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Immigration, Socio-Economic Conditions and Crime: A Cross-Sectional vs. Cross-Sectional Time-Series Perspective

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Corresponding Author:	Luigi M. Solivetti Universita degli Studi di Roma La Sapienza Rome, ITALY
Corresponding Author Secondary Information:	
Corresponding Author's Institution:	Universita degli Studi di Roma La Sapienza
Corresponding Author's Secondary Institution:	
First Author:	Luigi M. Solivetti
First Author Secondary Information:	
Order of Authors:	Luigi M. Solivetti
Order of Authors Secondary Information:	
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Immigration, Socio-Economic Conditions and Crime:

A Cross-Sectional vs. Cross-Sectional/Time Perspective

Luigi M. Solivetti
Department of Social Sciences and Economics, Sapienza University of Rome

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Immigration; natives; crime; crime determinants; instrumental variables; longitudinal analysis

Abstract
This study purpose is to verify if there is an association between foreign immigration and crime. In doing this, the study investigates also some satellite aspects revolving around this possible association: the range of offences affected by immigration, the relationship between immigrant and native crime, and whether the immigration impact on crime is direct or indirect. The present study has addressed these issues by both a cross-sectional and a longitudinal analysis, the latter including an instrument. The study is based on data of the Italian provinces. Italy represents a *critical* case for studying the migration-crime relationship, because in this country the rise in foreign immigration has been sudden and its pace feverish. The cross-sectional analysis findings show that crime intensities are affected by time-invariant factors and marginally by immigration. On the contrary, the longitudinal analysis shows that variations in immigration had a positive impact on both the most serious and the most common offences, on property crimes as well as on crimes of violence. There is no evidence of indirect effects of immigration on crime or of a link with native crime. In contrast to previous literature regarding the U.S., Canada, and Australia, these results suggest that a spiralling immigration can affect crime. In terms of methods, these findings show that the standard synchronic analysis models can be biased by non-observed factors and that therefore cross-sectional time-series models can offer significant advantages.

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Corresponding author:
Luigi M Solivetti
Department of Social Sciences and Economics
Sapienza University of Rome
Piazzale A. Moro, 5, Rome 00185, Italy
Email: luigi.solivetti@uniroma1.it
Ph. +39-3398575901
ORCID: 0000-0002-7811-1224

Immigration, Socio-Economic Conditions and Crime:
A Cross-Sectional vs. Cross-Sectional Time-Series Perspective

Introduction

Since the 1980s, studies conducted in most Western European countries have found immigrant crime figures markedly higher than those observed in the national population (Andersson 1984; Junger-Tas 1985; Natale 1988; Junger 1989; Tournier and Robert 1989; Albrecht 1993; Hebberecht 1997; Killias 1997; Lagrange 2010; O'Nolan 2011; Leerkes, Engbersen and van der Leun 2012). These results were unexpected, because studies conducted during the 1950s and 1960s in Europe's large-scale immigration countries – Germany, Switzerland, France, Belgium and England – had found that immigrant crime rates were inferior or similar to native rates (on the entire subject, Marshall 1997; Tonry 1997; Solivetti 2010). Moreover, studies conducted outside Europe have denied higher crime rates among immigrants: results obtained in larger immigration countries, such as Canada, the United States and Australia, seem to agree in confirming this picture (Yeager 1996; Rumbaut and Ewing 2007; Francis 2014; see also p. 8).

Unsurprisingly, the immigration-crime link has fuelled a most heated debate in Western Europe. Political parties have been at daggers drawn over immigration policies and control of immigrant crime, and these issues are at the top of the agenda of new nationalistic political organizations. Even social scientists present standpoints often in sharp conflict with each other.

Certainly, Western Europe's immigration is peculiar and few people are aware of its magnitude. In the 1990s, 1.65 million immigrants per year reached Western Europe; from 2001, about 2 million (OECD 2015). In the same period, the United States – *the land of immigration* – received an inflow of about 1 million per year. This rather uniform flow towards the U.S. since the 1990s has also been the outcome of stricter controls, which in turn have increased the migratory pressure on Europe.

Within Europe, Italy represents an ideal *critical* case for studying the migration-crime link. A net emigration country until the 1960s, Italy had a foreign population of only 0.4% in 1981. Since the early 1990s, however, there has been a massive spike in immigrant flows. The years 1995-2005 were crucial: the immigrant share rose in that period from 1.8% to 4.7% of the resident population. This despite the country's high unemployment (on average 10.3%) and its high Gini's (34.5) exacerbated by its poor score in economic freedom (64.9 compared to the UK's 79.2: Gwartney, Lawson and Hall 2013). These aspects inevitably dampen immigrants' vocational integration and upward mobility (Calavita 2005). Only a fraction of immigrants (16% in 2000) were from Western Europe or North America, Australia, Japan etc., and most others – usually low-skilled workers – from culturally remote, relatively less-developed countries: which is considered detrimental to assimilation/integration (Karstedt 2001; Junger-Tas 2001; Albrecht 2002; Reich 2006). The inflow from less-developed countries included a substantial number of illegal immigrants – cyclically reabsorbed by ad hoc regularizations – whose condition is considered critical for crime control (Leerkes, Engbersen and van der Leun 2012). Such a migratory flow has mainly concerned the Central and Northern regions, where immigrants during this period were 3.3 times their

number in the Southern region. The latter, in turn, is comparatively less industrialized, underdeveloped, and – as the "South" in the U.S. – with a much higher homicide rate. The Southern region is also well known for the long presence of criminal organizations rooted in the local context (Mafia, Camorra etc.).

Such migratory features and background make it worthwhile studying the immigration impact on crime in Italy. The Italian case could provide an answer to a couple of questions. Is the impact on crime larger in countries where the immigration growth has been feverish? Especially where there is a long-established form of organized crime, is immigrant crime the offshoot of native crime?

Regrettably, current literature has provided inconsistent answers to the migration-crime link, though the main theories expect immigrants to have high crime rates.

Some authors have adopted the anomie conceptual framework and Merton's hypothesis (1949) that high social pressure to succeed materially in the face of scarce legitimate opportunities leads to crime and other forms of deviance. Immigrants – who on average present lower education, higher unemployment and lower wages – are short of legitimate opportunities, whereas their pressure to succeed is high, since it was to better their status that they became immigrants. Therefore, they would be on average prone to crime (Basdevant 1983; Killias 1989; von Hofer, Sarnecki and Tham 1997; Albrecht 1997; Aoki and Todo 2009; Bovenkerk and Fokkema 2016). Other authors have supported the so-called *economic model of crime*, which, following Becker's pioneering study (1968), assumes that crime is a rational option whenever its benefit outweighs its cost. Crime costs and benefits, in turn, are influenced by economic conditions, which affect both legitimate opportunities (*supply*) and returns to crime

(*demand*). Therefore – for reasons abovementioned, i.e. shortage of legitimate opportunities – the average propensity for crime among immigrants should be higher (Neumayer 2006; Vaillant and Dervaux 2008; Bell, Machin and Fasani 2010; Spenkuch 2014). Both the anomie and the economic approach to crime posit an association between immigration and utilitarian crimes, though an association also with non-utilitarian crimes – mediated by frustration – has been hypothesized regarding anomie (Blau and Blau 1982; Bjerregaard and Cochran 2008). It should be noticed that most studies using these theories to explain immigrant crime come from Europe. Faced with a scenario of relatively low immigrant crime, most American authors emphasize, conversely, the *immigrant paradox*: the fact that immigrants' economic disadvantage does not translate into the expected high rates of deviance and crime (Sampson 2008; Stowell et al. 2009; Vaughn et al. 2014). This surprising outcome is usually ascribed to the immigrants' stronger family ties and ethnic social relations (Zhou and Bankston 1998), though the hypothesis that immigrants are less crime-prone out of fear of being "noticed" by the authorities is not ruled out (Ousey and Kubrin 2009). Because of this paradox, immigration inflows would lower local crime rates.

Immigrant crime could be associated with something other than socio-economic status. First, *social disorganization theory*, a product of the Chicago School of Sociology, regarded immigrant crime as an ecological problem: the consequence of the lack of cohesion and social control generated by the residential mobility and ethnic heterogeneity due to large-scale immigration. This model – near and dear to American authors – has been used in studies carried out also in other countries (Sampson and Groves 1989; Haynie and South 2005; Herzog 2009; Boggess and Hipp 2010). Because

immigration inevitably produces residential instability, usually these two aspects are deemed synonymous: however, it is important to ascertain whether crime derives from instability in itself or from the immigration behind it. To do so, we would have to verify whether instability not associated with foreign immigration has any effect on crime. Nor should we ignore that other studies contended that residential stability and ethnic homogeneity, when accompanied with concentrated disadvantage, would produce high crime levels (Sampson and Wilson 1995; Hipp 2010).

Second, any immigration-crime association could be the indirect effect of immigration. Foreign workers are expected to reduce natives' job opportunities, making less-skilled natives redundant and/or lowering their wages: which in turn would increase native propensity for crime. Therefore, the ascription of crime to immigrants could be a case of confusion between ecological and individual correlations. Empirical evidence supporting this hypothesis is scarce (Butcher and Piehl 1998; von Hofer and Tham 2000; Shihadeh and Barranco 2010); and the results regarding the immigration impact on native unemployment are contradictory (Card 2001; Borjas 2003). The issue is complicated further by the fact that immigrant inflows could generate native internal migration (Borjas 2003), which in turn would alter local unemployment levels.

Third, the *differential association theory* denied any immigrant penchant for crime. It regarded first-generation immigrants as less criminal than natives and explained the higher crime rate among second-generation immigrants as the result of their absorbing from native delinquents the attitudes and skills necessary to enter the criminal world (Sutherland 1924). This process would occur particularly where organized crime is a time-honoured tradition (Landesco 1968). Criticized for being too generic, this theory

was revised as *differential association-reinforcement* (Burgess and Akers 1966) and as such used to explain delinquency in newcomers and second-generation immigrants (Haynie and South 2005; Dipietro and McGloin 2012). It is worth trying to investigate this aspect and particularly whether new immigrant crime is an offshoot of past native crime. However, this subject is intertwined with that of immigrant location: consequently, various scenarios are possible. 1. Immigrants settle in high-crime territorial units; local crime rates decrease; cross-sectional differences in crime rates decrease. 2. Immigrants settle in high-crime territorial units; crime rates increase; cross-sectional differences increase. 3. Immigrants settle in low-crime territorial units; crime rates decrease; cross-sectional differences increase. 4. Immigrants settle in low-crime territorial units; crime rates increase; cross-sectional differences decrease. The first scenario is close to the original formulation of the theory, provided there is an increase in crime later with the second generation. The increase in crime across time and immigrant generations found support in a few studies in Europe (Killias 1989; Bovenkerk and Fokkema 2016) and in several U.S. studies (Zhou and Bankston 1998; Rumbaut and Ewing 2007; Hagan, Levi and Dinovitzer 2008). However many other U.S. studies (Sampson 2008; Stowell et al. 2009; Ousey and Kubrin 2009; Martinez, Stowell and Lee 2010; MacDonald, Hipp and Gill 2013) supported the abovementioned, more generic hypothesis of a decrease in crime concomitant with the immigration inflow. The differential association theory is ill suited to the second scenario, because the process of *going-native*, criminally speaking, requires time; it is even less suited to the fourth one, where the original crime rate is low but rises with immigration.

The theories mentioned above have led to both micro and macro research. The macro approach best serves the analysis of the immigration-crime link, not least because the diminutive clearance rate characterizing crime all over the world hinders a reliable association between total crime and individuals. Moreover, the macro approach permits supra-individual factors to be taken into account. A macro analysis across the territorial units could ascertain whether the immigration-crime link is confirmed territorially and whether there are local determinants of crime more momentous than immigration. On the other hand, cross-sectional territorial studies are good at identifying the event densities, but they miss their variations. And crime densities could also derive from time-invariant, non-observed factors, rather than from immigration. This is more likely wherever there are territorial differences in cultural and socio-economic conditions. A fixed-effects longitudinal analysis, being based on variations over time in the territorial units, would bypass the effects on crime of these persistent factors and would identify the effects of change. Second, longitudinal analyses reckon both the association between events and their temporal order. Therefore, they help distinguish between correlation and causality.

Ultimately, cross-sectional time-series analyses offer advantages over other methods, though these advantages are offset by drawbacks: it is difficult to find data for the same variables over time; some data are gathered infrequently, e.g. only during censuses; data collection procedures can differ locally. Therefore, cross-sectional time-series studies are time-consuming, expensive, and can exploit fewer variables. Unsurprisingly, immigration and crime studies of this type are rare.

Butcher and Piehl (1998) carried out a study on 43 metropolitan areas of the U.S. They found that high-crime areas were also characterized by higher immigrant shares, since immigrants settled mainly in those areas. However, when variations over time were considered, immigrant share changes were *not* associated with changes either in violent crime or in overall crime.

Ousey and Kubrin (2009) analysed the immigration-crime link as to U.S. towns. They found that violent crime variations were negatively correlated with the recent foreign-born share, and instead directly correlated with variations in family instability, residential instability and illegal drugs diffusion. Property crime rates, too, were negatively associated with immigration and directly with drug diffusion. Stowell et al. (2009), examining violent crime in the U.S. metropolitan areas between 1994 and 2004, found foreign-born share changes inversely associated with crime changes. Martinez, Stowell and Lee (2010) focused on smaller territorial units (San Diego's urban sections), where they found that homicide variations were directly associated with relative deprivation but inversely with the foreign born.

Spenkuch's findings (2014) diverge from the previous ones. He analysed panel data based on U.S. counties in the period 1980-2000 and distinguished the foreign born according to their origin, finding that immigration had a significant effect on property crimes but none on "crimes of passion", such as rape and aggravated assault. Besides, Spenkuch found that the presence of Mexican immigrants – on average less vocationally integrated – had an impact on property crime. The author regarded this finding as consistent with the economic theory of crime.

In Europe, a panel analysis of 11 German Länder (federal states) by Entorf and Spengler (2000) reached the conclusion that, when controlling for unemployment, income and juvenile population, variations in the foreign population had an impact on theft and overall crime, but not on violent crime.

Later, Buonanno (2006), using Italian regional data, found that, when controlling for urbanization, unemployment and income, there was a weak association between foreign immigrants and property crime. Bianchi, Buonanno and Pinotti (2008), this time using Italian provincial data, found that variations in the immigrant share were associated with significant variations in the robbery rate.

Ultimately, we can notice some unresolved topics in the existing literature. There is no leading theory on the immigration-crime link, and the different explanations offered by *anomie*, *social disorganization* and *differential association* are emblematic of this situation. Additionally, the validity of these hypotheses in contexts geographically far removed from those where they were developed is dubious. It is not even clear if the immigration-crime relationship in Western Europe has anything in common with that in Canada, Australia and the U.S. The aim of the present study is to ascertain whether the immigration-crime relationship can be direct, rather than negative or non-significant, as seems to be the rule in the latter countries. And if it were direct, we intend to identify its covariates, testing at least the main hypotheses deriving from the current literature.

Organization of the study and data

Sample

The present analysis has been conducted on the 103 Italian provinces (pre-2001 boundaries). Each territorial unit comprises on average 2,900 sq. km and 550,000

inhabitants (2001). Our strongly balanced panel contains four waves, corresponding to the years of spiralling immigration: 1995, 1998, 2002, and 2005. Data underlying the variables – crime data included – were drawn from Istat (Italy's Institute of Statistics) databases.

Measures: dependent, explanatory and instrumental variables

Crime rates and their variations are our main dependent variables. Crime figures regard recorded criminal offences verified by the judiciary. We considered some of the most serious offences, namely completed intentional homicide, rape, robbery, extortion; then a less serious but more common offence against the person, i.e. grievous bodily harm; then the most common offence, theft; and, last, the total number of offences, i.e. the so-called *criminality index* (Table 1). The decomposition of crime into these offences was inspired also by considerations about the underreporting of some offences. Official data tend to underrate some immigrant crimes, since intra-ethnic common offences such as theft and bodily harm are underreported, especially by recent immigrants (Bell and Machin 2011), who represent a large share of the immigrant population in Italy. Underreporting occurs also with intra-ethnic extortion, but rarely with robbery, and practically never with intentional homicide. We did not consider other offences, such as transnational drug trafficking, human trafficking and exploitation of prostitution, because they are regarded as rather obviously associated with immigration in Europe (Salt 2000; Paoli and Reuter 2008).

The main explanatory variables belong to the demographic domain and regard migration: all the adult foreign immigrants (MF, and M only), as well as the adult male immigrants belonging to the six national groups with the highest impact on crime,

which are all from non-Western, relatively less-developed countries.[1] These groups were identified by their contribution to the Italian criminality index, not by their crime rate. Groups with the highest crime rates may be small and therefore may have a limited impact on crime figures. The immigration indicators were based on the permits-of-stay and calculated as share of resident population. Ultimately, our "immigrants" are those without host country citizenship: the most marginal group among the foreign born. They are also adult, first-generation immigrants: on the other hand, immigration in those years was too recent to contain a sizeable second generation. To compare the impact of variations in foreign population with that of variations in non-foreign population, we considered the number of residents holding Italian citizenship.

We admit our indicators of immigrant presence could contain some measurement errors. Moreover, an omitted variable could affect both the endogenous variable and its causal variables. Therefore, a correlation between independent variables and disturbance of the endogenous variable cannot be excluded. An instrument would help, but a convincing instrument for immigration is hard to find, because many potential IVs do not satisfy the *exclusion restriction*. Eventually, we chose, as instrument, (lagged) foreign infants born in Italy. Ethnic groups of immigrants differ in birth rates, but this is counterpoised by an advantage of the newborn variable: while official immigration data do not compute illegal immigrants, newborn data include also illegal immigrants' newborns. Newborns are recorded by the medical staff and illegal immigrants have an interest in having their newborns registered, because newborns' registration implies

[1] The countries of origin of these immigrant groups are Morocco, Albania, Romania, Senegal, former Yugoslavia and Tunisia.

various benefits, including a temporary residence permit for their parents (Italy: Law 6 March 1998). Ultimately foreign newborn rates should predict later immigrant share and they could be a suitable instrument to check endogeneity. They cannot be directly associated with the dependent variables (crime rates), because infants cannot commit offences: therefore, any infants-crime relationship must pass through the association of infants with the instrumented variable.[2] Concurrently, our newborn rates pertain to a period preceding that considered for crime rates and immigrant shares: so, successive events cannot be the cause of previous events. We would expect (lagged) foreign newborn rates first to significantly predict the instrumented variable (*inclusion restriction*), second to impact on crime rates and, third, to be independent of the outcome Y *given the covariate* X, namely later presence of adult immigrants (*exclusion restriction*), which would imply that instrument and error are uncorrelated. The endogeneity test of Davidson and MacKinnon (1993: 241-242)[3] can provide a precise assessment of this point.

We used other demographic variables as well. Yearly changes of residence (internal or from abroad), a measure of *residential instability*, were introduced to check the *social disorganization* theories. Changes of residence and immigrant share are correlated (r = 0.65 in the pooled cross-sectional data), but not so as to hinder comparison between their effects. The male population aged 15 to 24 years, in turn, could be relevant as a

[2] Employing an instrumental variable, only that portion of the variations of X which can be explained by the instrument is used to infer about beta.

[3] This test performs an OLS, FE regression of the original Y on the original X, augmented by the residuals obtained from the first-stage regression of X on the instrument, and followed by an F-test for the hypothesis that the coefficient of the residuals is zero. Alternatively, regressing Y on X and the instrument, an F-test on the instrument coefficient would produce the same results.

control for the *crime-prone years* (Hirschi and Gottfredson 1983), since males in this age group make a more than proportional contribution to crime. Next, we selected chief town population and population per square km to control for urbanization. This control is relevant, because immigrants are attracted by large urban centres (OECD 2004; Jayet and Ukrayinchuk 2007). The latter in turn are the single best predictor of crime (Dijk, Kesteren and Smit 2007), because in urban centres opportunities for victimization increase while neighbourhood social control declines. Therefore, urbanization could cause spurious correlations between crime and immigration.

In the domain of economics, we chose per capita GDP as proxy for average economic conditions. We assumed that crime, especially property crime, is counter-related to income (Hale 1998; Arvanites and Defina 2006; Altindag 2012), though a higher level of income could boost *crime opportunities* while reducing *crime motivations* (Cantor and Land 1985, 2001). Besides, it has been known for a long time (Robinson 1950) that immigrants are attracted by the more developed areas, and therefore GDP represents also an appropriate control. The number of cars was included as a further wealth indicator suitable for a nation that – among the sizeably populated countries – has the highest rate of passenger cars. Next, two indicators of unemployment: unemployed people as a percentage of total labour force, and unemployed people aged 15 to 24 years (crime-prone age group) as a percentage of the same age labour force. For both these indicators, only males were considered, for their greater impact on crime. Unemployment has been used to proxy economic conditions in the whole population, both unemployed and employed (Cantor and Land 2001; Phillips and Land 2012). However, unemployment implies also loss of a meaningful role in

society. Therefore, we expect stronger effects on crime from unemployment than from low income (Hooghe et al. 2011) and inequality. Unemployment is the determinant of choice in the economic model of crime; and, due to its social by-products, it fits even better analyses inspired by the socio-economic deprivation theory. Last, we chose the share of people employed by economic sector to measure the impact of type and level of development (Reid et al. 2005).

To these variables, we added infant mortality rate: a variable relating to demography but regarded as a measure of actual poverty, net of any welfare benefit (Pridemore 2008; Messner, Raffalovich and Sutton 2010). Indeed, this variable seems a proxy for wide-ranging deprivation, rather than just poverty, because we found it to be associated in Italy with low education and correlated closer with unemployment than with GDP.

A couple of indicators were chosen to gauge the role of social capital in preventing crime (Akçomak and Weel 2012): namely, the number of voluntary work associations and the copies of the main general interest magazines. Initially, we considered newspapers circulation, advocated by Putnam (1993) as a good indicator of social capital. However, newspapers proved to be highly correlated with chief town population and uncorrelated with voluntary work (which is consistent with high levels of social capital) and Mafia-type organizations (consistent with low levels of social capital). Eventually, the choice fell on general interest magazines,[4] since they proved to be uncorrelated with urbanization and instead correlated with the abovementioned other

[4] These magazines are *Panorama*, *L'Espresso* and *Il Mondo*.

indirect indicators of social capital, as well as with education. These magazines' circulation can be regarded also as an indicator of education and culture.

Three variables were chosen to measure the dimension of an illegal and/or deviant local context that could favour further antisocial behaviour: the rate of people charged with "Mafia-type criminal conspiracy", the rate of people who died from drug abuse and that of people charged with drug trafficking offences. Deaths due to drug abuse were selected as proxy for hard drugs diffusion. In turn, hard drugs diffusion is considered an indicator of anomie and of pressure to commit crimes: violent crime for the control of the drug market, and income-generating crime to afford the costs of hard drugs (among the massive literature on this subject, Goldstein 1985; Johnson et al. 1991; Bean 2002; Ousey and Kubrin 2009).

Last, we included controls for each of the four waves – to identify and neutralize generalized changes in crime rates – as well as controls for peculiar crime trends in the main macro-regions, namely the Northern, the Central and the Southern ones.

Due to their relevance, juvenile male population, chief town population, per capita GDP and male unemployment were used in all the full regression models. The wave controls were used in all the regression models. The area trend controls whenever their contribution was of some relevance.

Data analysis

The analysis first focused on pooled data, by means of cross-province linear correlations, controlling for time waves, between crime rates and demographic-socio-economic indicators, to reveal the main forces associated territorially with crime.

Next, for reasons presented above, we re-analyzed the same associations in terms of variations over time, by means of within-province fixed effects regression models. In our models:

$$(y_{pt} - \bar{y}_p) = \beta(x_{pt} - \bar{x}_p) + \gamma(te_{pt} - \overline{te}_p) + \delta(at_{pt} - \overline{at}_p) + (u_{pt} - \bar{u}_p)$$

where *y* is crime in the province *p* during the year *t*, *x* is an independent variable, *te* is a time effect control, *at* is an area-trend control and *u* is the (conventional) error term. We chose the FE model because: a) the variables of interest registered within-province changes over time, b) there are grounds to suspect also powerful time-invariant unobserved factors and c) the FE model does not assume that these time-invariant factors are uncorrelated with time-varying independent variables (e.g. immigration, income, and unemployment), as the RE and GEE models do. Consequently, the FE model controls for all the possible time-invariant factors whereas RE and GEE do not.[5]

Third, to analyze in depth specific points of theoretical relevance (e.g., *differential association*), we used both variations over time and invariant measures. Due to the presence of invariant measures, we opted for within-province first differences OLS regression models.

Table 1 about here

[5] The Hausman's test was used for the significance of the estimators and the presence of time-invariant omitted variables. Possible correlations of the residuals between one wave and the next were checked by means of the Pesaran's and Frees' tests. These residuals do not represent a serious problem when the research units are numerous and the waves only a few. For the pooled data correlations and the FD regressions, we used macro-region dummies, substantially equivalent to the FE area-trend controls.

Results

The descriptive statistics show (Table 1) that crime rates are often widely differentiated across the territorial units: this advocates a search for explanations. Concurrently, the pooled data correlations (Table 2) reveal that the various offences differ in their associations with the demographic-socio-economic indicators: thus, necessarily, their distribution on the territory is dissimilar. This happens with "violent crime", such as homicides, rapes, grievous bodily harm and robberies. The same happens with "property crime": thefts and extortions are uncorrelated. Therefore, these results reveal that using, as regressands, aggregative crime categories such as "violent crime" and "property crime" – which is common practice in this type of studies – can be misleading when trying to identify crime determinants.

We notice also that several offences registered sizeable changes over time.[6] Rapes and grievous bodily harm registered increases; whereas thefts registered a decrease (see Table 2, Time). These changes were general, i.e. they concerned all or most of the territorial units. Changes due to "shock periods" call for controls for the various waves: we discovered that otherwise the outcomes of both the pooled and the longitudinal data would be different and ultimately unreliable.

Moreover, crime trends over time presented some differences in the main macro-regions. For example, the homicide trends were negative in the Northern and Central macro-regions and positive for the Southern one. Therefore, for some regression models, the controls based on macro-region time trends can prevent spurious results.

[6] The Chow's test confirmed that the time dummies are *jointly* significant for the rates of most offences.

That said, we notice (Table 2) that homicide rates are associated territorially with male unemployment (by far the closest association), 15 to 24-year-old male population, infant mortality, Mafia-type organizations and "South"; whereas they are inversely associated with GDP, cars, people employed in the industry sector, social capital and culture, residential instability and immigration indicators. Instead, there is no association between homicides, urbanization, and drug diffusion. So homicide is rife where there is unemployment, underdevelopment, limited social capital, residential stability, and larger juvenile age groups, as is the case in a pre-modern population profile. In such a context, foreign immigration is low, because immigrants are attracted by the richer, more developed and usually more urbanized areas.

The territorial distribution of extortions resembles that of homicides. Behind extortions, we find the same background of socio-economic underdevelopment, again with unemployment as the closest correlate, and an inverse association with residential instability and immigration, whereas the correlation with "South" is particularly high.

Table 2 about here

Robberies, in turn, are correlated with some indicators of social malaise characterizing the previous offences. However, robberies are mainly marked by their close association with urbanization. There is also an association with drug diffusion and "South", but no association with immigration. From all this, we can infer that robberies are more common in less-developed urban areas, which are not particularly attractive to foreign immigrants.

Rapes, as noticed, show a territorial distribution dissimilar from that of other "violent crimes", such as homicides and robberies. Rapes are correlated with foreign

immigration and, in addition, with urbanization (the closest correlate), income, the services sector, magazine circulation, and with drug trafficking as well. Overall, rapes are associated with a context of material wellbeing, attracting immigrants, where also deviant behaviour (drug trafficking) is rife. When we introduce the main controls, however, immigration loses its significance.

A further type of violent crime, namely grievous bodily harm, shows an association with the services sector and drug trafficking, but no association with foreign immigration.

The most common offence against property, theft, is territorially associated with urbanization (the closest correlate), then with income, cars, culture, drug trafficking, drug diffusion, and foreign immigration. Theft shows also some association with residential instability. The theft-unemployment correlation on the other hand is negative. This is partly due to the underlying link between income and unemployment ($r = –0.80$): if we regress thefts on unemployment controlling for income, unemployment becomes positively associated with thefts and both income and unemployment are significant. Concurrently, immigrants prefer to settle in high-income provinces, as shown by the correlation between immigration and GDP ($r = 0.76$) and confirmed by the association between lagged GDP and variations in immigration over the period 1995-2005 ($r = 0.78$). And immigration is inversely correlated with unemployment as well (in the pooled data, $r = −0.53$). Therefore, even the association between immigration and theft should be treated with caution. Indeed, controlling for unemployment and GDP, the immigration-theft relationship becomes weak.

Last, overall crime is associated with urbanization (again, the closest correlate), the services sector, culture and both drug diffusion and drug trafficking. Its correlation with immigration, too, is positive: however, as for theft, controlling for GDP and unemployment, the association between overall crime and immigration becomes weak.

Moving from the pooled data to the fixed effects analysis, we encounter a different scenario, as suggested by the significance of the fixed effects (in all but one of the 14 models, the hypothesis that the fixed effect intercepts are zero is rejected: Table 3, F-test). First, we notice that – contrary to the pooled data results – variations in foreign immigrants are statistically significant for all the offences considered. This occurs in both the FE models: the basic and the full regression model (Table 3). The effect of immigration is robust in all the cases, but for the extortion basic model. For robbery, rape, grievous bodily harm, theft and overall crime, immigration is the strongest predictor in the full models; for homicide and extortion, it is the second best. For each percentage change in male immigrants, the percentage change[7] in homicides is 0.28 and in rapes 0.15 (basic models); for each percentage change in high-crime national groups, the percentage change in grievous bodily harm is 0.23, in thefts 0.12, in robberies 0.25, and in overall crime is 0.11. The effect size of male immigrants is slightly higher than that of male and female immigrants, but similar in most cases to that of the high-crime national groups (males). The latter indicator, however, is particularly relevant in the case of thefts and overall crime, where the share of male and female immigrants plays the role of control variable. Instead, variations in non-foreign population – both as

[7] Elasticity was calculated as average value of $dy/dx * (x/y)$.

single regressor or in the full models – are never significant, for any offence. To check endogeneity, we ran two-stage FE models, using (lagged) foreign newborns as instrument. Foreign newborns are a *strong instrument* (Table 3, first stage: F-test *P* is 0.000, t-value for the instrument more than 11). They significantly predict overall crime, homicides, rapes and robberies. Concurrently, if we regress crime on both foreign newborns and the instrumented variable, newborns' impact on crime evaporates (t-value -0.55, P-value 0.585 in the case of overall crime) while that of the instrumented variable is momentous (t-value 4.07, P-value 0.000: full results available on request). For all the offences, Davidson and MacKinnon's endogeneity test statistics are non-significant: therefore, we cannot reject the null of exogeneity and we can continue to treat our foreign immigrant indicators (adult immigrants and high-crime national groups) as exogenous.

Regarding other indicators, we notice that – as in the pooled data – the contribution of Mafia-type organizations is robust for homicide and extortion. Infant mortality, too, is still relevant for homicide. Drug trafficking plays some role only for rape. The role of chief town population is modest, while the significance of social capital and culture indicators vanishes.

Table 3 about here

Table 3 (continued) about here

As mentioned earlier, changes in immigration are associated with changes in residential instability, while lagged immigration predicts instability variations (t-value = 5.4). However, lagged instability does not predict immigration variations: immigrants are not attracted by high instability provinces. For any offence, residential instability by

itself exhibits a null or inverse relationship with crime variations, no matter the model: e.g., as single regressor of overall crime variations, its t-value is −0.06 (model not shown).

Regarding the economic indicators, we notice that GDP variations contribute to theft variations only. Changes in unemployment, in turn, are never significant, no matter the model, even when controlling for GDP: e.g., for overall crime, unemployment t-value = 1.12 (model not shown). Immigration variables eclipse the role that GDP and unemployment had as predictors of thefts in the pooled data analysis.

The unemployment variable was scrutinized also to test the hypothesis of indirect effects of immigration on crime. To do this, we calculated the immigration impact on male and youth male unemployment. However, we know that immigrants prefer to settle where economic-vocational conditions are better. Besides, foreign immigrant inflows could generate native internal migration. All this could blur the immigration-unemployment link: therefore, we used controls for these aspects. The analysis was conducted for the entire period 1995-2005 and for the various waves as well. The results were convergent: conditional on baseline unemployment and other controls, immigration variations have no significant impact on unemployment; in particular, no impact on the unemployment of the critical 15 to 24 years age group (Table 4, Models 1). Moreover, we found no evidence of an inverse association between immigrant inflows and variations in non-foreign population, no matter the model (see also Table 4, Model 3-4). This contradicts the hypothesis of native internal migration as a consequence of foreign immigration. Regarding the immigration impact on income, we conducted a similar analysis. We found that immigrant inflows do not impact negatively

on per capita GDP (Table 4, Model 2). In the last analysis, these results do not support the hypothesis of an indirect impact of immigration on crime.

Table 4 about here

Next, we tested the hypothesis that immigrant crime has been the offshoot of previous native crime. Our data showed that foreign immigration was attracted by wealth, lower unemployment and urbanization. Such factors being equal, immigrant variations over the entire period 1995-2005 were inversely associated with previous crime rates (Table 4, Model 3-4, showing the cases of overall crime and grievous bodily harm). Therefore, immigrant population grew particularly where crime rate was originally lower. Moreover, the first differences analysis revealed that crime variations were negatively associated with previous crime level (Table 4, Models 5-6-7, showing thefts, robberies and overall crime; the results for homicides, rapes and bodily harm are equivalent).[8] If immigrant crime were the offshoot of previous native crime, we would expect some crime intensification in high-crime territorial units, and only in the long term. Instead, crime growth followed immigrant inflows without delay (Table 3 FE models: the temporal gap between the panel waves is 3.3 years) and such a growth was higher where crime had been lower. Consequently, crime distribution changed as immigration soared and the immigrants' territorial distribution became more homogeneous. From 1995 to 2005, the standard deviation to the mean of the immigrant share in all the provinces decreased from 70 to 57: concurrently, overall crime standard

[8] In this analysis, we used Δ_2 (dep. var.) t+3 in lieu of Δ_3 (dep. var.) t+3, because otherwise the baseline values of the dependent variable would be on both sides of the equation, inflating the errors.

deviation decreased from 41 to 35. Homicides, rapes, robberies, extortions and grievous bodily harm exhibited the same downward trend in standard deviation.

Discussion

A first result of the present study is the alternative scenario brought to light by the longitudinal analysis. When the analysis focused on pooled cross-sectional data, only two offences – rape and theft (plus overall crime) – showed a clear positive association with foreign immigration; two more offences – grievous bodily harm and robbery – had no association; what is more, the remaining offences – homicide and extortion – showed patent inverse associations with immigration. When the analysis focused on cross-sectional time-series data, the scenario dramatically changed: all the offences emerged as associated with immigration, and both in the basic and in the full regression models, while the instrumental variable confirmed the exogeneity of the immigration indicators. The immigration-crime association is particularly robust for homicide, robbery, theft, grievous bodily harm, rape and overall crime. The results obtained using the "male foreign immigrants" variable were in most cases like those obtained with "high-crime national groups (males)": and this supports the FE results reliability. Instead, variations in non-foreign population were never significant in predicting offences. The latter results indirectly emphasize the relevance of the immigration factor in itself.

In the light of the longitudinal findings, the cross-sectional data results should be reconsidered. The rates of some crimes – first homicides and extortions, then robberies – are affected by time-invariant factors belonging to a background of unemployment, underdevelopment, Mafia-type organizations and limited social capital. This background, characterizing the Southern region, is unsurprisingly associated with low

population mobility and limited foreign immigration. In turn, the theft rate is affected by a second relatively stable setting – characterized by development and wealth – which entices immigrants. Ultimately, the difference between the results obtained from the cross-sectional data and those from the cross-sectional time-series data suggests that the outcomes of studies based on synchronic analyses, the standard approach till now, can be misleading.

Further considerations can be drawn from *unemployment*, a variable deemed momentous for crime prediction. The cross-sectional analysis has shown that male unemployment is closely correlated with homicides, extortions and, at a lower degree, with robberies, but it is not correlated with thefts, the very offence one would expect to be most associated with unfavourable economic conditions. Instead, thefts are correlated with GDP: therefore, a higher GDP does not seem to curtail the interest in stealing by increasing affluence and, indirectly, legitimate opportunities (*supply*); on the contrary, it seems to encourage theft by making more goods available to thieves. For the crucial offence against property, i.e. theft, unemployment seems to play a subordinate role by comparison with the presence of goods. Still, controlling for income, cross-sectional unemployment differences predict thefts.

Unemployment variations *over time*, however, do not predict crime variations, not even in the case of thefts. Concurrently, decreases in GDP do not result in more crime. This is at odds with both the economic model of crime and the anomic strain or relative deprivation approach. One could maintain that these theories are indirectly confirmed, though unemployment in itself is non-significant, because variations in foreign immigrants – who are on average in worse economic conditions than natives – are

associated with crime. The fact that the previously mentioned six national groups from non-Western, less-developed countries, are particularly significant in predicting thefts could be another indicator pointing in the same direction: the status of these groups is indeed on average lower than that of other immigrants. However, one would have to admit that even so the crime determinant would not be a generic "lower economic status" but rather immigrants' specific deprivation.

To piece together this puzzle, we should consider that *structural* unemployment effects are far removed from *frictional* unemployment ones. In Southern Italy, there are provinces characterized by age-old structural unemployment – almost four times the national average – and male youth unemployment affecting two-thirds of the pertinent population (Table 1). The Italian welfare state is rather generous toward frictional unemployment, but powerless against such structural unemployment. Moreover, people in frictional unemployment can usually rely on their (or their family's) savings, whereas people in structural unemployment cannot do so. Understandably, high rates of structural unemployment are associated with high rates of crime, firstly professional crime like extortion; whereas temporary increases in unemployment – alleviated by savings and unemployment benefits – do not significantly affect crime. This tallies with the unemployment impact upon crime when dealing with *stock* data and its non-significant effect when dealing with *flow* data; it tallies also with GDP decreases over time that do not result in more crime. In the case of immigrants, their relative economic deprivation is hardly cushioned by savings and in particular illegal immigrants cannot rely on welfare benefits. Overall, the immigrant condition bears some similarity with

that of *structurally unemployed people,* and the immigrant inflow has been closely followed by increases in crime.

This scenario would suggest a link between immigrant economic deprivation and property crime. Indeed, previous longitudinal studies found a link between immigration and only property crimes, or no link at all. The present study results endorse a link concerning violent crimes as well as property crimes. The immigration elasticity of robbery is high: but so is that of grievous bodily harm. The immigration elasticity of rape – an offence at the opposite pole from utilitarian crime – is higher than that of theft. From these results, it is possible to draw some theoretical conclusions. This compound criminal scenario is hardly attributable only to the immigrants' recourse to illegitimate opportunities. It suggests, on the contrary, a multifaceted explanatory framework, where immigrant lower economic options are accompanied by alienation, frustration and problematic social interaction. This does not fit in with the economic model of crime but is compatible with the anomic strain theory.

The present analysis allowed us to check also the indirect effects of immigration on native crime, which could be caused – as stated previously – by an increase in natives' unemployment and a decrease in their income. We found no evidence of any increase in unemployment and decrease in income after the massive growth of foreign population. The reason for these results could be that the immigration impact on native unemployment and income is more likely to be sizeable where the labour market is open and immigrant labour competitive. This impact is probably limited where the labour market is segmented and immigrants non-competitive, also due to their low skills, as seems to be the case in Italy. The present analysis shows that, whereas increases in

immigration are good crime predictors, the hypothesis of indirect effects of immigration on crime remains unsubstantiated. The alternative hypothesis of *direct* effects emerges fortified by these results.

The panel analysis has been useful to check also other theoretical paradigms.

Residential instability embraces changes of residence of both national and foreign population. Consequently, one could hypothesize that residential instability is a good crime predictor. However, variations in residential instability do not predict crime variations; nor do they magnify the immigration effect on crime in the full regression models. Therefore, the present results do not support *social disorganization* theory, insofar as the latter emphasizes the relevance of residential instability as a crime determinant: any increase in foreign population implies also an increase in the residential instability figures, but only foreign population variations are significant.

The present findings are also at odds with the *differential association* hypothesis. There was already evidence that immigrant crime rates in Europe were higher than native rates. This was of itself discordant with the abovementioned hypothesis, which was developed in the U.S. when immigrant crime rates were on average lower than native ones but higher among second-generation immigrants. Our data concern the first generation only, but the possibility that first-generation immigrants replicated and further expanded native crime cannot be ruled out. However, this hypothesis is implausible, for a combination of reasons: because the immigrant inflow was lesser where crime rate was higher; because crime rapidly grew where immigrant population increased; and consequently, crime rates rose where they had been lower. An unsuspected development associated with foreign immigration has been the more even

distribution of crime rates over the national territory. The immigration-crime link did not entail a generalized rise in crime but, specifically, a territorial increase in crime concomitant with immigration.

Conclusions

This study – the first territorial panel analysis in Europe testing the main theoretical hypotheses on the immigration-crime association – found that this association, hardly detectable in the cross-sectional analysis, becomes manifest in the cross-sectional time-series one. The rise in foreign immigrants resulted in positive variations in common crime but also in serious crime; in offences with limited or zero underreporting (robbery, intentional homicide), as well as in offences underrated because underreported when committed within ethnic groups (theft, bodily harm). Moreover, contrary to expectations derived from previous literature, the immigration-crime association is not restricted to property crimes. In turn, phenomena usually regarded as crime determinants, i.e. unemployment and income, have emerged as poor predictors of crime as compared to immigration.

This study did not find just an association between immigration and crime. It found that this association seems direct, rather than indirect via an increase in native crime, because immigration did not affect natives' unemployment and income. Besides, it found that this association seems to derive from immigration in itself and not from *residential instability*. It found also that – contrary to *differential association theory* and despite the long presence of Mafia-type criminal organizations – crime associated with immigration is not the offshoot of past crime. The immigrants considered here were *foreign citizens*, the most recently arrived and marginal share of the foreign born. This

could explain the present findings and these immigrants' impact on crime: their impact is reminiscent of that of *structural* socio-economic deprivation. The whole picture of the Italian *critical case* – characterized by rampant rise in immigration, exotic origin of most immigrants and limited opportunities for them, due to scant economic freedom – contrasts with the situation of Western European countries in the 1950s-1960s, when most immigrants came from Western Europe itself, *pull factors* prevailed, manufacturing jobs were plentiful, illegal immigrants rare, and immigrant crime low. The Italian case stands in clear contradiction also to that of the U.S., Canada, and Australia, where the immigration impact on crime has remained statistically non-significant or negative. In particular, the Italian case challenges the possibility of generalizing the U.S. *immigrant paradox*, i.e. low crime in the first-generation immigrant population despite its relative socio-economic disadvantage.

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Table 1. Longitudinal data summary statistics. All the Italian provinces; four waves: 1995-1998-2002-2005; Observations (N · T) = 412

Variables by domain	Overall				Within		
	Mean	Std. dev.	Min	Max	Std. Dev.	Min	Max
Crime							
Intentional homicide	2.4	2.5	0.00	16.4	1.3	−3.4	10.6
Rape	6.1	3.1	0.00	15.9	2.4	−1.1	13.2
Grievous bodily harm	93.5	48.6	9.5	358.0	33.8	−51.0	262.1
Theft	2,251.3	1,209.3	234.9	7,820.1	757.3	−909.6	6,060.6
Robbery	51.1	52.7	6.1	491.6	18.2	−89.4	172.7
Extortion	13.5	11.4	0.2	91.9	5.0	−8.2	52.9
Overall crime	4,300.8	1,612.4	1,073.2	12,636.5	996.9	722.4	9,514.2
Population							
Adult foreign immigrants (MF) %	2.1	1.6	0.2	9.6	1.2	−1.4	7.0
Adult foreign immigrants (M) %	1.1	0.9	0.1	5.4	0.6	−1.2	4.0
High-crime nat. groups imm. (M) %	0.6	0.5	0.01	3.0	0.3	−0.1	1.7
(Foreign newborns per 1K pop.) year −1	0.4	0.4	0.005	2.6	0.3	−0.6	1.6
Ln (Non-foreign population)	12.9	0.7	11.4	15.1	0.01	12.9	13.0
Residential instability per 100 pop.	2.4	0.8	1.0	4.3	0.3	1.5	3.4
Male pop. aged 15 to 24 years %	6.0	1.2	3.6	9.2	0.7	4.8	7.6
Population per square km	81.4	89.3	13.1	562.1	1.9	74.6	96.1
Ln (Chief town population)	11.5	0.9	10.0	14.8	0.02	11.4	11.6
Infant mortality per 1K pop.	4.8	1.7	1.8	11.9	1.2	2.0	8.2
Economics							
GDP per capita (,000)	17.48	5.03	7.02	33.74	2.63	11.84	24.06
Passenger cars per 100 pop.	56.7	8.0	36.2	111.0	3.8	35.2	72.2
Employed, agriculture sector %	7.0	5.2	0.3	25.2	1.4	0.3	12.4
Employed, industry sector %	29.9	9.5	12.5	53.7	1.5	23.9	34.4
Employed, services sector %	63.1	8.1	45.3	86.7	2.0	56.8	69.6
Unemployed, m. 15-24 yr old %	23.3	16.2	1.2	68.1	6.1	4.5	40.0
Unemployed, m. >=15 yr old %	7.3	5.8	0.4	27.1	2.0	−1.3	13.6
Social capital & culture							
General interest magazines per 1K pop.	16.5	5.4	6.4	29.1	1.3	12.4	20.8
Voluntary work associations per 10K pop.	3.2	2.8	0.01	28.8	1.3	−10.8	10.7
Illegal & deviant context							
Ln (Mafia-type organizations)	0.4	1.1	0.00	10.7	0.6	−3.6	5.5
Deaths due to drug abuse per 100K pop.	1.3	1.2	0.00	11.9	0.9	−2.8	8.8
Drug trafficking	49.6	33.8	1.8	266.5	15.4	−26.4	111.8

NB: All the offences were calculated as yearly rates per 100K population.

Table 2. Pooled data of the four waves 1995-1998-2002-2005 for all the provinces. Partial correlation coefficients between the offences and the independent/control variables, controlling for the time variables; Observations (N · T) = 412

Variables by domain	Intent. homicide	Rape	Griev. bd. harm	Theft	Robbery	Extortion	Overall crime
Crime							
Intentional homicide	1.000	0.126	0.088	−0.020	0.280	0.588	0.141
Rape	0.126	1.000	0.178	0.223	0.157	0.143	0.289
Grievous bodily harm	0.088	0.178	1.000	0.133	0.001	0.069	0.398
Theft	−0.020	0.223	0.133	1.000	0.433	−0.044	0.903
Robbery	0.280	0.157	0.001	0.433	1.000	0.268	0.439
Extortion	0.588	0.143	0.069	−0.044	0.268	1.000	0.098
Overall crime	0.141	0.289	0.398	0.903	0.439	0.098	1.000
Population							
Adult foreign immigrants (MF)	−0.261	0.191	−0.072	0.282	0.038	−0.397	0.190
Adult foreign immigrants (M)	−0.233	0.172	−0.106	0.235	0.014	−0.389	0.141
High-crime nat. groups imm. (M)	−0.221	0.072	0.023	0.107	−0.124	−0.364	0.041
(Foreign newborns) year −1	−0.277	0.066	−0.182	0.192	−0.007	−0.365	0.053
Ln (Non-foreign population)	0.035	0.125	−0.199	0.389	0.638	0.131	0.302
Residential instability	−0.297	−0.005	−0.111	0.217	−0.009	−0.474	0.084
Male pop. aged 15 to 24 years	0.435	−0.123	−0.083	−0.225	0.247	0.588	−0.138
Population per square km	0.045	0.189	−0.070	0.452	0.698	0.067	0.439
Ln (Chief town population)	0.052	0.284	−0.066	0.561	0.664	0.094	0.492
Infant mortality	0.437	−0.030	0.000	−0.094	0.229	0.543	−0.030
Economics							
GDP per capita	−0.459	0.152	−0.116	0.316	−0.096	−0.577	0.159
Passenger cars	−0.325	−0.020	−0.014	0.209	−0.067	−0.424	0.116
Employed, agriculture sector	0.389	−0.075	0.018	−0.349	−0.134	0.502	−0.242
Employed, industry sector	−0.453	−0.131	−0.205	−0.073	−0.239	−0.437	−0.226
Employed, services sector	0.288	0.204	0.231	0.309	0.369	0.196	0.422
Employed per population	−0.496	0.137	−0.124	0.263	−0.138	−0.561	0.102
Unemployed, m. 15-24 yr old	0.602	0.047	0.140	−0.057	0.362	0.622	0.107
Unemployed, m. >=15 yr old	0.614	0.026	0.053	−0.100	0.376	0.624	0.033
Social capital & culture							
General interest magazines	−0.404	0.158	0.024	0.305	−0.171	−0.566	0.221
Voluntary work associations	−0.234	0.084	−0.097	0.017	−0.252	−0.392	−0.087
Illegal & deviant context							
Ln (Mafia-type organizations)	0.565	0.012	0.044	−0.067	0.200	0.528	0.031
Deaths due to drug abuse	−0.070	0.040	0.137	0.306	0.124	−0.165	0.279
Drug trafficking	−0.031	0.167	0.143	0.308	0.167	−0.060	0.309
Territory							
Northern provinces	−0.270	0.033	−0.055	0.137	−0.106	−0.427	0.029
Central provinces	−0.221	−0.004	0.002	0.107	−0.100	−0.209	0.094
Southern provinces	0.468	−0.032	0.055	−0.233	0.195	0.623	−0.110
Time							
T	−0.051	−0.557	−0.224	0.083	−0.062	−0.043	−0.037
t+1	0.075	0.110	−0.123	0.182	0.099	0.054	0.150
t+2	0.032	0.223	0.159	−0.100	0.002	0.008	−0.056
t+3	−0.056	0.224	0.187	−0.165	−0.039	−0.019	−0.057

NB: Coefficients >=0.178, p. <0.001; coeffs >=0.131, p. <0.01; coeffs >= 0.097, p. <0.05

Table 3. Within-province fixed effects multiple regression models for main criminal offences and various independent/control variables. Four waves: 1995-1998-2002-2005. Coefficients and standard errors

Variables	Model 1a		Model 1b		Model 2a		Model 2b		Model 3a		Model 3b		Model 4a		Model 4b	
	Intent. homicide		Intent. homicide		Extortion		Extortion		Robbery		Robbery		Rape		Rape	
	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.
t+1	0.34	0.21	−0.27	0.49	1.24	0.95	1.18	1.55	12.50	2.73	8.05	5.09	3.27	0.29	2.05	0.51
t+2	−0.10	0.24	−1.06	0.95	−0.91	1.54	−2.02	2.91	−1.37	3.06	−10.7	10.2	3.55	0.33	0.18	1.03
t+3	−0.89	0.32	−1.79	1.26	−3.01	2.29	−4.26	3.66	−12.80	4.04	−23.8	12.6	3.03	0.44	−1.34	1.28
Northern prov. area-trend			−0.112	0.051	0.024	0.196										
Southern prov. area-trend			−0.054	0.066	0.28	0.24										
Adult foreign immigrants (M)	0.68	0.19	0.90	0.30									0.85	0.26	1.24	0.41
High-crime nat. groups imm. (M)					3.62	1.78	5.19	1.84	22.47	4.56	18.61	5.88				
Ln (Non-foreign population)			−14.21	6.51												
Residential instability			−0.37	0.54			−2.61	1.91							−1.64	0.72
Male pop. aged 15 to 24 years			−1.18	0.50			−0.35	1.85			−6.36	6.52			−1.39	0.67
Ln (Chief town population)			0.31	4.08			7.60	14.63			34.2	52.2			7.96	5.32
Infant mortality			0.40	0.10												
GDP per capita			0.021	0.121			0.13	0.45			0.30	1.55			0.29	0.16
Employed, industry sector											−0.38	0.74				
Unemployed, males >=15 yr old			0.027	0.047			−0.21	0.18			0.35	0.67			−0.142	0.065
General interest magazines			−0.055	0.072			−0.28	0.28								
Voluntary work associations																
Ln (Mafia-type organizations)			1.28	0.33			7.53	1.28			3.11	4.63				
Drug trafficking			0.0076	0.0049											0.0117	0.0067
Constant (ave. value of FE)	1.86	0.17	326	111	−208	301	−65.0	166.4	37.43	2.50	−306	596	2.75	0.24	−79.0	60.4
F-test (prob.)	0.000		0.000		0.104		0.000		0.000		0.000		0.000		0.000	
R-squared (within)	0.072		0.211		0.034		0.156		0.162		0.169		0.514		0.544	
Observations (N · T)	412		412		412		412		412		412		412		412	

Table 3. Continued

Variables	Model 5a		Model 5b		Model 6a		Model 6b		Model 7a		Model 7b		Model 8			
	Grievous bd. harm		Grievous bd. harm		Theft		Theft		Overall crime		Overall crime		Overall crime: High-crime nat. groups imm. (M) = Foreign newborns (1st stage)		(2nd stage)	
	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.
t+1	2.63	5.74	−9.59	11.98	97.4	134.4	544	225	202	182	775	352	0.086	0.025	248	200
t+2	14.49	9.34	−24.6	26.9	−705	219	55.9	416.5	−949	296	110	737	0.217	0.041	−816	383
t+3	0.22	13.89	−52.0	35.4	−1,126	324	−17.9	525.7	−1,658	439	−210	977	0.423	0.059	−1,411	630
Northern provinces area-trend	−1.43	1.19	−0.54	1.30	−4.80	27.83			14.7	37.7	38.5	38.5	−0.0083	0.0054	16.2	37.8
Southern provinces area-trend	3.34	1.46	2.69	1.73	45.3	34.2			146.5	46.3	81.6	53.1	−0.033	0.006	126.5	59.1
Adult foreign immigrants (MF)							−536	148			−532	202				
High-crime nat. groups imm. (M)	43.9	10.8	37.8	12.3	715	252	1,748	388	1,553	342	2,589	531			1,275	612
(Foreign newborns) year −1													0.619	0.053		
Ln (Non-foreign population)											−6,476	5,091				
Residential instability							−122	300			−287	426				
Male pop. aged 15 to 24 years			−3.77	12.79			594	269			740	391				
Ln (Chief town population)			115.1	93.9			2,900	2,185			6,531	3,234				
Infant mortality			−3.02	2.49												
GDP per capita			0.91	3.02			148.5	67.1			124.8	96.0				
Passenger cars			2.06	1.06												
Employed, services sector			2.95	1.27												
Unemployed, males 15-24 yr old							13.0	10.7			25.1	14.8				
Unemployed, males >=15 yr old			−1.54	1.19			−24.1	36.1			−61.8	50.8				
General interest magazines							29.3	41.5								
Drug trafficking			0.053	0.122												
Constant (ave. value of FE)	−998	1,820	−2,905	2,238	−22,338	42,598	−37,528	24,944	−111,613	57,679	−85,336	85,899	30.66	7.84	−98,862	62,276
F-test (prob.)	0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000	
R-squared (within)	0.241		0.276		0.169		0.234		0.122		0.185		0.843		0.120	
Observations (N · T)	412		412		412		412		412		412		412		412	
Davidson-MacKinnon test of endogeneity (H0: var. is exog.):													0.299		Prob. = 0.585	

Table 4. Within-province first differences multiple regression models (OLS) for criminal offences and other variables. Four waves: 1995-1998-2002-2005. Coefficients and standard errors

Variables	Model 1 (Unemployed, m. 15-24 yr old) t+3		Model 2 (GDP per capita) t+3		Model 3 Δ_3 (Adult foreign imm. MF) t+3		Model 4 Δ_3 (Adult foreign imm. MF) t+3		Model 5 Δ_2 (Theft) t+3		Model 6 Δ_2 (Robbery) t+3		Model 7 Δ_2 (Overall crime) t+3	
	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.	coef.	s.e.
Northern provinces	1.54	2.02	−0.30	0.35	−0.26	0.30	−0.43	0.30	−304	317	2.15	6.77	−68.7	411.1
Southern provinces	4.07	2.71	−0.96	0.48	−1.02	0.44	−1.23	0.44	−190	405	−6.59	8.84	−492	526
Δ_3 (Adult foreign imm. MF) t+3	0.066	0.672	0.19	0.11										
Δ_3 (ln (Non-foreign population)) t+3	−29.5	22.7	−9.07	3.86	3.88	3.97	6.00	3.81						
(Male pop. aged 15 to 24 yrs) t					−0.21	0.21	−0.16	0.20						
Δ_3 (Male pop. aged 15 to 24 yrs) t+3	1.59	1.87	−0.57	0.32					433	357	1.38	7.45	651	451
(ln (Chief town population)) t	2.02	0.92	0.58	0.15	0.10	0.13	0.29	0.14						
Δ_3 (ln (Chief town population)) t+3									431	2,514	−81.8	54.6	1,365	3,295
(GDP per capita) t	−1.55	0.49	1.123	0.087	0.170	0.075	0.205	0.075						
Δ_3 (GDP per capita) t+3									148.3	94.3	3.39	2.03	110	122
(Unemployed, m. 15-24 yr old) t	0.254	0.075												
(Unemployed, m. >=15 yr old) t			−0.044	0.038	−0.023	0.035	−0.0035	0.035						
Δ_3 (Unemployed, m. >=15 yr old) t+3									12.9	44.5	−0.32	0.98	−24.4	57.8
(Grievous bodily harm) t					−0.0051	0.0018								
(Theft) t									−0.25	0.11				
(Robbery) t											−0.444	0.053		
(Overall crime) t							−0.000201	0.000069					−0.225	0.097
Constant	11.89	8.91	−2.50	1.53	1.53	1.85	−1.00	1.89	−99.7	833.9	−10.7	18.1	934	1,090
R-squared	0.781		0.959		0.688		0.689		0.117		0.511		0.110	
Observations (N)	103		103		103		103		103		103		103	