, Unintentional homicides, Blows crimes, Culpable injuries, Menaces, Kidnappings, Offences, Rapes, Sex with minors, Corruption of minors, Exploitation of prostitution, Child pornography, Thefts, Robberies, Extortions, Cyber frauds, Cyber crimes, Counteractions of goods and services, Intellectual property crimes, Receiving stolen goods, Money laundering, Usury, Damage crimes, Arson crimes, Damage with arson, Drug trafficking, Attacks, Criminal association crimes, Mafia crimes, Smuggling.	ISTAT Open Access Database. Section on *Justice and Security*.	Rate per 100000 inhabitants
FCS immigration Stock of foreign citizens from countries categorised as FCS by the World Bank during the reference period 2010-17.	ISTAT Open Access Database. Section on *Demographics*.	Rate per 100000 inhabitants
GDP per capita	Eurostat Open Access data.	Euro per head
Population density	Eurostat Open Access data.	Persons per square kilometre
Total population	ISTAT Open Access Database. Section on *Demographics*.	Number
Unemployment rate	ISTAT Open Access Database. Section on *Demographics*.	Percentage of total population

Table 3.C.31 (Continue)

Variables (all measured at province-level)	Source	Unit of measurement
Index of political orientation It is built as an index taking the following values: -1 if the mayor of the province (or the biggest municipality in the province if unavailable) is the expression of an "Extreme-Left" coalition (i.e., the majority of parties in the coalition are "Extreme-Left"-wing such as Comunisti Italiani, Liberi e Uguali, Sinistra Ecologia e Libertà, etc.), -0.5 if Centre-Left (i.e., Partito Democratico, Centro Democratico, ecc.), 0 if not related to a coalition with a clear political orientation (i.e., technical governments where the chief is a special commissioner independent from the politics, mayor from Movimento Cinque Stelle or from civic coalitions independent and not supported by from political parties present in the national parliament), +0.5 if Centre-Right (i.e., Forza Italia, Unione di Centro, Noi con l'Italia, etc.), and +1 if "Extreme-Right" (Lega, Fratelli d'Italia, Forza Nuova, Casapound).	Website tuttitalia.com. It gathers information on local municipalities, provinces and regions in Italy. Information concerns politics, demography, economic sectors, and so on.[82]	Number
Clear-up rate It is a ratio of the crimes with known offender on the total number of crimes. In the past, this variable was available for different types of crimes, now it is only available for the total number of crimes.	ISTAT Open Access Database. Section on *Justice and Security*.	Percentage
No-FCS immigration Stock of foreign citizens who are not from a country defined as FSC during the reference period 2010-17.	ISTAT Open Access Database. Section on *Demographics*.	Rate per 100000 inhabitants
Males aged 15-39 It is the share of males aged 15-39 years old out of the total population.	ISTAT Open Access Database. Section on *Demographics*.	Percentage
Internal migration. Internal migration from the North, Centre and South by province and divided in: - Total internal migration. - Internal migration of Italian citizens. - Internal migration of foreign citizens. In total, 9 variables referring to internal migration.	ISTAT Open Access Database. Section on *Demographics*.	Rate per 100000 inhabitants
Hospitality facilities It is the rate per 100,000 inhabitants of the number of hospitality facilities divided by the total population per province.	ISTAT Open Access Database. Section on *Services*.	Rate per 100000 inhabitants

[82] The website is available at: https://www.tuttitalia.it/comuni/.

Table 3.C.31 (Continue)

Variables (all measured at province-level)	Source	Unit of measurement
GDP per capita annual growth rate for FCS A weighted average, where the weights are stock of foreign citizens from each of the FCS included in the sample multiplied by the respective GDP per capita annual growth in that FCS.	World Development Indicators (WDIs), World Bank Open Access Database. Combined with ISTAT data on stock of foreign citizens from FCS living in the Italian provinces.	Percentage
Shift-share instrument. It is the differential in the immigrant flow by citizenship at national level in France between period t and t-1 (present year minus the year before). It is also a sort of weighted average where the inflow of immigrants by citizenship at national level in France is multiplied by the stock of the population of the same citizenship living in the Italian provinces lagged of one year (t-1). This lag is used as a sort of weight and then the sum-product is divided by the total population of the province. This is a "classic" instrument used in the empirical analysis of the socio-economic effects of immigration and is taken from Bianchi *et al*. (2012).	International Migration Database (IMD), OECD Open Access Databank. Combined with ISTAT data on stock of population by citizenship living in the Italian provinces.	Number

Chapter 4: The link between migratory background and crime perceptions. A repeated cross-sectional analysis with household data

4.1 Introduction

While the focus of the previous chapters was on migration from fragile countries, the present chapter takes into account the link between country of birth, proxy for migratory background, and crime perceptions in various European countries using EU-SILC micro-data.

Crime perceptions and fear of crime can affect mental health and they have implications on economic growth and wellbeing (Foster *et al*. 2016).[83] Various studies have tried to understand the determinants of fear of crime, some of them taking into account differences across race and ethnic groups.[84] In this chapter, the research interest is to understand the relationship between migratory background, proxied by country of birth, and crime perceptions. Moreover, other factors that may affect crime perceptions, borrowed from the SDT (Shaw and McKay 1942; Sampson and Groves 1987), are also considered and they are interacted with the country of birth to obtain the combined estimates of migratory background and the various socio-economic or environmental factors.

The present study contributes to the literature in three main ways. Firstly, while most of the studies take into account the impact of migratory background on its own (Pearson and Breetzke 2014), the present chapter also considers the joint coefficient with other factors (socio-economic background, housing deprivation, gender, etc.). Secondly, this is one of the few quantitative non-experimental studies on crime perceptions while most of the others are experimental quantitative (Foster *et al*. 2016) or qualitative studies (Lorenc *et al*. 2012; 2013a; 2013b).[85] Finally, the analysis concerns many households across different European countries in the period 2004-10 and exploits the EU-SILC dataset, while most of the analysis are carried out within a country or in a specific context (Hipp 2010; Callanan 2012).

The rest of the chapter is structured as follows. Subsection 4.1.1 outlines the hypotheses that the chapter tests specifically the link between migratory background and diversity and crime perceptions. Section 4.2 introduces the dataset

[83] See also Lorenc *et al*. (2012; 2013a; 2013b).
[84] See, for instance, Callanan (2012).
[85] An analysis more similar than others to the one of the present chapter is the one by Callanan (2012), but the sample was much smaller than the one used in this chapter.

and some descriptive statistics and correlations between variables. Section 4.3 presents the methodological approach used in the empirical analysis. Section 4.4 discusses the results of the empirical estimations. Section 4.5 provides some concluding remarks, policy implications and perspectives for future research.

4.1.1 Hypotheses

This subsection presents the hypotheses that are to be tested throughout the chapter based on the main research question.

Although a theoretical framework as such does not exist with regard to the link between country of birth and crime perceptions, a number of previous studies dealt with this relationship empirically and provided qualitative and quantitative evidence. Many studies found that race is positively associated with perceptions of unsafety and fear of crime (Boateng and Adjekum-Boateng 2017; Box *et al*. 1988). On the contrary, some other studies found that fear was lower among ethnic and racial minorities compared to natives (Barton *et al*. 2017), however, this might be in line with the findings of Brunton-Smith and Sturgis (2011) who found that in neighbourhoods with low ethnic heterogeneity fear of crime is higher among ethnic minorities, while the reverse was true when the neighbourhood presented a high degree of racial diversity.[86] Some other studies found no significant and substantial impact of race on fear of crime (Clemente and Kleiman 1977).

Nevertheless, the bulk of studies seem to show that race and ethnicity are positively associated to higher fear of crime (Fox *et al*. 2009; Ortega and Myles 1987; Randa and Mitchell 2018).[87] Therefore, the first hypothesis of Chapter 4 is the following:

H1. Given the findings of many previous studies that showed that race and migratory background are positively and significantly associated with fear of crime at individual level, the expectation is that the country of birth (non-native heads of

[86] See also Alda *et al*. (2017) for race and confidence on the police and Cho and Ho (2018) for ethnic heterogeneity and perceptions of public safety.
[87] See also Shelley *et al*. (2021).

households) is positively and significantly associated with the probability of reporting crime as an issue of the neighbourhood.

Along with country of birth, other factors that measure the level of deprivation and concentrated disadvantage, borrowed from the SDT, that are likely to be correlated with higher fear of crime would be interacted with country of birth.[88] Given that SDT factors have been found to be linked to higher fear of crime, the second hypothesis is the following:

H2. Country of birth is expected to be significantly and positively associated with fear of crime as well as the SDT factors are as found by Brunton-Smith *et al*. (2013). Thus, the interactions between country of birth and SDT factors are expected to have a positive and significant association with fear of crime.

The SDT factors considered in the present chapter are socio-economic deprivation, housing deprivation, environmental deprivation, monetary poverty, family disruption (measured by single parent households and disrupted marital status separately), are correlated with higher fear of crime and their interactions with the variables of interest would also yield a positive coefficient.
Some empirical studies have found that female gender is associated with higher fear of crime (Ortega and Myles 1987; Fox *et al*. 2009). Other studies have combined the effect of gender and race/ethnicity and found that women of an ethnic minority or from a different race compared to the majoritarian group are more likely to fear crime (Callanan 2012). For this reason, the third hypothesis that is addressed in this chapter is the following:

H3: Given that women and immigrants are more likely to be fearful of crime and given the results of previous studies that found that a positive effect from combining gender and ethnicity or migratory background, a positive and significant coefficient of the interaction term between female and country of birth is expected.

[88] Brunton-Smith *et al*. (2013) and Brunton-Smith and Sturgis (2011) found that social disorganization and the factors leading to it also affect the fear of crime.

Other studies have found that the female gender to be a significant predictor for fear of crime and race or ethnicity to be negatively associated with it, although broadly not particularly significant (e.g., Reid and Konrad 2004 for fear of specific types of crimes). The interactions of gender and race have been proved significant also by Callanan and Rosenberg (2015), with female being more fearful of crime compared to men for most of the races.

The remaining of the chapter tests these hypotheses refer back to them when discussing the empirical results of the estimation.

4.2 Dataset and descriptive statistics

The main source of data is the cross-sectional European Union Survey on Income and Living Conditions (EU-SILC). The EU-SILC database has been used in many empirical analyses and can be either cross-sectional or longitudinal.[89] For instance, the longitudinal EU-SILC is used by many authors to estimate the impact of individual characteristics on income levels and poverty.[90] In the present chapter, the longitudinal EU-SILC could not be used because the variables of interest are not included and can only be found in the cross-sectional EU SILC. Thus, the data framework used in the present chapter is a repeated cross-sectional. Although, this framework includes much heterogeneity as it is not possible to follow the same set of households and individuals over time, it allows to control for many factors and to have a large dataset including time-related dummies and country-region fixed-effects (Verbeek 2008).[91]

The data employed cover the period 2004-2010 and concern most of the EU-27 countries plus the UK and some EEA countries (Iceland and Norway), and

[89] Iacovou *et al*. (2012) point out some of the strengths and weaknesses of using the EU-SILC database. One of the main advantages is that it allows comparing countries through time based on population characteristics.

[90] The framework is a rotating panel data that goes from 2003 onwards, that is, every two-three years the individuals included in the sample change and so it is not possible to build a long panel data going from 2003 until the latest date.

[91] See also Verbeek and Vella (2005).

Switzerland. This dataset is divided in four parts: the household file, the household register, the personal (individual level) file and the personal register. All the variables in the 4 databases are either self-reported through questionnaires or gathered through interviews.[92] The response to the interview for the household data is given by the member of the household, aged 15 and over, who is responsible for the accommodation. The present chapter matches individual level and household level data by only keeping the information for the household respondent. This way, the analysis is carried out at household level by having one row corresponding to one household in a specific country at a given year. Personal information for the households' respondents is also available and is used in the empirical analysis.

This way of analysing the various factors affecting fear of crime is in line with the approach followed by many studies. For instance, Alper and Chappell (2012) used data from a telephone survey where they asked to one person, aged 18 or older, representative of the household, various questions about fear of crime and vandalism. The data gathered through the survey were then analysed using personal characteristics of the household respondent and other contextual information to find out the most determinant factors leading to higher fear of crime, violence or vandalism.[93]

From the household file, most of the needed data for the empirical analysis are gathered. Information has been taken for crime perceptions, household type (single parent households), degree of urbanisation in the area where the household live (population density), monetary poverty indicator, socio-economic (non-monetary), housing and environmental deprivation. This information has been chosen in order to cover various aspects of the SDT that could affect crime perceptions. Building on this data, indexes of socio-economic (non-monetary), housing and environmental deprivation (have been created, and variables that measure urbanisation and population/residential density, and concentrated disadvantage have been obtained. Concentrated disadvantage measured through the variables of sex (female) of the household respondents, single-parent households, and monetary

[92] For some countries, the responses are gathered by combining both through interviews and registers (EU-SILC Documentation, 2006).

[93] A similar approach was used by Andreescu (2013) for investigating the fear of crime among foreign-born individuals. The author employed data from the European Social Survey (ESS) where they interview all people in the household who are aged 15 or over.

poverty. Housing and environmental deprivation and the degree of urbanisation partially proxy for residential mobility/instability, another important feature of the SDT framework (Shaw and McKay 1942; Sampson and Groves 1989; Sampson *et al*. 1997).

From the personal file, individual level data for the household respondents have been obtained and they concern their country of birth, sex, age, educational attainments and health status. These variables have been included in many studies considering their effects on fear of crime (Ortega and Myles 1987; LaGrange and Ferraro 1989; Reid and Konrad 2004; Franklin and Franklin 2009).

Table 4.A.39 in Appendix 4.A presents the comprehensive list of all the variables included in the empirical analysis, how they are measured, what is the source and how they can be interpreted.

The main dependent variable that is analysed in this chapter is a binary variable taking value 1 if the household reports crime or vandalism being a problem in the neighbourhood without a common standard for what has to be considered a problem. Given that SDT factors are used as predictors of crime perceptions due to their link with actual crime figures, it is interesting to note that this is confirmed by many previous studies such as Thornberry and Krohn (2002) or Vasiljevic *et al*. (2020), who found that self-reported measures of delinquency and crime are mostly accurate to represent actual crime and valid for analytical purposes.[94]

Given that migratory background has been found to be a significant predictor of crime perceptions, the variable of interest for the empirical estimation is the country of birth of the household respondents. The EU-SILC data also allows to use data on citizenship of the household heads, however, the choice of using the country of birth instead of the citizenship is due to data availability. Moreover, most of the literature on the effects of immigration used the birthplace to define international migration instead of the citizenship or nationality (Ottaviano and Peri 2012; Peri and Sparber 2009). For the country of birth , the data distinguish between natives, EU and non-EU born.[95] Thus, the variables of interest are two binary variables depending on the

[94] Other studies argue for validity of self-reported measures of crime, such as Huizinga and Elliott (1986), Maxfield *et al*. (2000) and Gilman *et al*. (2014).

[95] The EU-SILC, to be precise, distinguishes between EU (born in an EU-25 member country different from the residence one), LOCAL (native-born in the residence country) and OTH (born in

country of birth of the household respondent, and these are EU born, non-EU born, and native (i.e., native-born) that is the omitted category in the empirical estimation. From 2004 to 2007 countries who are defined EU in relation to country of birth are the EU-25 countries (but not the ones where the household resides or else will be categorised as native-born). From 2008 to 2010, country of birth coded as EU refers to EU-27 countries as Romania and Bulgaria became members of the EU in 2007. Although the distinction between EU and non-EU born does not allow for specific characteristics of the country of birth or the ethnic or racial background at individual level, general immigration data at country level show that on average, in the period of analysis, around 89 percent of non-EU immigrants came from low and middle-income countries.[96] This statistics might suggest that, on average, non-EU migrants might be presenting lower socio-economic conditions compared to individuals residing in the countries of our sample (i.e., they are all European and high income countries) and, following the SDT, this might increase their probability of living in a socially disorganised area and of perceiving crime in the neighbourhood (Brunton-Smith and Sturgis 2011).[97]

Many of the variables that are listed in Table 4.A.31 in Appendix 4.A are included in the SDT models and are likely correlated to each other and so, for instance, a neighbourhood with strong social ties and lower anti-social behaviour might be located in an area of a city or town where socio-economic status is relatively higher compared to other neighbourhoods. This is also what is predicted by the SDT models (Shaw and McKay, 1942; Sampson and Groves, 1989; Bursik, 1988).

4.2.1 Descriptive statistics and correlation matrix

In this section, the descriptive statistics and the correlation matrix of the variables are presented. Table 4.32 below presents the descriptive statistics of the variables

a country other than the one of residence and other than EU, it includes also EFTA country and other geographically European countries not EU members).

[96] We followed the classification of the World Bank for defining low and middle-income countries. The reported rates are obtained through our own calculations based on data from the International Migration Database (OECD 2020).

[97] See, for instance, Valentová and Alieva (2018) for differences in integration between EU and non-EU migrants.

included in the main specifications. It is possible to see that crime is perceived as a problem with a probability of 14 percent on average and there is high variability given by the standard deviation being higher than the mean. Housing and socio-economic deprivation present a lower variability with the means higher than the respective standard deviations; on the other hand, environmental deprivation is more volatile. High urbanisation and monetary poverty conditions also vary substantially across households. Single parent households represent a small fraction of the whole dataset given that on average the probability of a household to be a single parent one is equal to 5 percent. Foreign-born as heads of households represent a minority in the dataset with the highest value being the probability of a non-EU born to be head of household on average equal to slightly less than 5 percent. Most of the households are female lead with the probability for a head of household to be female on average equal to around 55 percent. The average age of households respondents is equal to slightly more than 50 years old. In relative terms, most of the heads of households have an upper secondary educational attainment (high school) equal to 39 percent, while the probabilities of having a lower secondary education or higher education as highest educational attainments on average respectively equal to 17 and 27 percent; moreover, most of households' heads self-report a good or very good health status in general and on average the probability is slightly less than 60 percent across households. On the other hand, on average, the probability for a head of household to have an average (not good, not bad) health status is equal to 27 percent. The probabilities for households' heads to have a disrupted marital status (separated, widowed or divorced) and an inactive or unemployed activity status are respectively equal to around 25 and 24 percent.

Table 4.32 Descriptive statistics of the main empirical estimation

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Crime perceived as a problem	1226326	0.13	0.34	0	1
Housing deprivation	1226326	1.36	0.71	0	3
Socio-economic deprivation	1226326	1.83	1.81	0	9
Environmental deprivation	1226326	0.42	0.71	0	3
Urbanisation (high density)	1226326	0.41	0.49	0	1
Poverty indicator	1226326	0.17	0.37	0	1
Single parent households	1226326	0.04	0.20	0	1
EU born	1226326	0.03	0.17	0	1
Native-born	1226326	0.92	0.27	0	1
Non-EU born	1226326	0.05	0.21	0	1
Age	1226326	52.32	16.03	15	81
Age2	1226326	2994.29	1699.63	225	6561
Sex: female	1226326	0.55	0.50	0	1
Lower secondary education	1226326	0.17	0.38	0	1
Upper secondary education	1226326	0.39	0.49	0	1
Higher education	1226326	0.27	0.44	0	1
Good health status	1226326	0.60	0.49	0	1
Average health status	1226326	0.28	0.45	0	1
Disrupted marital status	1226326	0.24	0.43	0	1
Inactive-unemployed status	1226326	0.18	0.39	0	1

Table 3.32 excludes the dummy variables referring to the various types of households (e.g., one person household, 2 adults aged below 65 years without dependent children, 2 adults at least one aged 65 or older without dependent children, etc.), except the single parent household that is instead presented, because they are used as additional controls but they are not very meaningful in relation to the hypothesis to be tested and the literature on fear of crime. Moreover, these variables are not interacted with country of birth in the models with interaction terms.

The correlation matrix shown in Table 4.33 below presents the coefficients of correlation for the different variables. The probability of perceiving crime in the neighbourhood is positively and significantly correlated to housing, socio-economic and environmental deprivation in line with Brunton-Smith *et al*. (2013). A high degree of urbanisation is also linked to higher probability of perceiving crime in the area of living in line with the findings by Wikström and Dolmén

(2001).[98] The correlation between monetary poverty and crime perception is positive and significant, but modest in magnitude, in line with Kujala *et al*. (2019).[99] The dummy variable, related to whether the household is single parent is positively and significantly correlated to the probability of self-reporting crime as a problem in the area of living in line with studies such as Scarborough *et al*. (2010).[100] Non-EU born is positively correlated with crime perceptions in line with various studies such as (Ortega and Myles 1987; Fox *et al*. 2009).[101] Age and age squared are negatively correlated with crime perception at 1 percent level of significance. This is in line with the findings by LaGrange and Ferraro (1989). Female gender is also significantly and positively correlated to self-reporting crime as a problem in the area of living, in line with the reported findings by Cops and Pleysier (2011) although the author found the gap between females and males to be fluctuating over other characteristics (e.g., age groups). Higher education seems correlated to higher fear of crime, but this is in contrast with most of the literature (LaGrange and Ferraro 1989; Smith *et al*. 2001). Only one study reported positive coefficients of higher education on crime, but they were not significant (Wanner and Caputo 1987). Health status is also a social factor correlated to crime perceptions. Table 4.B.33 in Appendix 4.A shows a negative and significant correlation between a good health status and the probability of self-reporting crime, while the coefficient is positive in case of an average health status, and this is generally in line with the evidence that a better health is associated with lower fear of crime (Braungart *et al*. 1980; Stafford *et al*. 2007).[102] Family disruption, the share of people who are divorced, separated or widowed is positively and significantly correlated to higher fear of crime (Scarborough *et al*. 2010; Toseland 1982). Being inactive or unemployed is also positively and significantly correlated to the probability of self-reporting crime as a problem of the neighbourhoods and this is in line with the findings of previous studies (Will and McGrath 1995; Bennett and Flavin 1994).

[98] It is also in line with the predictions of the SDT by Sampson and Groves (1989) and the evidence by Jalil and Iqbal (2010) and Shopeju (2007) for actual crime rates.
[99] See also Pantazis (2000) for fear of crime in Britain.
[100] This is line with the predictions of the SDT by Sampson (1987).
[101] See also Houts and Kassab (1997).
[102] See also Jacoby *et al*. (2017) for the association between violent neighborhoods and low mental health.

For the correlation with the variables of interest, both EU and non-EU born are positively and significantly correlated to housing deprivation in line with Carter III (2011). Socio-economic deprivation at household level is negatively and significantly correlated to EU born as household heads. It is, on the contrary, positively correlated to non-EU born as household heads. This might reflect a better integration of EU migrants in a European country compared to non-EU ones as shown by Valentová and Alieva (2018) for the differences in engaging in voluntary associations. Environmental and area deprivation is positively and significantly correlated to the variables of interest except for EU born for which is positive but not significant, and this seems to be in line with the evidence of local deprivation in the area of living for new migrants provided by Clark *et al*. (2019). Urbanisation and population density in the area of living of the household is positively and significantly correlated to all the variables of interest in line with what reported by Fitzgerald *et al*. (2014). Monetary poverty is positively correlated to foreign-born (both EU and non-EU) and this is partially in line with Bruner (2017) who investigated the link between race and poor neighbourhoods. Single parent households, proxy for concentrated disadvantage a factor considered in the SDT (Sampson 1987), are positively correlated to foreign-born as heads of households in line with Krivo *et al*. (1998). Foreign-born household respondents tend to be relatively younger than the average for household heads and this is in line with the fact that immigrants tend to be mostly young at time of arrival (Coleman 1992). Generally, there is a small, but positive and significant, correlation between the variables of interest, and the probability of having a higher education degree, and this is line with the findings by Chiswick and DebBurman (2004). The correlation is negative and significant with lower and upper secondary educational attainments. EU born household respondents are positively correlated to the probability of reporting a good health status, while the correlation is negative, but negligible and not significant for non-EU born and this seems to signal a healthy immigrant effect as described by McDonald and Kennedy (2004).[103] Foreign-born individuals are negatively correlated with the probability of being in a disrupted marital status, that

[103] For all variables of interests, the correlation is instead negative with the shares of people with an average (not good not bad) health status within households.

is, divorced, separated or widowed and this is in line with Borjas and Bronars (1991). Non-EU born are positively and significantly correlated, although coefficients are modest in magnitude, with being unemployed or inactive as for the individual economic status, while this is not true for EU born. This seems in line with the evidence of a lower labour market outcomes among immigrants especially non-EU immigrants (Fellini and Guetto 2020; Nakhaie and Kazimur 2013). The variables of interest are also positively and significantly correlated to household size, and this is coherent with various reports such as Hogan and Eggebeen (1999).

The next sections introduce the empirical strategy used in the chapter and discuss the results of the estimations.

Table 4.33 Correlation matrix between the variables included in the main specification

	Crime perc.	Hous. depr.	Soc-econ. depr.	Env. depr.	High urban.	Pov. ind.	Single par.	EU born	Native-born
Crime perception	1								
Hous deprivation	0.10*	1							
Soc-econ. deprivation	0.08*	-0.10*	1						
Env. deprivation	0.30*	0.08*	0.14*	1					
High urbanisation	0.16*	0.29*	-0.05*	0.15*	1				
Poverty indicator	0.02*	-0.04*	0.31*	0.03*	-0.06*	1			
Single par.	0.03*	0.07*	0.10*	0.03*	0.03*	0.08*	1		
EU born	0.00	0.05*	-0.03*	0.00	0.03*	0.01*	0.01*	1	
Native-born	-0.02*	-0.12*	-0.04*	-0.03*	-0.09*	-0.05*	-0.02*	-0.61*	1
Non-EU born	0.03*	0.11*	0.07*	0.03*	0.09*	0.06*	0.02*	-0.04*	-0.77*
Age	-0.02*	-0.16*	0.05*	-0.02*	-0.03*	0.03*	-0.15*	-0.04*	0.05*
Age squared	-0.02*	-0.14*	0.05*	-0.02*	-0.03*	0.05*	-0.13*	-0.04*	0.04*
Female	0.03*	0.03*	0.14*	0.02*	-0.01*	0.06*	0.13*	0.00	-0.00
Lower sec. educ.	0.01*	-0.02*	0.09*	-0.00	-0.05*	0.09*	-0.00	-0.02*	0.01*
Upper sec. educ.	0.00*	0.05*	0.01*	-0.01*	-0.03*	-0.05*	0.03*	-0.02*	0.03*
Higher education	0.01*	0.15*	-0.25*	-0.00*	-0.14*	-0.22*	0.02*	0.03*	-0.05*
Good health	-0.04*	0.10*	-0.29*	-0.08*	0.04*	-0.11*	0.04*	0.04*	-0.01*
Average health	0.02*	-0.05*	0.12*	0.04*	-0.03*	0.05*	-0.02*	-0.03*	0.02*
Disrupted mar. stat.	0.02*	0.01*	0.18*	0.02*	0.02*	0.11*	0.19*	0.00	-0.01*
Inactive-unemployed	0.03*	-0.02*	0.20*	0.04*	-0.01*	0.26*	0.05*	0.00*	-0.01*

Table 4.33 (Continue)

	Non-EU born	Age	Age squared	Female	Lower sec. educ	Upper sec. educ.	Higher education	Good health
Non-EU born	1							
Age	-0.03*	1						
Age squared	-0.03*	0.99*	1					
Female	-0.00	-0.02*	-0.02*	1				
Lower sec. educ.	0.01*	0.06*	0.07*	0.02*	1			
Upper sec. educ.	-0.02*	-0.16*	-0.17*	-0.01*	-0.37*	1		
High education	0.04*	-0.16*	-0.17*	-0.02*	-0.28*	-0.49*	1	
Good health	-0.01*	-0.42*	-0.42*	-0.07*	-0.07*	0.06*	0.18*	1
Average health	0.00	0.25*	0.24*	0.03*	0.04*	-0.02*	-0.10*	-0.76*
Disrupted mar. stat.	0.01*	0.34*	0.35*	0.22*	0.05*	-0.05*	-0.10*	-0.21*
Inactive-unemployed	0.02*	-0.14*	-0.13*	0.20*	0.06*	-0.01*	-0.12*	-0.06*

Table 4.33 (Continue)

	Average health	Disrupted mar. stat.	Inactive-unemployed
Average health	1		
Disrupted mar. stat.	0.10*	1	
Inactive-unemployed	0.01*	-0.00*	1

* indicates a level of significance p<0.01.

Table 3.33 excludes the dummy variables referring to the various types of households (e.g., one person household, 2 adults aged below 65 years without dependent children, 2 adults at least one aged 65 or older without dependent children, etc.), except the single parent household that is instead presented, because they are used as additional controls but they are not very meaningful in relation to the hypothesis to be tested and the literature on fear of crime. Moreover, these variables are not interacted with country of birth in the models with interaction terms.

4.3 The empirical strategy

Two models were estimated: one without interaction terms between the variables of interest and selected control variables based on their relevance in predicting changes in crime perceptions, and one with interaction terms. Both models are estimated through OLS. This is done in order to compare the impact of the variables of interest *per se* and when combined with other factors leading to social disorganisation as predicted by the SDT models and, thus, higher fear of crime (Sampson 1987; Sampson *et al*. 1997; Brunton-Smith *et al*. 2013). The models to be estimated are presented at household level, that is, individual level variables have been aggregated at household level.

The baseline specification without interaction terms is:

$$Crm_{kjt} = \beta_0 + \beta_1 Cb_{kjt} + \beta_2 C_{kjt} + \delta_j + \gamma_t + r_{kjt} \qquad 4.1$$

where Crm_{kjt} is the probability of household k to self-report crime, violence or vandalism to be a problem of the area of living in country j at time t, Cb_{kjt} indicates either the country of birth of the household respondent who is the head of the household, separately for EU and non-EU born (these are two different dummy variables, one for EU born and one for non-EU born and the omitted category is native-born) for household $k$in country j and time t. C_{kjt} is a vector of control variables at household level, while δ_j and γ_t are respectively country fixed-effects and year dummies, while r_{kjt} is the residual term.

The control variables included in the model of Equation 4.1 above are the 3 indices of deprivation, housing, socio-economic and environmental deprivation, the degree of urbanisation, monetary poverty, single parent households, the age (and its square) of the household respondent, the sex that takes value 1 if the household head is of a female sex and 0 otherwise, three binary variables that take value 1 if the highest educational attainment is respectively a lower secondary education, upper secondary education or higher education one and 0 otherwise, two binary variables taking value 1 if the head of household's self-reported health status is a good health status (that includes also a very good self-reported health status) or an average

health status and 0 otherwise, a dummy variable that takes value 1 if the household respondent reports being divorced, separated or widowed and 0 otherwise, a dummy variable that takes value 1 if the household head is inactive or unemployed as for the labour status and 0 otherwise and the household type.[104] The three deprivation indices have been chosen as relevant factors based on the various formulations of the SDT (Shaw and McKay 1942; Sampson 1987; Sampson *et al*. 1997) as they are expected to have an impact on actual crime rates and also fear of crime (Brunton-Smith *et al*. 2013).[105] The degree of urbanization in the area of living was also found to be relevant in affecting fear of crime (Wilkström and Dolmén 2001), thus, it has been chosen as a control variable for crime perceptions in this chapter. Monetary poverty is also related to higher probability of reporting crime as a problem of the neighbourhood although the effect was found to be modest in the previous literature (Kujala *et al*. 2019). Age is also another relevant factor that needs to be considered when exploring fear of crime (Tulloch 2000; LaGrange and Ferraro 1989). Many studies highlighted the importance of gender in determining differences in crime perceptions and, for this reason, the dummy for female sex of the household head has been included (Callanan and Rosenberg 2015; Ortega and Myles 1987). Educational attainments are also deemed as important in many studies investigating the factors that cause fear of crime (Smith *et al.* 2001; Krannich *et al*. 1989), and, therefore, the three dummies on educational attainments are included as control variables.[106] The health status has also been included as a factor potentially affecting crime perceptions following the procedure of many previous studies (Stafford *et al*. 2007; Chandola 2001; Cossman and Rader 2011). Marital status, namely whether the household respondent is separated, divorced or widowed, is also included in the estimation as a factor that could affect the fear of crime as it has been included in many previous studies (Toseland 1982; Weinrath and Gartrell 1996; Braungart *et al*. 1980). Unemployment and inactivity are deemed as relevant in affecting crime perceptions by the previous literature (Scarborough *et al*. 2010; Smolej and Kivivuori 2006). Household type has also been considered as a potential

[104] See Table 3.A.31 in Appendix 3.A for the comprehensive list of variables included in the specification.
[105] See also Palmer *et al.* (2005).
[106] See also Scarborough *et al*. (2010) for another analysis investigating fear of crime and finding significant associations with educational attainments.

factor linked to the probability of self-reporting crime as a problem in the area of living as it was done in some of the previous studies analysing the determinants of crime perceptions (Liska *et al*. 1982; Miceli *et al*. 2004).

The same specification, with the addition of interaction terms, is then used to estimate the combined effects of the variable of interest, the place of birth of the household head, with some of the control variables. The equation is the following:

$$Crm_{kjt} = \beta_0 + \beta_1 Cb_{kjt} + \beta_2 F_{kjt} Cb_{kjt} + \beta_3 C_{kjt} + \delta_j + \gamma_t + r_{kjt} \qquad 4.2$$

where β_3 and β_4 are the vectors of the coefficients that respectively represent the combined effect of country of birth Cb_{kjt} with the vector F_{kjt} that includes some factors related to the SDT and other variables that might affect fear of crime that are a subset of all the control variables C_{kjt} for household k in country j at time t. The variables included in F_{kjt} are the indices socio-economic deprivation, housing deprivation, environmental deprivation, the binary variables on monetary poverty, single parent household, the degree of urbanisation (population density), female sex for the household head, a divorced, separated or widowed marital status, the inactive-unemployed labour status. These factors are likely to lead to higher crime rates as predicted by the SDT and therefore to higher fear of crime (Brunton-Smith *et al*. 2013).

Given that these factors are expected to lead to higher crime rates and higher fear of crime (Shaw and McKay 1942; Sampson *et al*. 1997; Brunton-Smith *et al*. 2013),[107] and that ethnicity and race are also correlated with higher probability of reporting crime as a problem in the neighbourhood (Ortega and Myles 1987; Fox *et al*. 2009), the expectation is that the coefficients on the interaction terms are positive and significant on the probability of self-reporting crime as a problem in the area of living.

Both the models with and without interaction terms have been estimated using linear OLS estimators. Given that the dependent variable is a dummy (0, 1), one may decide to use a logit or probit estimator for estimating the effect of country of

[107] See also Sampson (1987), Sampson and Groves (1989) and Bruinsma *et al*. (2013).

birth on crime perceptions. However, many authors have found that the two approaches yield very similar results, and, although probit might outperform OLS in terms of predicting the probability of an attribute (Pohlmann and Leitner 2003), the OLS supplies a "Best Linear Unbiased Estimation" (BLUE) in many circumstances, especially when there is no particular reason for assuming a non-linear relationship (in the parameters) between the variable of interest (country of birth in the case of this chapter) and the dependent variable (Krueger and Lewis-Beck 2008). Moreover, the OLS estimator provides coefficients that are easier to be interpreted when discussing the empirical results compared to a logit or probit estimator.

The next section presents the results of the empirical estimation.

4.4. Results of the empirical estimation

This section presents the results of the empirical estimation. Two main models are estimated: one without and one with interaction terms. The inclusion of the interaction terms gives the opportunity of assessing the joint impact between individual and household characteristics and the variables of interest. The results of these two models are presented in subsections 4.4.1 and 4.4.2 respectively when interactions are excluded and included.

Some specification tests are carried out for different subsamples. In the first of the specification tests, presented in subsection 4.4.3, a model for the period from 2004 to 2007 is estimated. Secondly, a model is estimated for the period from 2008 to 2010 and this is discussed in subsection 4.4.4 of the present chapter. This is done to account for potential increasing effects of the 2008 economic recession on the perceptions of crime or the actual crime rates. Bushway *et al*. (2012) found that recessions are associated with an increase in property crimes, while Klaer and Northrup (2014) found that GDP has an inversely proportional effect on violent crimes; in turn, actual crime rates are highly correlated to crime perceptions (Bug *et al*. 2015). Splitting the period also allows accounting for the access of Romania and Bulgaria into the EU that happened in 2007 (European Central Bank 2007).[108] Both these factors make it relevant to have separate specifications for the two periods.

Other specification tests are the ones for which the sample is separated between Central-Eastern European and Balkan countries on the one side and Western and Nordic countries on the other side. Central-Eastern European countries attracts less immigration compared to Western and Nordic ones as shown by various studies (Hooghe *et al*. 2008; Pedersen *et al*. 2008). For this reason, it is relevant to conduct the statistical analysis separately for the two groups of countries. The results of these checks are discussed in subsections 4.4.5 and 4.4.6 of this chapter.

[108] In the EU-SILC dataset Romanian and Bulgarian born are coded as EU instead of non-EU from 2008 onwards.

4.4.1 Main specification without interaction terms

Column 2 of Table 4.34 shows the results for the overall sample without interaction terms. It is possible to notice that country of birth (both EU and non-EU) is not significantly associated to the probability of self-reporting crime issues. This result seems in line with Franklin *et al*. (2008) that found small differences in crime perceptions between ethnic minorities and natives and generally lower for ethnic minorities compared to natives. However, other studies such as Callanan (2012) found a significant positive association between migratory background and fear of crime or between race and crime. Similar results were also found in other studies (Chiricos 1997; Andreescu 2013).

The findings point in the opposite direction compared to hypothesis H1 that was formulated in the previous subsection 4.1.1 for which migratory background, proxied by the country of birth of the heads of households in the present chapter, should have been associated with higher fear of crime based on most of the previous empirical evidence (Ortega and Myles 1987; Fox *et al*. 2009; Callanan 2012).

Among the other factors, listed by the SDT models, all the deprivation indices (housing, socio-economic and environmental) are associated with a higher probability of self-reporting crime as a problem in the neighbourhood and the coefficients are highly significant. A high degree of urbanisation is also positively associated to the probability of self-reporting crime in the area of living. The findings for these variables are in line with the evidence by Brunton-Smith *et al*. (2013) that linked SDT models, such as Sampson and Groves (1989), to fear of crime.

The monetary poverty indicator is not significant in line with the findings by Kujala *et al*. (2019). Single parent households are also associated with higher probability of self-reporting crime as a problem in the neighbourhood and the coefficient is significant at 1 percent level in line with the predictions of the SDT model by Sampson *et al*. (1997) for actual crime rates and the findings by Renauer (2007) on fear of crime.

Age is associated to higher probability of self-reporting crime as a problem in the neighbourhood in line with Abdullah *et al*. (2014) and partially with Alper and Chappell (2012). However, for high increase in age, the link between being older

and crime perceptions becomes negative, that is why the coefficient on age squared is negative and highly significant in line with the findings by Tulloch (2000) that older people fear less crime because of low perception of being at personal risk.
Female sex is associated with a higher probability of self-reporting problems of crime in the neighbourhood, but the effect is not significant contrary to most of the literature (Fox *et al*. 2009; Callanan and Rosenberg 2015) and partially in line with Cops and Pleysier (2011) who found that differences across gender for fear of crime are contingent on the age groups. Education is positively linked to crime perceptions in line with Ollenburger (1981) and Dowler (2003) although the coefficient is significant only for graduates of upper secondary education (e.g., high school graduates). A self-reported good health status, or average but not bad, is negatively associated with the probability of self-reporting crime as a problem in the area of living and this is coherent with the findings of Braungart *et al*. (1980). Both a disrupted marital status and an inactive or unemployed labour status are not significantly associated to the probability of self-reporting crime or vandalism as issues in the area of living. This is in line with Mesch (2000) that found no significant link between marital status and crime perceptions. Although measured at city level, also Franklin *et al*. (2008) found no significant link between unemployment and fear of crime. This is opposed to most of the literature that, instead, found a positive and significant association between unemployment condition and fear of crime (Smolej and Kivivuori 2006; Hummelsheim *et al*. 2011).

4.4.2 Main specification with interaction terms

Column 3 of Table 4.34 presents the outcome of the regression with interaction terms. A subset of the control variables used in the specification of Column 2 are interacted with the variable of interest, country of birth (the base category is native). These variables have been chosen based on the predictions of the SDT that are aimed to explain differences in crime rates but are also determinant factors for fear of crime (Brunton-Smith *et al*. 2013).
EU born dummy by itself is positively and significantly associated to the probability of reporting crime as an issue of the neighbourhood. That means that married EU

born men without any of the deprivation conditions are associated with around 1.6 percentage points higher probability to report crime as a problem of the area of living.[109] However, this coefficient is only significant at 10 percent level. This result seems to confirm hypothesis H1 that being foreign-born is associated to higher probability of reporting crime as a problem of the area of living, and somehow in line with Andreescu (2013) that finds that foreign-born people are more likely to fear of being victimised, although in the case of the present chapter the analysis concerns the probability of perceiving crime as a problem rather than perceptions about victimisation.

The interactions between housing deprivation and the variables of interest are mostly not significant, except between housing deprivation and EU born. For given levels of housing deprivation, being born an EU country other than the one the household is living in (given that most of the reference countries in our sample are EU countries) is associated with a lower probability of self-reporting crime as a problem in the neighbourhoods by around 1.6 percentage points compared to natives. This effect is similar to the one found by Vauclair and Bratanova (2017) although the authors focused on the joint effect of income inequality (measured at country level) and belonging to an ethnic minority. This result seems in contrast to hypothesis H1 for which the joint effect of country of birth and deprivation conditions (in this case housing deprivation) should be positive and significant on the probability of self-reporting crime as a problem of the neighbourhood.

[109] The marginal effects have been estimated in order to understand whether, in presence of all the deprivation conditions, the coefficients on EU and non-EU born are significantly associated to crime being a problem in the neighbourhood. These coefficients appear to be not significant as shown at the bottom of Table 4.34 below.

Table 4.34 Main estimation with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0241***	0.0254***
	(0.0042)	(0.0042)
Socio-economic	0.0109***	0.0113***
deprivation	(0.0010)	(0.0011)
Environmental deprivation	0.1267***	0.1265***
	(0.0050)	(0.0051)
High urbanisation	0.0743***	0.0750***
	(0.0064)	(0.0063)
Monetary poverty	-0.0029	-0.0014
	(0.0024)	(0.0035)
Single parent households	0.0130***	0.0142***
	(0.0033)	(0.0035)
EU born	-0.0109	0.0165*
	(0.0100)	(0.0082)
Non-EU born	-0.0171*	0.0132
	(0.0087)	(0.0090)
Age	0.0023***	0.0023***
	(0.0005)	(0.0005)
Age squared	-0.0000***	-0.0000***
	(0.0000)	(0.0000)
Female	0.0007	-0.0002
	(0.0015)	(0.0015)
Lower secondary	0.0052	0.0050
education	(0.0037)	(0.0036)
Upper secondary	0.0079**	0.0077*
education	(0.0038)	(0.0037)
Higher education	0.0068	0.0065
	(0.0048)	(0.0047)
Good health	-0.0314***	-0.0315***
	(0.0035)	(0.0035)
Average health	-0.0126***	-0.0127***
	(0.0022)	(0.0022)
Disrupted marital status	-0.0018	-0.0026
	(0.0017)	(0.0018)
Inactive-unemployed	0.0034	0.0040
	(0.0020)	(0.0022)
Hous depr*EU born		-0.0159**
		(0.0076)
Hous depr*non-EU born		-0.0094
		(0.0076)
Ses depr*EU born		-0.0035**
		(0.0016)
Ses depr*non-EU born		-0.0047**
		(0.0019)

Table 4.34 (Continue)

Env depr*EU born		0.0014
		(0.0052)
Env depr*non-EU born		0.0038
		(0.0078)
High urb*EU born		-0.0036
		(0.0100)
High urb*non-EU born		-0.0124*
		(0.0069)
Mon pov*EU born		-0.0061
		(0.0050)
Mon pov*non-EU born		-0.0159***
		(0.0045)
Single par*EU born		-0.0347***
		(0.0101)
Single par*non-EU born		0.0029
		(0.0099)
Female*EU born		0.0045
		(0.0062)
Female*non-EU born		0.0128
		(0.0061)
Disr. mar stat*EU born		0.0142
		(0.0059)
Disr. mar. stat.*non-EU		0.0064
born		(0.0050)
Inact.-unempl.*EU born		0.0009
		(0.0058)
Inact.-unempl.*non-EU		-0.0143**
born		(0.0069)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0088
		(0.0087)
Non-EU born		-0.0081
		(0.0066)
Observations	1226326	1226326
R-squared	0.1253	0.1255
Constant	-0.0505	-0.0520
	(0.0173)	(0.0175)

The Table shows the results for country of birth (EU and non-EU born) with respect to native-born that is the omitted category. The coefficients for EU born, and non-EU born should both be interpreted with respect to the reference category. The same is true for the interaction terms, the coefficients of the joint terms should be interpreted with respect to the omitted category, that is, with respect to native-born.
Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.
Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Var1*Var2 in the first column, indicates the interaction term.

The interactions between country of birth and socio-economic deprivation yield small but highly significant negative coefficients for both EU and non-EU born.

Namely, for a given level of socio-economic deprivation, being EU born and non-EU born is associated with a lower probability of self-reporting crime as a problem of the area of living respectively by around 0.4 and 0.5 percentage points compared to native-born. This effect seems in line with the findings by Brunton-Smith and Sturgis (2011) who argued that ethnic minorities living in deprived areas are less likely to perceive fear of crime because of the immigrants concentration in the neighbourhoods they live in. This result seems also against hypothesis H2 for which socio-economic deprivation combined to country of birth should lead to higher fear of crime.

No significant interactions can be spotted between environmental deprivation and the variables of interest.

For high degrees of urbanisation, only the interaction term with non-EU born is significant but only at 10 percent level and shows that a non-EU born is associated to a lower probability of self-reporting crime as a problem of the area of living by slightly more than 1 percentage point compared to a native-born. This appears to be contrary to hypothesis H2 outlined in subsection 4.1.1 and seems in line with Brunton-Smith and Sturgis (2011).

For monetary poverty interactions, it is possible to spot a highly significant (1 percent level) negative coefficient for monetary poverty combined with non-EU born. It suggests that, given the situation of monetary poverty, being non-EU born is associated with a lower probability of self-reporting crime as a problem of the area of living by around 1.6 percentage points compared to natives in line with Vauclair and Bratanova (2017). This finding is also strongly against hypothesis H2 that states that deprivation, concentrated disadvantage combined with being foreign-born should be associated with higher fear of crime (i.e., higher probability of self-reporting crime as an issue of the neighbourhood).

For the interaction between single parent households with dependent children and the variables of interest, the coefficient of the interaction term with EU born is negative and significant at 1 percent level. Namely, for single parent households, respondents that are born in an EU member country (other than the reference one) are associated with a lower probability to report crime as a problem in the neighbourhood by around 3.5 percentage points compared to native born. This

result appears to be consistent with Brunton-Smith and Sturgis (2011) that found that, being a member of a minority ethnic group in a situation of concentrated disadvantage and deprivation, increases the probability of being fearful of crime. However, this seems in contrast with hypothesis H2 stated in above subsection 4.1.1 and with the findings by Holmes (2003) that find a positive effect of being Hispanic and living in an area of concentrated minority disadvantage on fear of crime.

For inactivity and unemployment interactions with the variables of interest, the results show that given a situation of unemployment or inactivity, non-EU born households heads are associated with an around 1.4 percentage points lower probability to self-report crime as a problem in the area of living compared to native born ones and the estimate is significant at 1 percent level. This seems in line with the impact for income inequality found by Vauclair and Bratanova (2017) and is in contrast with hypothesis H2 that states that, given a condition of deprivation, a foreign-born should be more likely to perceive crime as an issue of the area of living. Overall, the model with interaction terms fits better the data as the R-squared is higher than the one of the model without interaction terms. However, most of the coefficients are not significant and modest in magnitude, at most equal to 4 percentage points change in the dependent variable. The marginal effects, shown in Table 4.34 in the previous page, that represent the total coefficients for EU and non-EU born with and without deprivation conditions are negative but not significant, somehow contrasting hypotheses H1 and H2 for which the estimates should be positive and significant. This result seems in line with Bennett and Flavin (1994) and Franklin and Franklin (2008) that find not significant effect of migratory background and race on fear of crime.

The results of this main specification seem in line with studies such as those by Vauclair and Bratanova (2017) or Brunton-Smith and Sturgis (2011) that find a negative impact on fear of crime when a deprivation, disadvantage or poverty condition is combined to being of an ethnic minority. The findings presented so far do not support hypothesis H2 discussed in subsection 4.1.1 that being foreign-born and in a condition of deprivation is associated with higher probability of self-reporting crime as an issue of the area of living as the evidence shows that rather the contrary is true. The explanation might be that conditions of deprivation are

likely to be seen in areas that are themselves deprived and that often are characterised by high ethnic heterogeneity and immigrant concentration as theorised by SDT, therefore people of foreign background might not feel fearful in the context where there are many other immigrants.
The next subsection presents some specification tests to see whether the results differ based on considering different periods of time or groups of countries.

4.4.3 Further specifications: before the Great Recession 2004-07

Table 4.35 below shows the results for the specification test for the period 2004-2007. Most of the results remain unchanged compared to the main specification. As a difference, EU born is not any more significantly associated with the probability of self-reporting crime as a problem of the neighbourhood as it was instead in the main specification. On the other hand, non-EU born appeared to be negatively and significantly associated with the probability of self-reporting crime as an issue of the area of living at household level. Being a non-EU born head of household, is associated with a lower probability of perceiving crime as a problem in the neighbourhood by around 2 percentage points compared to native-born heads of household. This effect is significant at 5 percent level. This finding is contrary to hypothesis H1 that foreign background is expected to be positively and significantly associated with the probability of self-reporting crime as an issue of the area of living.
For the interaction terms, differently from the main specification, housing deprivation is significant when interacted with non-EU born instead of EU born. Namely, for given levels of housing deprivation, non-EU born household respondents are associated with a lower probability of self-reporting crime as a problem in the area of living by around 1.3 percentage points compared to natives. The estimate is significant at 5 percent level. This result seems in line with Wu *et al*. (2017) that find a negative coefficient of foreign-born on fear of crime although in their specification the coefficient is not statistically significant. It is also partially in line with Ceccato (2018) that finds a lower fear of crime for foreign-born respondents compared to native-born respondents with foreign-born parents.

However, the results presented in Table 4.35 and the ones by Ceccato (2018) are not directly comparable because the information on the country of birth of the parents of the household respondents is not available in this chapter.

Similar to the main specification, the interactions between socio-economic deprivation and the variable of interest are negative and significant, although only at 10 percent level for EU born. The results show that, for a given level of socio-economic deprivation, EU and non-EU born heads of household are respectively 0.4 and 0.7 percentage points less likely to report crime as a problem of the area of living compared to a native-born head of household. The estimate for non-EU born is highly significant (1 percent level).[110]

These findings for the interactions between the variables of interest and housing and socio-economic deprivation are in line with the findings by Brunton-Smith and Sturgis (2011) for the link between SDT and fear of crime and with Vauclair and Bratanova (2017), although in their case the approach was multilevel and interacted income inequality measured at country level with country of birth at individual level. The joint effect is negative and small in magnitude similarly to the results of the present chapter.

The coefficient of the interaction between monetary poverty and non-EU born is not any more significant in the specification before the Great Recession in 2008, although it is still negative. On the other hand, the interactions of inactive-unemployment and single parent with non-EU born remain negative and significant as the same as in the main specification. These findings seem to oppose hypothesis H2 that the effect of deprivation and foreign country of birth should be positive and significant.

The findings for single parent households and an inactive-unemployed labour status interacted with the variables of interest are in line with the evidence provided by the studies who linked the SDT with fear of crime and found that, under disadvantaged conditions, immigrants and ethnic minorities are less likely to be fearful of crime in relation to the area where they live (Brunton-Smith and Sturgis 2011; Brunton-Smith *et al*. 2013).

[110] Also here, the marginal effects for country of birth have been estimated and they are not statistically significant when all the deprivation conditions are present.

Interestingly, the interaction with female sex is positive and significant (5 percent level) and indicates that a non-EU born woman is associated with an around 1.6 percentage points higher probability of self-reporting crime as a problem of the area of living. This result seems to confirm hypothesis H3 and seems in line with most of the literature finding that immigrant women are more likely to fear crime (Callanan 2012; Callanan and Rosenberg 2015; Braungart *et al*. 1980).

Overall, the findings for this specification support the hypothesis H3 that immigrant women are generally more fearful of crime compared to native ones. In particular, this is true for non-EU women, while for EU women the result is not significant. Two possible explanations can be thought of here: one is that immigrants end up living in areas that are more deprived compared to the regions where they come from. Alternatively, the gender effect on crime could be more severe due to discrimination (e.g., racial discrimination) although the data do not provide enough information to test the specific origin country effect on fear of crime. The marginal effects for EU and non-EU born, shown at the bottom of Table 4.35 below, are negative but not significant and this is partially contrary to hypotheses H1 and H2 stated in subsection 4.1.1 above.

Consistently with the findings of the main specification, and contrary to hypothesis H2, the results show that inactivity-unemployment and single parent households interacted with country of birth are negative and significant indicating that, in a condition of deprivation, foreign-born are associated with a lower probability of self-reporting crime as a problem of the area of living in line with Brunton-Smith and Sturgis (2011) and Brunton-Smith *et al*. (2013).

These results seem to be coherent with the findings by Vauclair and Bratanova (2017) and Brunton-Smith *et al*. (2013) for which being foreigner and in a situation of deprivation or low socio-economic status is associated with lower fear of crime compared to natives.

Table 4.35 Specification test from 2004 to 2007 with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0280***	0.0295***
	(0.0044)	(0.0045)
Socio-economic deprivation	0.0112***	0.0117***
	(0.0011)	(0.0011)
Environmental deprivation	0.1208***	0.1200***
	(0.0042)	(0.0041)
High urbanisation	0.0785***	0.0793***
	(0.0078)	(0.0078)
Monetary poverty	-0.0040	-0.0029
	(0.0024)	(0.0024)
Single parent households	0.0165***	0.0180***
	(0.0042)	(0.0045)
EU born	-0.0080	0.0223*
	(0.0119)	(0.0108)
Non-EU born	-0.0193**	0.0165
	(0.0093)	(0.0092)
Age	0.0026***	0.0026***
	(0.0005)	(0.0005)
Age squared	-0.0000***	-0.0000***
	(0.000)	(0.0000)
Female	0.0015	0.0005
	(0.0016)	(0.0015)
Lower secondary education	0.0051	0.0048
	(0.0039)	(0.0038)
Upper secondary education	0.0075*	0.0071*
	(0.0037)	(0.0037)
Higher education	0.0066	0.0063
	(0.0050)	(0.0050)
Good health	-0.0312***	-0.0312***
	(0.0035)	(0.0035)
Average health	-0.0127***	-0.0128***
	(0.0027)	(0.0027)
Disrupted marital status	-0.0021	-0.0026
	(0.0021)	(0.0023)
Inactive-unemployed	0.0017	0.0024
	(0.0024)	(0.0025)
Hous depr*EU born		0.0175
		(0.0114)
Hous depr*non-EU born		-0.0131*
		(0.0069)
Ses depr*EU born		-0.0042*
		(0.0022)
Ses depr*non-EU born		-0.0065***
		(0.0022)

Table 4.35 (Continue)

Env depr*EU born		0.0089
		(0.0062)
Env depr*non-EU born		0.0096
		(0.0076)
High urb*EU born		-0.0084
		(0.0092)
High urb*non-EU born		-0.0120
		(0.0081)
Mon pov*EU born		-0.0074
		(0.0080)
Mon pov*non-EU born		-0.0068
		(0.0064)
Single par*EU born		-0.0321***
		(0.0107)
Single par*non-EU born		-0.0067
		(0.0134)
Female*EU born		0.0033
		(0.0063)
Female*non-EU born		0.0158**
		(0.0070)
Disr. mar stat*EU born		0.0068
		(0.0079)
Disr. mar. stat.*non-EU born		0.0052
		(0.0064)
Inact.-unempl.*EU born		0.0070
		(0.0063)
Inact.-unempl.*non-EU born		-0.0211**
		(0.0069)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0063
		(0.0106)
Non-EU born		-0.0093
		(0.0071)
Observations	626259	626259
R-squared	0.1242	0.1245
Constant	-0.0624**	-0.0638***
	(0.0176)	(0.0179)

Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Var1*Var2 in the first column, indicates the interaction term.
Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.

4.4.4 Further specifications: after the Great Recession 2008-10

Table 4.36 below shows the results of the specification test for the period 2008-2010. In the model without interactions (column 2), the results are very similar to

the one of the main models for the whole period. As the same as the main specification, the coefficient on non-EU born is negative and significant, although only at 10 percent level. It suggests that a non-EU born is less likely to report fear of crime by around 1.5 percentage points. This seems contrary to hypothesis H1 made in subsection 4.1.1 although the significance level is low, similarly to Reid and Konrad (2004).

Among the rest of variables, the deprivation variables are positively and significantly associated to the probability of self-reporting crime as a problem in the area of living. This evidence is in line with Franklin *et al*. (2008), but not with many other studies such as Callanan (2012) and Fox *et al*. (2009).

In the model with the interaction terms (column 3), contrary to hypothesis H2 stated in section 4.1.1 for which it is expected a positive and significant effect from the interaction of deprivation conditions and country of birth on the probability of self-reporting crime as a problem of the neighbourhood, negative coefficients for the interactions between housing deprivation and EU born, high urbanisation and non-EU born, monetary poverty and non-EU born, single parent household and EU born, are presented. While the former two interactions are only significant at 10 percent level, the latter are highly significant, namely at 1 percent level. For given levels of housing deprivation, an EU born is 1.3 percentage points less likely to self-report crime as a problem of the neighbourhood compared to a native-born, while given a high degree of urbanisation (i.e., population density), being a non-EU born head of household is associated with a lower probability of self-reporting crime issues by around 1.3 percentage points compared to being native-born. For the latter interactions, a condition of monetary poverty for the household when the household head is non-EU born is associated with a lower probability of self-report crime as a problem in the neighbourhood. Namely, a non-EU born head of household is associated with 2.6 percentage points lower probability of self-reporting crime as a problem in the neighbourhood compared to a native-born, given a condition of monetary poverty. A single parent household is associated with a lower probability of self-reporting crime when the household respondent is EU born. Namely an EU born single parent that is living with children is associated with a 3.7 percentage

points lower likelihood to self-report crime as a problem of the neighbourhood compared to a native-born.

These findings seem in line with evidence provided by Vauclair and Bratanova (2017) especially for the interactions with monetary poverty and with Brunton-Smith and Sturgis (2011) for the conditions of deprivation combined with country of birth, although the authors focused on the joint effect of income inequality measured at country level and ethnicity at individual level.

The interactions between marital status and non-EU born is positive and significant, differently to the main specification, and this seems to be consistent with hypothesis H2. Family disruption is one of the SDT factors, as theorised by Sampson (1987; 2008), that Brunton-Smith *et al*. (2013) find to be a relevant factor in explaining fear of crime, while race and ethnicity have also been found to be positively associated with fear of crime (Callanan 2012; Ortega and Myles 1987).

Table 4.36 Specification test from 2008 to 2010 with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0200***	0.0210***
	(0.0043)	(0.0044)
Socio-economic deprivation	0.0105***	0.0108***
	(0.0010)	(0.0011)
Environmental deprivation	0.1333***	0.1337***
	(0.0069)	(0.0071)
High urbanisation	0.0700***	0.0707***
	(0.0058)	(0.0058)
Monetary poverty	-0.0019	0.0003
	(0.0027)	(0.0025)
Single parent households	0.0093**	0.0099**
	(0.0042)	(0.0043)
EU born	-0.0133	0.0091
	(0.0095)	(0.0095)
Non-EU born	-0.0149*	0.0095
	(0.0085)	(0.0114)
Age	0.0021***	0.0021***
	(0.0005)	(0.0005)
Age squared	-0.0000***	-0.0000***
	(0.000)	(0.0000)
Female	-0.0002	-0.0008
	(0.0017)	(0.0016)
Lower secondary education	0.0046	0.0045
	(0.0041)	(0.0041)
Upper secondary education	0.0078	0.0078
	(0.0047)	(0.0047)
Higher education	0.0063	0.0063
	(0.0052)	(0.0051)
Good health	-0.0318***	-0.0318***
	(0.0044)	(0.0044)
Average health	-0.0128***	-0.0128***
	(0.0030)	(0.0031)
Disrupted marital status	-0.0017	-0.0027
	(0.0016)	(0.0016)
Inactive-unemployed	0.0051**	0.0058**
	(0.0020)	(0.0022)
Hous depr*EU born		-0.0130*
		(0.0066)
Hous depr*non-EU born		-0.0054
		(0.0091)
Ses depr*EU born		-0.0026
		(0.0092)
Ses depr*non-EU born		0.0026
		(0.0021)

Table 4.36 (Continue)

Env depr*EU born		-0.0068
		(0.0069)
Env depr*non-EU born		-0.0026
		(0.0092)
High urb*EU born		0.0009
		(0.0128)
High urb*non-EU born		-0.0133*
		(0.0072)
Mon pov*EU born		-0.0059
		(0.0065)
Mon pov*non-EU born		-0.0256***
		(0.0057)
Single par*EU born		-0.0367***
		(0.0128)
Single par*non-EU born		0.0142
		(0.0133)
Female*EU born		0.0056
		(0.0077)
Female*non-EU born		0.0097
		(0.0073)
Disr. mar stat*EU born		0.0200***
		(0.0060)
Disr. mar. stat.*non-EU born		0.0080
		(0.0057)
Inact.-unempl.*EU born		-0.0056
		(0.0070)
Inact.-unempl.*non-EU born		-0.0073
		(0.0084)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0110
		(0.0079)
Non-EU born		-0.0067
		(0.0065)
Observations	600067	600067
R-squared	0.1271	0.1273
Constant	-0.0359*	-0.0372*
	(0.0197)	(0.0199)

Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Var1*Var2 in the first column, indicates the interaction term.
Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.

4.4.5 Further specifications: migratory background and crime perceptions in Central-Eastern European countries and the Balkans

Table 4.37 below presents the results for the group of Central and Eastern European countries. Interestingly, for the results without interaction terms in column 2, it is possible to see that the variables of interest are not significantly associated with the probability of self-reporting crime as a problem in the neighbourhood in Central and Eastern European countries. This is different from what happened in the main model where all the countries were included. This might be due to the smaller stock of foreign-born or foreign citizens residing in the Central-Eastern and Balkan countries in Europe compared to the Western and Nordic countries (Hooghe *et al*. 2008; Pedersen *et al*. 2008). It is in contrast to hypothesis H1 for which country of birth should have been positively and significantly associated with reporting crime as a problem of the neighbourhood.

Similar to the main specification, the interactions between socio-economic deprivation and EU born is negative and highly significant (1 percent level). Namely, for a given level of socio-economic deprivation, an EU born is associated with a 0.7 percentage points lower probability of self-reporting crime as an issue of the area of living. This seems contrary to hypothesis H2 that stated a positive and significant combined effect of material deprivation and country of birth as predicted by the SDT (Markowitz *et al*. 2001; Sampson 1987) and those studies predicting a positive impact of race/migratory background or ethnicity on fear of crime (Callanan 2012; Lane and Meeker 2004 that interacted social disorganization and race).

Interestingly, the interaction terms between monetary poverty and EU and non-EU born respectively return opposite results. EU born heads of households that are living in a condition of monetary poverty, are associated with an around 3.3 percentage points higher likelihood to report crime as a problem of the area of living compared to natives. On the contrary, non-EU born in a similar condition are associated with an around 2.4 lower probability of self-reporting crime as a problem of the neighbourhood compared to natives. These results are at the same time in contrast and consistent to hypothesis H2 stated in subsection 4.1.1 respectively for non-EU and EU born compared to natives. They seem to signal that non-EU born,

mostly coming from low or lower-middle income countries (OECD 2020), are associated with lower probability of reporting crime as a problem of the neighbourhood when finding themselves in a condition of monetary poverty. This is probably because conditions of monetary poverty are more present in neighbourhoods characterised by ethnic heterogeneity and social disorganisation, as predicted by the SDT (Markowitz *et al*. 2001). These are the areas where migrants tend to cluster, and, consistently with the findings by Brunton-Smith and Sturgis (2011), the perceptions among these ethnic groups is less negative compared to natives because of the intra-ethnic social cohesion and economic support that migrants can find in these neighbourhoods and it can be argued that these migrants might live in conditions of more severe deprivation and higher crime in the origin countries and thus they feel relatively safer in the host countries in spite of the condition of monetary poverty that the household face.

For EU born and monetary poverty, the results are consistent with hypothesis H2. This might signal that EU born that are coming from better off countries, especially considering that this specification takes into account the poorer group of countries in Europe, are feeling less secure given a condition of monetary poverty. They might be used to live in safer neighbourhoods in their home countries while they have to face poorer conditions in the host country and reside in neighbourhoods that they perceive more insecure where crime could be considered as a problem. It might also be that these migrants are coming from EU countries that are not better off (e.g., Romanian-born heads of household that live in Czech Republic), and that while in the home country, for a given wage, they could live in safer areas, they have to resort to live in areas that are perceived more unsafe in the host country because of higher living costs.

Similar to all previous specifications, the interaction between single parent household and EU born is negative and significant. Namely an EU born household head is associated with an around 5.8 percentage points lower probability of self-reporting crime as a problem in the area of living. The coefficient is significant at 1 percent level. This provides evidence against hypothesis H2 that a migrant, living in a condition of concentrated disadvantage, is significantly associated with a higher likelihood to report crime as a problem in the area of living. It seems in line with

Brunton-Smith *et al*. (2013) for which a migrant who lives in a condition of deprivation is less likely to report fear of crime compared to a native.

On the contrary, a single parent household head that is born outside the EU is positively and significantly associated with reporting crime as a problem of the area of living by around 6.3 percentage points compared to a native. The estimate is sizeable and highly significant (1 percent level). This result is consistent with hypothesis H2 for which, in a condition of disadvantage, a foreign-born is more likely to report crime as a problem of the neighbourhood. It might be that non-EU born heads of household feel more discriminated compared to EU born and they are less integrated as found by Valentová and Alieva (2018), and thus, in a condition of disadvantage, they feel lack of support and are more likely to perceive crime as a problem of the areas where they live. This seems in line with Lane and Meeker (2004) that found a positive joint effect of race at individual level and social deprivation on fear of crime.[111]

[111] Specifically, the authors focus on fear of gang crime in the US.

Table 4.37 Specification test for Central-Eastern European and Balkan countries with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0165**	0.0159**
	(0.0063)	(0.0063)
Socio-economic deprivation	0.0073***	0.0074***
	(0.0006)	(0.0007)
Environmental deprivation	0.1450***	0.1447***
	(0.0134)	(0.0135)
High urbanisation	0.0695***	0.0708***
	(0.0075)	(0.0065)
Monetary poverty	-0.0010	0.0002
	(0.0036)	(0.0029)
Single parent households	0.0096	0.0071
	(0.0060)	(0.0065)
EU born	-0.0040	0.0107
	(0.0055)	(0.0123)
Non-EU born	0.0154	0.0083
	(0.0192)	(0.0095)
Age	0.0006	0.0006
	(0.0005)	(0.0005)
Age squared	-0.0000*	-0.0000*
	(0.000)	(0.0000)
Female	0.0029	0.0024
	(0.0035)	(0.0033)
Lower secondary education	-0.0121	-0.0119
	(0.0066)	(0.0066)
Upper secondary education	-0.0032	-0.0029
	(0.0050)	(0.0050)
Higher education	0.0026	0.0029
	(0.0047)	(0.0048)
Good health	-0.0235***	-0.0235***
	(0.0055)	(0.0055)
Average health	-0.0073*	-0.0075**
	(0.0033)	(0.0032)
Disrupted marital status	-0.0004	-0.0000
	(0.0023)	(0.0022)
Inactive-unemployed	-0.0048*	-0.0044
	(0.0025)	(0.0027)
Hous depr*EU born		0.0015
		(0.0085)
Hous depr*non-EU born		0.0157
		(0.0114)
Ses depr*EU born		-0.0073***
		(0.0014)
Ses depr*non-EU born		-0.0018
		(0.0017)

Table 4.37 (Continue)

Env depr*EU born		0.0099
		(0.0152)
Env depr*non-EU born		-0.0064
		(0.0083)
High urb*EU born		-0.0019
		(0.0191)
High urb*non-EU born		-0.0057
		(0.0139)
Mon pov*EU born		0.0328***
		(0.0090)
Mon pov*non-EU born		-0.0238***
		(0.0072)
Single par*EU born		-0.0584***
		(0.0176)
Single par*non-EU born		0.0626***
		(0.0181)
Female*EU born		-0.0075
		(0.0093)
Female*non-EU born		0.0047
		(0.0065)
Disr. mar stat*EU born		0.0165
		(0.0090)
Disr. mar. stat.*non-EU born		-0.0084
		(0.0068)
Inact.-unempl.*EU born		-0.0220
		(0.0281)
Inact.-unempl.*non-EU born		-0.0254
		(0.0160)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0066
		(0.0046)
Non-EU born		0.0192
		(0.0121)
Observations	360026	360026
R-squared	0.1561	0.1566
Constant	0.1516***	0.1494***
	(0.0267)	(0.0269)

Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Var1*Var2 in the first column, indicates the interaction term.
Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.

Overall, the results seem to suggest mixed findings compared to the main hypotheses that needed to be tested. However, if anything, the findings presented in this subsection seem to be partially in line with hypothesis H2 but point in the direction of rejecting H1 and H3 as no significant effects have been found for

country of birth by itself and the interaction between female gender and foreign-born.

4.4.6 Further specifications: migratory background and crime perceptions in Western, Mediterranean and Nordic countries in Europe

Table 4.38 below presents the results for migratory background and crime perceptions in the Western, Mediterranean and Nordic countries in Europe. For the variables of interest, similar to the main specification, it is possible to see that non-EU born household heads are associated with an around 3 percentage points lower probability of self-reporting crime as a problem of the area of living. This result contradicts the hypothesis H1 for which an individual with foreign background is associated with higher probability of perceiving crime as a problem of the area of living or fear of crime (Fox *et al*. 2009; Callanan 2012).

On the other hand, the deprivation conditions are positively and significantly associated with the probability of self-reporting crime as a problem of the area of living. The same holds for other variables such as a high degree of urbanisation, single parent households, educational attainments, health status and inactive or unemployed labour status in line with SDT predictions and other studies (Sampson *et al*. 1997; Brunton-Smith *et al*. 2013; Scarborough *et al*. 2010).

Interestingly, it is noticed that being an EU born with no deprivation condition is positively and significantly associated with the probability of self-reporting crime as a problem of the area of living by around 2 percentage points compared to a native-born. The coefficient is significant at 5 percent level. This result is consistent with hypothesis H1 that being foreign-born is associated with a higher probability of reporting crime as a problem of the area of living and is in line with the evidence of many previous studies (Callanan 2012; Callanan and Rosenberg 2015). The reason here might be related to the degree of discrimination that these migrants have to face in the host countries and, although they face no material or social deprivation, they might still end up living in areas that are deprived and characterised by crime rates and, thus, be more likely to self-report crime as an issue of the area of living.

On the contrary, the marginal effect of non-EU born that is the sum of the coefficients with and without deprivation and disadvantage is negative and highly significant (1 percent level). Namely, a non-EU born head of household is on average associated with an around 1.6 percentage points lower likelihood to self-report crime as a problem of the area of living. This is contrary to hypotheses H1 and H2 and seem in line with the studies finding a negative effect of combining deprivation or disadvantage with a foreign background (Vauclair and Bratanova 2017; Brunton-Smith *et al*. 2013).

For the interaction terms of this specification, housing deprivation combined with EU born is significantly associated with an around 2 percentage points lower probability of self-reporting crime as an issue in the neighbourhood compared to natives and the estimate is significant at 5 percent level. Similarly, socio-economic deprivation combined with EU and non-EU born is also negatively and significantly associated with the probability of self-reporting crime as an issue of the neighbourhood respectively by around 0.5 and 0.9 percentage points compared to natives. Both the estimates are significant at 5 percent level. The results for both the interactions with socio-economic and housing deprivation are contrary to hypothesis H2 and seem in line with the findings of Brunton-Smith and Sturgis (2011) for which foreign-born are less likely to report fear of crime compared to natives given a situation of deprivation of neighbourhoods they live in.

Similar to all the previous specifications, an EU born who is a single parent with children is significantly associated with an around 3.1 percentage points lower probability of self-reporting crime as a problem of the area of living. The coefficient is significant at 5 percent level. This finding is contrary to hypothesis H2, stated in subsection 4.1.1 above, that a foreign-born in a condition of concentrated disadvantage (i.e., single parent or with a disrupted marital status) should be more likely to self-report crime as an issue of the neighbourhood. The result seems in line with the evidence provided by Brunton-Smith and Sturgis (2011) that race and ethnic background moderate the impact of concentrated disadvantage on fear of crime.

The interaction between a disrupted marital status and EU born is positive and significant at 5 percent level and shows that, given a disrupted marital status, an EU

born is associated with a 1.4 percentage points higher likelihood to self-report crime as an issue of the area of living compared to a native-born. This result seems consistent with hypothesis H2 that, given a condition of deprivation or disadvantage, a foreign-born should be associated with a higher probability of self-report crime as a problem of the area of living. It is also in line with the literature finding a positive impact of family disruption on social disorganisation and, through this, on fear of crime (Sampson *et al*. 1997; Brunton-Smith *et al*. 2013), and with the studies finding that a condition of deprivation or disadvantage combined with a foreign background has the effect of increasing fear of crime (Lane and Meeker 2004). The explanation might be that an EU born that is divorced, widowed, or separated might not have enough social support in the host country and might have to live in deprived areas where rent costs are lower given that she or he lives with only one source of income and, in case of divorce, might have to pay a compensation to the former partner. Given this circumstance, the probability of living in an area where crime is perceived as a problem would be higher.

Table 4.38 Specification test for Western European countries with and without interaction terms

	OLS (without interactions)	OLS (with interactions)
Housing deprivation	0.0271***	0.0291***
	(0.0051)	(0.0051)
Socio-economic deprivation	0.0133***	0.0142***
	(0.0011)	(0.0012)
Environmental deprivation	0.1182***	0.1175***
	(0.0036)	(0.0036)
High urbanisation	0.0756***	0.0763***
	(0.0082)	(0.0082)
Monetary poverty	-0.0039	-0.0023
	(0.0028)	(0.0028)
Single parent households	0.0126***	0.0144***
	(0.0036)	(0.0039)
EU born	-0.0124	0.0203**
	(0.0114)	(0.0087)
Non-EU born	-0.0284***	0.0168
	(0.0073)	(0.0107)
Age	0.0030***	0.0031***
	(0.0005)	(0.0005)
Age squared	-0.0000***	-0.0000***
	(0.000)	(0.0000)
Female	-0.0005	-0.0012
	(0.0015)	(0.0015)
Lower secondary education	0.0120***	0.0117***
	(0.0040)	(0.0039)
Upper secondary education	0.0145***	0.0142***
	(0.0044)	(0.0043)
Higher education	0.0106*	0.0102*
	(0.0058)	(0.0057)
Good health	-0.0374***	-0.0373***
	(0.0038)	(0.0039)
Average health	-0.0172***	-0.0172***
	(0.0024)	(0.0023)
Disrupted marital status	-0.0027	-0.0034
	(0.0022)	(0.0024)
Inactive-unemployed	0.0060**	0.0061**
	(0.0024)	(0.0027)
Hous depr*EU born		-0.0198**
		(0.0086)
Hous depr*non-EU born		-0.0134
		(0.0086)
Ses depr*EU born		-0.0052**
		(0.0022)
Ses depr*non-EU born		-0.0092***
		(0.0017)

Table 4.D.38 (Continue)

Env depr*EU born		0.0073
		(0.0055)
Env depr*non-EU born		0.0063
		(0.0071)
High urb*EU born		-0.0039
		(0.0108)
High urb*non-EU born		-0.0097
		(0.0059)
Mon pov*EU born		-0.0077
		(0.0046)
Mon pov*non-EU born		-0.0091*
		(0.0047)
Single par*EU born		-0.0314***
		(0.0101)
Single par*non-EU born		-0.0024
		(0.0095)
Female*EU born		-0.0061
		(0.0065)
Female*non-EU born		0.0051
		(0.0047)
Disr. mar stat*EU born		0.0142**
		(0.0065)
Disr. mar. stat.*non-EU born		0.0038
		(0.0047)
Inact.-unempl.*EU born		0.0007
		(0.0061)
Inact.-unempl.*non-EU born		-0.0068
		(0.0065)
Marginal effects for EU and non-EU born in the interaction model		
EU born		-0.0096
		(0.0101)
Non-EU born		-0.0159***
		(0.0047)
Observations	866278	866278
R-squared	0.1141	0.1144
Constant	-0.0737***	-0.0770**
	(0.0173)	(0.0173)

Cluster-robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Var1*Var2 in the first column, indicates the interaction term.
Both the regressions include country fixed-effects, year dummies, interactions between country and year dummies to account for resistance factors, and dummies related to the household type (e.g., one person household, 2 adults without dependent children, etc.). Standard errors are clustered at country level.

Although the findings for the last two interactions (i.e., single parent and disrupted marital status separately interacted with EU born) seem to contradict each other, it is plausible for them to be different from each other. Namely, a single parent with children household is likely to receive benefits on top of the household income, and this might provide a support to avoid being caught in a poverty trap that might

increase the probability of living in an area where crime could be perceived as a problem.[112] Moreover, a single parent with children that is EU born might receive social support from the neighbourhood also thanks to the network that is built with other families in the neighbourhood. On the other hand, a person with a disrupted marital status might not receive income support especially if from a foreign background or ethnic minority (see Harrington Meyer *et al*. 2005 for the link between benefits and marital status for women) and might be more likely to suffer from physical and psychological disorders (Shapiro and Keyes 2008). This, in turn, may lead to a more negative perception of the safety of the neighbourhood (Foster *et al*. 2016).Overall, the results for the Western, Mediterranean and Nordic countries in Europe are similar to the one for the main specification with all countries over the whole period. Most of the findings do not support the hypotheses H1, H2 and H3 that have been made in the beginning of this chapter, except for the positive and significant interaction between a disrupted marital status and an EU born household head. On the other hand, a negative and significant impact has been found for the interaction term between EU born and single parent household contrary to hypothesis H2, and this is consistent throughout all previous specifications. Other results seem not robust and context dependent.

4.5. Concluding remarks

In this chapter, the link between migratory background, proxied by country of birth, and the probability of self-reporting crime, violence or vandalism as a problem of the area of living has been assessed for various European countries across a period of time of 6 years, namely from 2004 to 2010. In the general model, it has been shown that being born in a non-EU country is associated with a lower probability of self-reporting crime as an issue in the area of living. This is in contrast with many previous studies that find a positive impact between race and migratory background and fear of crime (Fox *et al*. 2009; Callanan 2012) and seem partially in line with other studies that documented a generally lower fear of crime among foreign-born

[112] See Bradshaw *et al*. (2018) and Morissens (2018) for the link between universal benefits and poverty risk for single parent households.

(Franklin *et al*. 2008). However, this result is only significant at 10 percent level and does not appear to hold through various specifications signalling that the link between country of birth and crime perceptions is very context-dependent and cannot be easily generalised.

Other factors included in the analysis have been borrowed from the SDT, namely socio-economic, housing and environmental deprivation as well as urbanisation and population density, monetary poverty and single parent households. The SDT is used to predict crime rates, but it has been found to be useful in predicting also fear of crime or crime perceptions (Brunton-Smith *et al*. 2013; Brunton-Smith and Sturgis 2011). Other personal variables such as sex, age, educational attainment, self-reported health status, marital status and labour status have also been included following what was done in most of previous papers (Ortega and Myles 1987; Scarborough *et al*. 2010).

Given that both these variables and the variables of interest have been found to be important predictor of crimes and their link with crime perceptions is intertwined as argued by Brunton-Smith and Sturgis (2011) and found by Ortega and Myles (1987), specifically for the interactions between sex, age and race, interaction terms between these variables and the variables of interest have been included in the analysis. In the main specification, the interactions between housing deprivation and socio-economic deprivation respectively with EU born and both EU and non-EU born indicate that, for given levels of deprivation, EU and non-EU born are less likely to report crime as an issue of the area of living. This result seem in line with the findings by Vauclair and Bratanova (2017) who found a negative joint effect between income inequality and migratory background in their multilevel analysis and by Brunton-Sturgis (2011) who found that, in line with the SDT, migratory background and race are associated with lower fear of crime especially in those areas classically defined as deprived, that is, those areas having high levels of immigrant concentration and ethnic diversity, residential mobility and low socio-economic background. In addition, the interaction term of female sex and foreign-born indicates a significant association with higher levels of fear of crime and this seems in line with the findings by Callanan and Rosenberg (2015) but opposed to that of other studies such as Ortega and Myles (1987). However, none of the

interaction terms are significant across all the specifications, at the most 4 out of 5 specifications.

On the other hand, the negative link between single parent household and EU born household head has been found to be consistent across all the specifications although the magnitude of the estimate of the interaction is not the same. On average, the interaction signals that a single parent household who is born in an EU country, different from the country of residence, is associated with an around 3.5 percentage points lower probability of self-reporting crime as a problem of the area of living. This seems in line with those studies finding a higher support for individuals with a foreign background in areas where there is clustering of immigrants that do not experience necessarily higher crime rates and fear of crime (Hipp and Yates 2011; Brunton-Smith and Sturgis 2011; Lee and Martinez 2009). Moreover, single parent households headed by a non-native EU born in a European country might be eligible to receive welfare benefits from the government (Bradshaw *et al*. 2018) and might be more likely to receive social support in the area of living. Both these factors can lead to diminishing fear of crime. It might also be related to the levels of crime experienced by these single parents in their home countries which could be expected to be higher than those in the countries of residence.

Overall, the results presented in this chapter show that the link between country of birth and crime perceptions is very much context and time dependent. While several studies found positive effects of migratory background and/or race on fear of crime (Fox *et al*. 2009: Callanan 2012), the evidence provided here is inconclusive and, if anything, points toward the opposite direction by indicating that foreign-born or citizens are less likely to perceive higher fear of crime especially when exposed to deprivation conditions compared to native-born or citizens.

In terms of policy implications, this chapter shows that migratory background itself is not a significant predictor of crime perceptions, thus, no particular effort based on country of birth or citizenship, such as tougher migration policies, should be taken in order to tackle fear of crime. On the other hand, the deprivation levels of the area where the heads of the households live matter for determining a higher probability of self-reporting crime as a problem of the area of living and this result

is robust across all the specifications. Furthermore, combined with the country of birth, deprivation seems to be associated with higher probability of self-reporting crime as a problem of the neighbourhood if the head of the household is native-born, while this is not true or rather the opposite if the respondent is foreign-born. This indicates that policymakers should rather focusing on fighting deprivation and pursue policies that facilitate integration for migrants rather than reducing migratory flows or make it more difficult to apply for visas or residence permits.

Further research would need to be done to understand the specific impact of the country of origin, not only EU and non-EU, and following the same households through time in a panel data setting. If information on single geographic country of birth is available, it would be interesting to check whether being born in a certain area of the world is associated to higher crime perceptions. Moreover, data at neighbourhood level on crime rates, location and other variables (social ties, neighbourhood cohesion, disadvantage) would be very useful in this setting as it would allow a researcher to link SDT elements with actual crime rates and crime perceptions and the levels of ethnic diversity or immigrant concentration to explore whether differences in crime perceptions by country of birth depends on the specific characteristics of the neighbourhood.

Appendix 4.A: Descriptive statistics and correlation matrix

Table 4.A.39 Comprehensive list of all variables used in the empirical analysis

Variables (all measured at province-level)	Source	Unit of measurement
Crime perception It is a dummy variable taking value 1 if the household perceives that crime, violence or vandalism are a problem of the area of living with no standard definition of what a problem is (EU-SILC Documentation, 2006).	EU-SILC microdata household file	Binary variable (0,1)
Country of birth There are 3 dummy variables for country of birth: 1) EU born. The variable takes value 1 if the individual is EU born, but not in the country of residence, and 0 otherwise. 2) Native-born. The variable takes value 1 if the individual is born is the country where she or he resides in, and 0 otherwise. 3) Non-EU born. The variable takes value 1 if the individual is born in a non-EU country, but not the country of residence, and 0 otherwise.	EU-SILC microdata personal file	Binary variable (0,1)
Housing deprivation index The housing deprivation index is the sum of three dummy variables referring to housing condition: the presence of leaking roof, the tenure status namely if the individual is a private tenant or pays a rent lower than the market value and the type of dwelling namely if the household head lives in a flat or apartment situated in a building with more than 10 dwellings (EU-SILC Documentation, 2006). The maximum value of this index is 3 if all the conditions of deprivation are present and 0 if, instead, no deprivation is present.	EU-SILC microdata household file	Number from 0 (no deprivation) to 3 (maximum deprivation)
Socio-economic deprivation index The socio-economic deprivation index is constructed by summing up dummy variables referring to various conditions of socio-economic exclusion. Specifically, there are a dummy variable taking value 1 if the housing cost is considered a heavy burden for the household and 0 otherwise, a variable that takes value 1 if the household has some difficulty, difficulty or great difficulty to make ends meet and 0 otherwise, and other four variables taking value 1 if the household cannot afford respectively a computer, a washing machine, a television or a telephone. Other binary variables, used to build the socio-economic deprivation index, have value 1 if the household cannot face unexpected financial expenditures, cannot pay for a holiday abroad or cannot afford a protein prevalent meal (meat, fish or vegetarian equivalent). The maximum value of the indicator is equal to the maximum number of variables included, thus 9 in the case of the socio-economic deprivation index and 0 the lowest value if no deprivation condition is in place.	EU-SILC microdata household file	Number from 0 (no deprivation) to 9 (maximum deprivation)

Table 4.A.39 Continue

Variables (all measured at province-level)	Source	Unit of measurement
Environmental deprivation index The environmental deprivation index puts together elements of social deprivation and exclusion and environmental decay. It results as the sum of the three binary variables taking value 1 in case the household lives in a socio-ecological condition of deprivation. These variables refer to living in a dwelling that is too dark (the rooms do not have enough light, but no common standards are indicated on how to assess this), perceiving noise in the neighbourhood as a problem and the presence of pollution, grime or other environmental issues. By including the self-reported problem of noises from neighbours, the socio-ecological deprivation index takes partially into account the social ties and the friendship networks within the neighbourhood as theorised by Sampson *et al*. (1997) in the SDT model with social capital and collective efficacy. The variable on self-reported problem of noises from neighbours is used a proxy for social ties within a neighbourhood (i.e., a household would not report noise from neighbours being a problem if the social ties are strong within the neighbourhood). It is a simplification, but it appears plausible given that noise or nuisance are considered as anti-social behaviours in a neighbourhood (Age UK, Report February 2020).	EU-SILC microdata household file	Number from 0 (no deprivation) to 3 (maximum deprivation)
Urbanisation and population density Urbanisation and population density are captured through the variable on degree of urbanisation which takes value 1 if the area has a population density higher than 500 inhabitants per square kilometre and the total population of the area is higher than 50,000 inhabitants (EU-SILC Documentation, 2006).	EU-SILC microdata household file	Binary variable (0,1)
Monetary poverty The variable takes value 1 if the equivalised disposable income, that is given by the total disposable household income times the within household non-response inflation and divided by the equivalised household size, is lower than the "at risk of poverty threshold" equal to 60% of the median household income deriving from interest, dividends and profit from capital investments in unincorporated business (EU-SILC Documentation, 2006) and 0 otherwise.	EU-SILC microdata household file	Binary variable (0,1)
Single parent household The variable takes value 1 if the household is a single parent household with one or more dependent children, and 0 otherwise.	EU-SILC microdata household file	Binary variable (0,1)
Age The variable is equal to the age of the respondent at the date of the interview. It is calculated by subtracting date of birth (in year and month) from date of interview (in year and month). It may vary from one digit compared to real age at the exact day of interview, as the day of birth is not known (EU-SILC Documentation, 2006).	EU-SILC microdata personal file	Number representing the age in years
Sex The variable is equal to 1 if the household respondent is female and 0 otherwise, so the omitted category is male.	EU-SILC microdata personal file	Binary variable (0,1)

Table 4.A.39 Continue

Variables (all measured at province-level)	Source	Unit of measurement
Lower secondary education The variable takes value 1 if the highest educational attainment reached by the household respondent is a lower secondary education degree and 0 otherwise. For defining a lower secondary education level, the ISCED 97 classification (ISCED 97) has been used.	EU-SILC microdata personal file	Binary variable (0,1)
Upper secondary education The variable takes value 1 if the highest educational attainment reached by the household respondent is an upper secondary education degree and 0 otherwise. For defining a upper secondary education level, it has been used the ISCED 97 classification (ISCED 97).	EU-SILC microdata personal file	Binary variable (0,1)
Higher education The variable takes value 1 if the highest educational attainment reached by the household respondent is a tertiary education degree and 0 otherwise. For defining a tertiary education level, it has been used the ISCED 97 classification (ISCED 97).	EU-SILC microdata personal file	Binary variable (0,1)
Good health status The variable takes value 1 if the self-perceived health status by the household respondent is a "very good" or "good" health status and 0 otherwise. The measurement of self-perceived health (SPH) is, by its very nature, subjective. The notion is restricted to an assessment coming from the individual and not from anyone outside that individual, whether an interviewer, health care worker or relative (EU-SILC Documentation, 2006).	EU-SILC microdata personal file	Binary variable (0,1)
Average health status The variable takes value 1 if the self-perceived health status by the household respondent is an "average (not good nor bad)" health status and 0 otherwise. The measurement of self-perceived health (SPH) is, by its very nature, subjective. The notion is restricted to an assessment coming from the individual and not from anyone outside that individual, whether an interviewer, health care worker or relative (EU-SILC Documentation, 2006).	EU-SILC microdata personal file	Binary variable (0,1)

Table 4.A.39 (Continue)

Variables (all measured at province-level)		Unit of measurement
Disrupted marital status The variable takes value 1 if the household respondent is either separated, widowed or divorced and 0 otherwise.	EU-SILC microdata personal file	Binary variable (0,1)
Inactive-unemployed status The variable takes value 1 if the household respondent is either "unemployed" or "inactive" as for her/his activity status and 0 otherwise. Inactive does not include people that are retired or in early retirement, but it includes people who are in military service (EU-SILC Documentation, 2006).	EU-SILC microdata personal file	Binary variable (0,1)
Household type Various dummies for the household type taking value 1 for each one of the following conditions and 0 otherwise (in total 7 dummies excluding the single parent household described above and the omitted category): 1) 2 adults, no dependent children, both adults under 65 years. 2) 2 adults, no dependent children, at least one adult 65 years or more. 3) Other households without dependent children. 4) 2 adults, one dependent child. 5) 2 adults, two dependent children. 6) 2 adults, three or more dependent children. 7) Other households with dependent children. The omitted category is "One person household" without dependent people (EU-SILC Documentation, 2006).	EU-SILC microdata household file	Binary variable (0,1)

General Conclusions

In the present thesis, the impact of immigration on crime rates and the link between migratory background and crime perception have been explored and analysed.

Chapter 1 has reviewed the literature for immigration and crime and for migratory and ethnic background and fear of crime. It has also outlined the contributions of the subsequent chapters.

In Chapter 2, the impact of FCS immigration on crime rates in Europe has been empirically assessed in a cross-country comparison. The main difficulty in this chapter was to find a way to work without a consistent definition of crimes across countries with different legislations and criminal laws. In order to do that, data were collected for those types of crimes that had similar definitions across countries according to the Eurostat database (Eurostat 2020), namely assaults, sexual violence acts, robberies and thefts. The baseline specification has shown that FCS immigration is significantly associated with robberies and this result remains significant when correcting for endogeneity through the IV regressions. However, when carrying some robustness checks by adding further variables linked to crime rates, the coefficient becomes not significant. Therefore, the evidence is inconclusive, but still in contrasts with that of previous studies on immigration from fragile countries and crime such as Couttenier *et al*. (2019) that found a positive and significant effect of asylum seekers on violent crimes. In the case of the present thesis the effect is not significant, but if anything, it should have been negative on robberies, but the setting of the two studies is different so the comparison cannot be directly made.

In Chapter 3, the effect of FCS immigration on crime rates in Italy is analysed by employing provincial-level data. The aim has been to test the violence-breed-violence framework introduced by Rohner *et al*. (2013a) same as in Chapter 2, but focusing on the Italian context. The results for this chapter showed a sizeable, significant and statistically positive effect of FCS immigration on mafia type of crimes. Namely, an increase by 10 percent in FCS immigration causes an increase in mafia crimes by 9-10 percent. One possible explanation for this result is that immigrants coming from fragile countries because of the difficulties faced in obtaining documents (visas, permits) and jobs are likely to be victimised by mafia-

type of organisations. This framework sees migrants as victims rather than offenders and predicts a positive impact on crime rates who are perpetrated against them or previous migrants. On the other hand, immigrants could be actively participating in mafia-like criminal organisations as they migrate to the destination country where they already have contacts through a criminal network, perhaps within the same ethnic group, and with the intent of committing crimes (importation model, see Wortley 2009). This result is also different from the evidence by Couttenier *et al*. (2019).

Chapter 4 has focused on the link between migratory background, proxied by country of birth, and crime perceptions. The analysis has been carried out at household level by keeping data only for the household respondent. Household level measures for monetary poverty, housing, socio-economic and environmental deprivation, and single parent families were collected and constructed (in the case of the deprivation indices). The analysis has shown that overall migratory background is not significantly associated by itself with the probability of self-reporting crime as an issue of the area of living when carrying various robustness checks. All-in-all, the results for country of birth and citizenship on crime perceptions were context- and time-dependent and not stable across many different specifications.

The policy implications of the present thesis can be discussed based on the results of each empirical chapter.

For Chapter 2, the results do not back the claim that a tougher immigration policy is needed in Europe in order to reduce crime rates, and do not show the need for particular policy measures to shape the link between immigration and crime. Immigration from FCS has been showed to be negatively and significantly associated to robberies in many specifications. However, the results have not proven robust to the many different checks, therefore it can also not be concluded that a policy favouring immigration would be relevant for reducing crime.

For Chapter 3, the evidence points out that FCS immigration is associated to higher rates of mafia crimes. However, there is no significant link for many other individual types of crimes. Although, the positive effect may suggest that a reduction of immigration could help in reducing crimes, it may be possible that

immigrants are exploited by mafia organisations (Duca 2014), therefore a policy that controls the channels through which mafia takes advantage of immigration would be more effective. At the same time, a control at the border to understand whether the newcomer has a criminal network in Italy that she or he intends to actively join, would be needed.

For Chapter 4, the findings show that the link between country of birth and crime perceptions is not significant under all specifications and is very much context- and time- dependent. However, if anything, the policymaker should focus on reducing fear of crime among native-born given that, especially in a condition of housing deprivation, a native-born is more likely to report crime as a problem of the area of living.

In terms of the limitations of the present thesis, these should be discussed in light of the analyses carried in each of the empirical chapters.

In Chapter 2, the focus has been on FCS immigration in a pool of European countries from 2008 to 2016. The chapter takes into account only formal migration while it does not include data on asylum seekers form fragile countries. This could be very useful in order to have a more complete analysis. Moreover, the chapter takes into account only some categories of crimes and the number of countries included in the empirical estimations are based on a similar definition for the crimes. This has very much limited the dimension of the sample and inhibited the use of many control variables in the IV estimation. Perhaps the analysis could also focus on the effect of immigration on prisons population (the data are available in the Eurostat database) by distinguishing between foreign prisoners and national ones.

Future research, based on Chapter 2, could use data for prisoners and asylum seekers from FCS in order to provide a more complete analysis. Moreover, if immigration data is available at a more disaggregated level together with other variables, this could be very interesting for evaluating the impact of immigration in more detail in the European regions.

In Chapter 3, the focus is on FCS immigration in Italy using province level data and its effect on crime rates. The main limitation is that, for many crimes, such as corruption crimes or bribes, there is no data available at provincial level. Moreover, data on asylum seekers at provincial level were also not available. Finding a dataset

that provides this type of data would be very useful to make the analysis more complete. In addition, when estimating the impact of immigration on crime, researchers would prefer to have data about neighbourhoods and crimes at street level in order to get into details. The study also does not take into account the combined effect of various variables such as unemployment and immigration from FCS to see whether the impact differs when combining these variables.

Future research could improve the results obtained in Chapter 3 of the present thesis by finding data on crimes that are not covered in the chapter such as hate or corruption crimes and also control for the impact of asylum seekers on crime rates. In addition, the joint impact of various variables such as population density and unemployment with FCS immigration, would be notably important to obtain some further insights for the relations hip between immigration and crime in the Italian context.

In Chapter 4, the link between migratory background of the household heads and the probability of self-reporting crime as a problem in the neighbourhood has been analysed. The main limitation of the analysis has been the lack of information about the neighbourhood or the city where the household lived. This has precluded the possibility to conduct a multilevel analysis that puts together elements of social disorganisation such as ethnic heterogeneity, population density, neighbourhood trust, social ties at neighbourhood level with information at individual level. Moreover, more interaction terms could be used to explain the differences in crime perceptions between immigrants and natives.

Future research should merge the data employed in Chapter 4 with neighbourhood level data containing information on socio-economic disadvantage, ethnic diversity, population density, and crime rates. Moreover, it would be important to combine such a set of data with information about informal control and organisational structure in the neighbourhood in order to merge theoretical frameworks such as the SDT with models on vulnerability to explain differences in crime perceptions. This would be also more indicative in understanding the issues to be tackled for policymaking in order to reduce fear of crime and social disorganisation.

In conclusion, this thesis has provided some insights on the link between immigration from fragile countries and crime rates. The analyses have been carried

out both at aggregate and meso levels (i.e., country and province levels). The evidence is mixed but provides some directions and hints for rethinking the impact of immigration on crime and the potential policies to deal with this linkage. Moreover, it has showed how individual and household level factors can contribute to differences in crime perceptions. Further research could be built from the evidence provided by this dissertation in order to go into more details around these issues.

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