PARIS SCHOOL OF ECONOMICS
ÉCOLE D'ÉCONOMIE DE PARIS

WORKING PAPER N° 2008 - 05

Do immigrants cause crime?

Milo Bianchi

Paolo Buonanno

Paolo Pinotti

JEL Codes: F22, J15, K42, R10
Keywords: Immigration, crime

PARIS-JOURDAN SCIENCES ECONOMIQUES
LABORATOIRE D'ÉCONOMIE APPLIQUÉE - INRA

48, BD JOURDAN – E.N.S. – 75014 PARIS
TÉL. : 33(0) 1 43 13 63 00 – FAX : 33 (0) 1 43 13 63 10
www.pse.ens.fr
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE – ÉCOLE DES HAUTES ÉTUDES EN SCIENCES SOCIALES
ÉCOLE NATIONALE DES PONTS ET CHAUSSÉES – ÉCOLE NORMALE SUPÉRIEURE

Do Immigrants Cause Crime?*

Milo Bianchi
Paris School of Economics

Paolo Buonanno
University of Bergamo

Paolo Pinotti
Bank of Italy

February 2008

Abstract

In this paper we examine the empirical relationship between immigration and crime across Italian provinces during the period 1990-2003. Drawing on police administrative data, we first document that the size of immigrant population is positively correlated with the incidence of most types of crime, as well as with the overall number of criminal offenses. However, using changes of immigrant population in other European countries to identify exogenous shifts of immigrant population in Italy, the causal effect seems limited to some categories of crime: murders, robberies and, to a lesser extent, thefts.

Keywords: Immigration, crime.
JEL codes: F22, J15, K42, R10.

*Contact information: paolo.pinotti@bancaditalia.it (corresponding author), bianchi@pse.ens.fr, paolo.buonanno@unibg.it. We want to thank Giuseppe Casamassima of the Italian Ministry of Interior for the data on residence permits. We also thank Federico Cingano, Ugo Melchionda, Alfonso Rosolia, Andrea Tiseno and seminar participants at the Bank of Italy for many useful comments. All errors are our responsibility. The opinions expressed herein are those of the authors and do not necessarily represent those of the Bank of Italy.

1 Introduction

The impact of migration on crime dominates the political debate in most of immigrants' destination countries. Somewhat surprisingly, however, there is little systematic evidence on this issue. Indeed, most economics literature has focused on the labor market effects of immigration, leaving its impact on crime largely unexplored.[1]

At the same time, crime appears to be a major concern for citizens in most recipient countries. Figure 1 reports the results of a survey conducted in 1995 and 2003 by the International Social Survey Programme. It clearly emerges that, among the interviewed, there tend to be more people worried that "immigrants increase crime rates", rather than "immigrants take jobs away from natives."

In this paper, we attempt to bridge this gap by investigating the empirical relationship between migration and crime across Italian provinces during the period 1990-2003. As we discuss in the next Section, this sample is very interesting for several reasons. First, during the last few years Italy has experienced a considerable increase in migration pressures from neighboring countries, mostly as a consequence of economic and/or political turmoil in those countries. Similarly to many other receiving countries, this phenomenon resulted in substantial concerns at the social and political level, mainly because of the alleged relationship between migration and crime. Second, during our sample period Italian authorities have implemented several massive regularizations of previously unofficial immigrants, which allow for an estimate of the irregular component of migration.

In Section 3 we start our econometric analysis with an OLS estimation in which we control extensively for other determinants of criminal activity, as well as for province- and year- specific unobserved heterogeneity. According to these estimates, a percentage increase in the total number of immigrants is associated with a 0.1 percent increase in the total number of criminal offenses, this coefficient being very precisely estimated. Once we distinguish among several types of crime, the effect seems particularly strong for thefts, robberies and murders.

We go on in Section 4 by asking whether this evidence can be attributed to a causal effect of migration on crime. Any interpretation in this sense must take into account that the location choice of immigrants within the destination country may respond to unobserved demand-pull factors that are also correlated with crime. As a result, OLS estimates may be biased. The standard solution to this problem is using a Two Stage

[1]For example, crime is completely neglected in authoritative surveys like Borjas (1994), Bauer and Zimmermann (2002) and Card (2005). Some notable exceptions are considered in Section 1.1.

Least Squares approach that exploits supply-push factors in the origin countries as a source of (exogenous) variation in migration flows (see, for instance, Angrist and Kugler, 2003; Munshi, 2003; Saiz, 2007).

We will follow this approach by using changes over time of immigrant population in the rest of Europe as an instrument for changes of immigrant population in Italy. Our identification strategy relies on the fact that the supply-push component of migration by nationality is common to flows toward all destination countries. At the same time, flows toward the rest of Europe are exogenous to demand-pull factors in Italian provinces. Variation across provinces of supply-driven shifts of immigrant population results from differences in the beginning-of-period distribution of immigrants by origin country. Indeed, first stage estimates confirm that our instrument provides a strongly statistically significant prediction of migration to Italy.

Once we take into account the endogeneity of immigrants' distribution across provinces, the causal effect of migration on the total number of crimes estimated in the second stage is not significantly different from zero. On the other hand, the estimated coefficient is still statistically significant for murders, robberies and (to a lesser extent) thefts. Moreover, the effect on murders and robberies doubles in magnitude. According to these estimates, a standard deviation increase in the log-change of immigrant population across provinces between 1991 and 2001 (equal to 54%) would increase murders by 75% and robberies by 49% during the same period.

In Section 5, we consider the magnitudes of our results, and discuss their robustness with respect to measurement errors in the immigrant population. In Section 6, we conclude with a final remark on the interpretation of our results and on their policy implications.

Before turning to our main analysis, we briefly consider some related literature in order to show why immigration and crime may be systematically correlated, and what previous empirical studies suggest about the direction of such correlation.

1.1 Related literature

The economics literature has devoted little attention to the issue of immigration and crime. There are several reasons, however, to expect a significant relationship between the two.

First, immigrants and natives may have different propensities to commit crime. According to the standard economic theory of crime (Becker, 1968), this may occur because immigrants and natives could have different legitimate earnings opportunities, different

attitudes toward risk, different probabilities to be convicted, and even different costs of conviction. From a theoretical viewpoint, however, the direction of such effects is unclear. For example, immigrants may initially face worse labor market conditions than natives, but also a steeper growth in their earning potential (LaLonde and Topel, 1991; Borjas, 1998); immigrants may be less risk averse than non-migrants, but not necessarily less risk averse than natives (Bonin et al., 2006); convictions may be more costly for immigrants, who also face the risk of deportation (Butcher and Piehl, 2005).

Furthermore, immigrants tend to be much more spatially concentrated than natives, and so their location choices become crucial. If for example immigrants tended to settle down in depressed areas, perhaps due to lower housing costs or to networks of previous immigrants, their legitimate earnings opportunities would be lower and their propensity to commit crime would be higher. Also, such areas may display higher crime rates, so the effect would be amplified by social interactions (see Glaeser et al., 1996). Of course, the opposite would occur if immigrants instead settled down in areas with better legitimate opportunities and lower crime (Saiz, 2007).

In addition, immigrants have a different cultural background, as affected for example by their source countries' institutions, which may or may not induce a stronger respect of law. Finally, at the macro level, the effects of interest include also natives' response to the inflows of immigrants. For example, Borjas et al. (2006) argue that recent immigrants have contributed to the increase in criminal activity of native black males in the U.S. by displacing them from the labor market.

Despite such ambiguity in the theoretical predictions, the empirical literature is quite small and mostly limited to the U.S. case. Current U.S. immigrants have been found to have lower incarceration rates than natives (Butcher and Piehl, 1998b, 2005), while the pattern seems reversed for the early 1900s (Moehling and Piehl, 2007). At the macro level, Butcher and Piehl (1998a) look at a sample of U.S. metropolitan areas over the 1980s and document that new immigrants inflows had no significant impact on one-year changes in crime rates. As the authors recognize, however, using immigrant flows rather than stocks may underestimate the effects of interest.

2 Trends and characteristics of migration in Italy

Migration to Italy displays several interesting features for the purpose of our analysis. First, it is a very recent phenomenon, which basically started in the early 1980s and took off during the 1990s. The first law regulating the inflows of foreigners was approved in 1990, later amended in 1998 and 2002. Throughout this period, Italian migration policy

has remained grounded on the residence permit, which allows the holder to stay legally in the country for a given period of time.[2] We have drawn directly on police administrative records for recovering the number of valid residence permits by province and nationality during the period 1990-2003. These data serve as our measure of legal immigration.

Second, immigration has grown dramatically over this period: in 1990, immigrants with a regular residence permit were 436,000 (which represented less than 0.8% of the population); in 2003, they were more than 1,500,000, which corresponds to a growth of about 240% of the immigrant population in an otherwise stable population of natives. Such growth has been significantly driven by push factors in neighboring countries, like the collapse of Soviet Union and the Balkan Wars (see Del Boca and Venturini, 2003). Indeed, over the period 1991-2001, migration from Eastern Europe grew at a rate of 372%, as compared to 86% from Northern Africa and 132% from Asia (see Figure 2).

Third, during this period Italy implemented several regularizations, which offered irregular immigrants the possibility to obtain a residence permit.[3] For our purposes, regularizations are important as they provide snapshots of the irregular component of migration. In these episodes, in fact, immigrants had clear incentives to report their irregular status, irrespective of the province in which they were resident. Hence, under-reporting issues may be less serious and less correlated with province characteristics than in survey data and in apprehension statistics. As for regular residence permits, we have obtained from police administrative records the demands for regularization presented in 1995, 1998 and 2002.

As it turns out, the distribution of irregular immigrants follows very closely that of regular immigrants. As a consequence, the variation across provinces of the log of total immigrants is almost entirely explained by the variation of the log of legal immigrants (see Figure 3). In particular, the hypothesis that the two vary one-to-one cannot be rejected for any of the three regularizations (see Table 1). Accordingly, we can write

$$\ln IMMIGRANTS^{*}_{it} = I_i + I_t + \ln IMMIGRANTS_{it}, \tag{1}$$

where $IMMIGRANTS^{*}_{it}$ is the total number of immigrants in province i at year t, $IMMIGRANTS_{it}$ is the number of regular immigrants, while I_i and I_t are province- and year-specific fixed effects. Therefore, in the next Sections we will use $\ln IMMIGRANTS_{it}$ as a proxy for $\ln IMMIGRANTS^{*}_{it}$, which would be unobserved outside of regulariza-

[2]The total number of awarded permits, as well as their distribution across provinces and countries of origin, is decided on a yearly basis by the government in accordance with provincial authorities.

[3]Regularizations have been implemented in 1986, 1990, 1995, 1998, and 2002; they involved about 105, 220, 246, 217 and 700 thousands individuals, respectively.

tion years.

Turning to the measures of criminal activity, we look at the crime reported by the police to the judiciary authority. These statistics are published yearly by the Italian Statistics Institute (ISTAT), and they allow a disaggregation by provinces and by type of crime. In particular, in our analysis, we focus on total crime and on a series of categories that are most common among immigrants: violent crimes (murder, assault, rape), property crimes (robbery, common theft, car theft) and drug-related crimes.

In general, a major drawback of crime data is measurement error, caused for instance by under-reporting, heterogeneous law enforcement, and so on. Following a standard approach, we deal with such issue by proxing the true crime rate with the logarithm of reported crime. This approach builds on the fact that reporting errors are likely to be proportional to the true number of crimes, so that

$$\ln CRIME^*_{it} = C_i + C_t + \ln CRIME_{it}, \tag{2}$$

where $CRIME^*_{it}$ is the true number of crimes, $CRIME_{it}$ is the number reported by the police, while C_i and C_t are respectively province- and year- fixed effects (see e.g. Ehrlich (1996) and Levitt (1996) for a similar approach).

At a first glance, a greater incidence of immigrants over total population is associated with higher crime rates. In particular, both migration and crime tend to be higher in the North and in provinces with big cities (see Figure 4). On the other hand, their correlation over time appears weak. While immigration has increased greatly during the 1990s, total crimes show, if anything, a decreasing trend during the same period (see Figure 5).

In order to identify any systematic relationship between migration and crime, in the next Section we move beyond simple correlations and into multivariate econometric analysis.

3 Panel Analysis

Identifying the effect of migration on crime is complicated by the fact that both variables are likely to be simultaneously determined in equilibrium. In order to address this issue, we start by controlling extensively for a large set of variables that are likely to affect both migration and crime, as well as for province- and year-specific unobserved heterogeneity. Toward this purpose, we have assembled a province-level data set of annual observations

for all 95 Italian provinces during the period 1990-2003.[4] Our main estimating equation is thus

$$\ln CRIME_{it} = \beta \ln IMMIGRANTS_{it} + \gamma' X_{it} + FE_i + FE_t + \varepsilon_{it}, \tag{3}$$

where $\ln CRIME_{it}$ is the log of crimes reported by the police in province i during year t; $\ln IMMIGRANTS_{it}$ is the log of residence permits; X_{it} is a set of control variables; finally, FE_i and FE_t are province- and year-specific unobserved fixed effect, while ε_{it} is the residual of the equation.[5]

The set of observables X_{it} includes several demographic, socioeconomic, and deterrence variables.[6] As for demographic variables, we control for the log of resident population in the province ($\ln POP$), which allows to interpret log-changes of crime and migration in terms of ratios over the population. Also, since equation (3) includes province fixed effects, $\ln POP$ implicitly controls for population density, which is considered a key determinant of the level of criminal activity (Glaeser and Sacerdote, 1999). For the same reason, we also include among the regressors the share of population living in cities with more than 100,000 inhabitants (*URBAN*). Finally, young men are said to be more prone to engage in criminal activities than the rest of the population (Freeman, 1991; Levitt, 1998; Grogger, 1998); accordingly, we include the percentage of men aged 15-29 (*MALE1529*).

Turning to socioeconomic variables, we include GDP per capita (*GDP*) and the unemployment rate (*UNEMP*). These factors proxy for the general level of prosperity in each province, and thus for legitimate and illegitimate earning opportunities (Ehrlich, 1973; Raphael and Winter-Ember, 2001; Gould et al., 2002).

Deterrence variables capture instead the expected costs of crime, as determined for example by the probability of apprehension. As a proxy for such probability, we use the clear-up rate (*CLEAR*), defined as the ratio of the number of crimes cleared up by police over the total number of reported crimes (Ehrlich, 1996).

[4] Italian provinces correspond to level 3 in the Eurostat classification (Nomenclature of Territorial Units for Statistics); they are comparable in size to U.S. counties. In 1995, 8 new provinces were created by secession. In order to keep our series consistent, we attribute their post-1995 data to the corresponding pre-1995 province. Furthermore, we did not use data after 2003 because a new classification for crime data was adopted in that year.

[5] Since for some categories of crime (namely murders and rapes) the number of reported offenses was zero in some province-year observations, we approximated the log of reported crimes as $\ln(1+CRIME_{it})$. All results presented below are robust to using $\ln CRIME_{it}$ instead, thus excluding observations in which the number of crimes was zero.

[6] Freeman (1999) and, more recently, Eide et al. (2006) and Dills et al. (2008) provide reviews of the empirical literature about the determinants of crime.

Finally, fixed effects control for other unobserved factors that are constant within provinces or years. Also, fixed effects are important in light of the measurement issues related to migration and crime that were discussed in the previous Section.

The data source for all explanatory variables are the statistical annals published by ISTAT. Table 2 presents some descriptive statistics and Table 3 reports the correlation matrix among all dependent and explanatory variables. The univariate correlation between immigration and all types of crime is positive and very high in absolute value. However, this is likely to reflect many omitted factors (both observed and unobserved) affecting both variables.

Tables 4 and 5 present the results of OLS estimates on equation (3). Table 4 removes unobserved province- and year- heterogeneity and rescales migration and crime in terms of population. These results suggest that total crime is significantly correlated with the size of immigrant population, and that the relationship is particularly strong for some typologies of crime: murder, robbery, theft and drug-related crimes.

In particular, consistently with the descriptive analysis, the incidence of murders, robberies and thefts is positively correlated with immigration. Perhaps surprisingly, the relation between migration and drug-related crimes is negative. However, before attempting any interpretation, we consider whether this finding is robust once we introduce the full set of controls, and especially when we assess causality.

In Table 5, we enrich our specification with the set of observable control variables. Their inclusion, however, does not significantly affect the estimated effect of $\ln IMMIGRANTS$. According to such estimates, a 1% increase of immigrant population is associated with about a 0.1% increase of total crime. Distinguishing among different types of crime, the effect is similar on robberies and thefts, while the increase of murders is twice this magnitude; drug-related crimes, instead, would decrease by 0.1%.

While these results suggest that the size of immigrant population is systematically correlated with the total number of criminal offenses, as well as with the incidence of some specific types of crime, they can hardly be interpreted in a causal sense. Identifying causality requires a source of exogenous variation of immigrant population, an issue that we tackle in the next Section.

4 Causality

Even after controlling for other determinants of crime, as well as for province- and year-unobserved heterogeneity, the distribution of immigrant population across provinces of destination could still be correlated with the error term for at least two reasons. First,

our set of controls could neglect some time-varying, possibly unobserved demand-pull factors that are also correlated with crime. For instance, improvements in labor market conditions that are not adequately captured by changes in official unemployment rates and income could increase inward migration and decrease crime, which would entail OLS estimates to be negatively biased.[7] As an opposite case, the socioeconomic decline of some areas could attract immigrants (e.g. because of declines in housing prices) at the same time as crime rates rise, which would bring a positive bias. The second reason to worry about is the possibility of reverse causality, because changes in the distribution of crime rates across provinces could have a direct effect on the location choice of immigrants.

In order to take these concerns into account, in this Section we adopt a 2SLS approach that uses the (exogenous) supply-push component of migration by nationality as an instrument for shifts in immigrants population across Italian provinces. Supply-push factors can be thought as all events in origin countries that increase the propensity of population to emigrate; examples include economic crises, political turmoil, wars, natural disasters and so on. Since these are likely to be both important in determining migration outflows and independent of the location choice of immigrants, they have often been used as a source of exogenous variation of immigrant population across and within destination countries (see, for instance, Angrist and Kugler, 2003; Munshi, 2003; Saiz, 2007).

We construct an outcome-based measure of supply-push factors that uses information from bilateral migration flows toward some European countries other than Italy. In order to do this, we first take within-province differences of equation (1). Then, we decompose the log-change of $IMMIGRANTS$ between $t-1$ and t as the (approximate) sum of log-changes by nationality weighted according to beginning-of-period nationality shares within each province. That is,

$$\Delta \ln IMMIGRANTS_{it} \approx \sum_{n \in N_{it}} \omega^n_{it-1} \times \Delta \ln IMMIGRANTS^n_{it}, \tag{4}$$

where the superscript n denotes nationalities, N_{it} is the set of nationalities present in i at $t-1$ and $\omega^n_{it-1} = IMMIGRANTS^n_{it-1}/IMMIGRANTS_{it-1}$. The second term on the right-hand side is the bilateral log-change of stocks of immigrants from origin country n into destination province i. These depend on both supply-push factors in n (which affect nationality n in all provinces) and demand-pull factors in i (which affect all nationalities

[7] Notice that, according to many estimates, the underground component of Italian economy is likely to be very large (see, for instance, Gobbi and Zizza, 2007).

in province i). In order to exclude the latter, we substitute $\Delta \ln IMMIGRANTS_{it}^{n}$ with the log-change of immigrants of nationality n in the rest of Europe. Hence, we define the predicted log-change of immigrants in each province and year as

$$\Delta \ln IMMIGRANTS_{it}^{IV} = \sum_{n \in N_{it}} \omega_{it-1}^{n} \times \Delta \ln IMMIGRANTS_{EUROPE}^{n}. \qquad (5)$$

Since demand-pull factors in the i-th Italian province *relative to other provinces* can be reasonably thought as independent of demand-pull factors in other European countries, the correlation between $\Delta \ln IMMIGRANTS_{it}$ and $\Delta \ln IMMIGRANTS_{it}^{IV}$ must be due solely to supply-push factors in origin countries, weighted at beginning-of-period nationality shares.[8]

We were able to obtain a cross section of log-changes between 1991 and 2001 of immigrant population from 13 origin countries in 11 European countries using decennial census data in the destination countries.[9] Figure 6 shows that these patterns resemble those observed in Italy, which points at the importance of the supply-push component of migration. Indeed, first stage estimates confirm that our instrument fits well the actual changes of immigrant population across provinces over the 1990s (see Figure 7). The F-statistic of the first stage regression is about 14, which is well above the lower bound of 10 suggested, as a rule of thumb, by the literature on weak instruments (see Bound et al., 1995; Stock and Yogo, 2002).

Once equipped with this instrument for immigrant population, we turn to examine its effect on crime rates in the second stage. For the sake of comparability between OLS and 2SLS results, we also present OLS estimates on the cross section of log changes between 1991 and 2001 (Table 6). These results are broadly consistent with panel estimates using all years. When we move to 2SLS estimates (Table 7), there are two main differences to

[8]The weighting scheme used in equation (5) may be interpreted also in terms of network effects, whereby new immigrants of a given nationality tend to settle in the same places as previous immigrants of the same nationality (see e.g. Card, 2001; Lewis, 2005; Ottaviano and Peri, 2006). In fact, it can be shown that the predicted log-change of immigrants in equation (5) would be the same if one instead considered the *absolute* change in the number of immigrants of nationality n, and defined the weights as the ratio of immigrants of nationality n in province i over the number of immigrants of nationality n in all provinces.

[9]Ideally, one would use total outflows from origin countries (possibly excluding inflows to Italy) as a measure of supply-push factors. Unfortunately, these data are generally not available. The destination countries for which we obtained census data are Austria, Belgium, Denmark, Finland, France, Greece, Netherlands, Norway, Spain, Sweden and Switzerland. Information on the stock of immigrants in those countries was available for the following nationalities: Albania, Algeria, Brazil, China (excluding Hong Kong), Egypt, India, Morocco, Nigeria, Pakistan, Philippines, Romania, Tunisia, Former Yugoslavia. Overall, immigrants from these countries accounted for 48% and 56% of Italian residence permits in 1991 and 2001, respectively.

notice. On the one hand, some coefficients loose statistical significance. In particular, the effect on the total number of criminal offenses is not statistically significant anymore, and the effect on the number of thefts is now significant only at the 5% level. On the other hand, the 2SLS estimate of the effect of immigration on murders and robberies is twice the magnitude of the OLS coefficient. This finding may point at the existence of demand-pull factors (omitted from the OLS specification) that have opposite effects on migration and on the incidence of these two types of crime.[10]

5 Discussion of the results

The results presented in the previous Section suggest that, taking into account the endogeneity of immigrant population, the total number of crimes as well as most types of criminal offenses do not depend significantly on immigration. On the other hand, there are two categories of criminal offenses that seem to be positively and significantly affected: murders and robberies. According to our estimates, the incidence of murders and robberies varies approximately one-to-one (in percentage) with immigrant population. This would imply that a standard deviation increase in the log-change of immigrant population across provinces between 1991 and 2001, equal to 54%, would increase murders by 75% and robberies by 49% during the same period. In absolute terms, this means having 15 additional murders (out of 20 in 1991) and 202 additional robberies (out of 413 in 1991). The effect on thefts remains smaller in magnitude (the point estimate of the coefficient is 0.25%) and not so precisely estimated.

Of course, these results are subject to several caveats, the most significant of which concern the measurement of immigrant population. A first issue relates to the dimension of irregular immigration in Italy. As discussed in Section 2, we used demands for regularization to infer the distribution of irregular immigrants, arguing that this approach minimizes under-reporting. However, one can not conclude that all irregular immigrants did submit such demand. In particular, if immigrants who are more at risk of committing crime are also less likely to apply for a regular permit, we would be understating immigrants exactly where they contribute most to crime, which in turn would bias the estimated coefficient of $\ln IMMIGRANTS$ downward.[11]

For this reason, we looked also at apprehensions of irregular immigrants (as recorded

[10] An alternative explanation could be that OLS estimates suffer from attenuation bias due to measurement errors in immigrant population. However, if this was the reason, we should observe an analogous bias in the regressions for all types of crime, which does not seem to be the case.

[11] Indeed, during the period we consider about 80% of convicted immigrants in Italy were irregular (Ministero dell'Interno, 2007).

by Ministero dell'Interno, 2007), which may better capture that part of irregular migration with no willingness or no possibility to access regularization. The correlation across provinces between apprehensions and demands for regularization ranges between 64% and 86% in all years. At the same time, apprehensions have not been a major policy instrument against illegal immigrants for the period we consider. In 1995 there were less than 64,000 apprehensions and 260,000 demands for regularization; this ratio was 61,000 over 250,000 in 1998 and 106,000 over 700,000 in 2002.

Furthermore, notice that the 2SLS-approach developed in Section 4 may attenuate the bias due to under-reporting of irregular immigrants. In fact, if both regular and irregular immigrants of the same nationality cluster into the same areas, then our instrument provides a measure for the predicted log-change of total immigrants that depends solely on geographic distribution and supply-push factors by nationality.

Another issue is related to immigrants' composition by nationality. In order to avoid arbitrary classifications, we included all residence permits regardless of immigrants' origin countries. On the other hand, most crime concerns are directed toward immigrants from developing countries. While it is beyond the scope of this paper to investigate the relationship between nationality and propensity to crime, one may wonder whether adopting the broader definition introduces error in the measurement of those immigrants that could actually be more at risk of committing crime.[12] Therefore, we checked the robustness of our estimates to using only residence permits awarded to immigrants from developing countries. The results are remarkably similar to those obtained using all residence permits, the only difference being that the coefficient on theft is even weaker in terms of statistical significance.[13]

6 Conclusions

In this paper, we have attempted to shed some light on the impact of migration on crime. According to our estimates, the total number of criminal offenses as well as most types of crime are not related to the size of immigrant population once endogeneity is taken into account. On the other hand, immigration seems to have a positive and robust effect on some typologies of crime, namely murders, robberies and (to a lesser extent) thefts.

We would like to conclude with a final remark on the interpretation of our results.

[12]This measurement issue is particularly relevant for Italy. During our sample period, about 85% of all foreigners from outside developing countries came from U.S. and Switzerland. These are very peculiar groups: the first includes mostly U.S. military servants, the second Swiss citizens that commute daily between Switzerland and Italy.

[13]Results not reported, available upon request.

Even though our approach allows to measure variation across provinces and years of total immigrants, both regular and irregular, the coefficients we estimate remain conditional on the composition of Italian migration in terms of legal status. In particular, the estimated effect of total immigrants must be intended as a weighted average of the effects on crime of both regular and irregular immigrants. Since any change in migration restrictions is likely to affect both the size and composition of immigrant population, caution is needed when interpreting our results in support of restrictive migration policies.[14] In particular, any policy that lowers the total number of regular immigrants may at the same time increase the potential for irregular ones. Hence, the resulting impact on crime may differ significantly from the one we estimated keeping immigrants' composition constant.

Indeed, it would be extremely interesting to estimate separately the effect of the regular and irregular components of immigration on crime. However, the strong correlation existing between the two (while useful for recovering the variation in total immigrants using only the regular ones) does not allow to disentangle their separate effects. For this reason, we leave this topic for future research.

[14] See also Bianchi (2007) on this point.

References

Angrist, J. D. and A. D. Kugler (2003). Protective or counter-productive? labour market institutions and the effect of immigration on eu natives. *Economic Journal 113*(488), 302–331.

Bauer, T. K. and K. F. Zimmermann (Eds.) (2002). *The Economics of Migration. Volume I-IV*. Edward Elgar Publishing Ltd.

Becker, G. S. (1968). Crime and punishment: An economic approach. *Journal of Political Economy 76*(2), 169–217.

Bianchi, M. (2007). Immigration policy and self-selecting migrants. PSE Working Paper No. 2007-41.

Bonin, H., A. Constant, K. Tatsiramos, and K. F. Zimmermann (2006). Native-migrant differences in risk attitudes.

Borjas, G. J. (1994). The economics of immigration. *Journal of Economic Literature 32*(4), 1667–1717.

Borjas, G. J. (1998). The economic progress of immigrants. NBER Working Paper No. 6506.

Borjas, G. J., J. Grogger, and G. H. Hanson (2006). Immigration and african-american employment opportunities: The response of wages, employment, and incarceration to labor supply shocks. NBER Working Paper No. 12518.

Bound, J., D. A. Jaeger, and R. M. Baker (1995). Problems with instrumental variables estimation when the correlation between the instruments and the endogeneous explanatory variable is weak. *Journal of the American Statistical Association, 90*(430), 443–450.

Butcher, K. F. and A. M. Piehl (1998a). Cross-city evidence on the relationship between immigration and crime. *Journal of Policy Analysis and Management 17*(3), 457–493.

Butcher, K. F. and A. M. Piehl (1998b). Recent immigrants: Unexpected implications for crime and incarceration. *Industrial and Labor Relations Review 51*(4), 654–679.

Butcher, K. F. and A. M. Piehl (2005). Why are immigrants' incarceration rates so low? evidence on selective immigration, deterrence, and deportation. Federal Reserve Bank of Chicago WP-05-19.

Card, D. (2001). Immigrant inflows, native outflows, and the local labor market impacts of higher immigration. *Journal of Labor Economics 19*(1), 22–64.

Card, D. (2005). Is the new immigration really so bad? *The Economic Journal 115*(507), 300–323.

Del Boca, D. and A. Venturini (2003). Italian migration. IZA Discussion Paper No. 938.

Dills, A. K., J. A. Miron, and G. Summers (2008). What do economists know about crime? NBER Working Paper No. 13759.

Ehrlich, I. (1973). Participation in illegitimate activities: A theoretical and empirical investigation. *Journal of Political Economy 81*(3), 521–65.

Ehrlich, I. (1996). Crime, punishment, and the market for offenses. *Journal of Economic Perspectives 10*(1), 43–67.

Eide, E., P. H. Rubin, and J. M. Shepherd (2006). *Economics of Crime*. Now Publishers.

Freeman, R. B. (1991). Crime and the employment of disadvantaged youths. NBER Working Paper No. 3875.

Freeman, R. B. (1999). The economics of crime. In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics*, Chapter 52, pp. 3529–3571. Elsevier.

Glaeser, E. L. and B. Sacerdote (1999). Why is there more crime in cities? *Journal of Political Economy 107*(S6), S225–29.

Glaeser, E. L., B. Sacerdote, and J. A. Scheinkman (1996). Crime and social interactions. *The Quarterly Journal of Economics 111*(2), 507–48.

Gobbi, G. and R. Zizza (2007). Does the underground economy hold back financial deepening? evidence from the italian credit market. CEP Discussion Papers dp0789, Centre for Economic Performance, LSE.

Gould, E. D., B. A. Weinberg, and D. B. Mustard (2002). Crime rates and local labor market opportunities in the united states: 1979-1997. *The Review of Economics and Statistics 84*(1), 45–61.

Grogger, J. (1998). Market wages and youth crime. *Journal of Labor Economics 16*(4), 756–91.

LaLonde, R. J. and R. H. Topel (1991). Immigrants in the american labor market: Quality, assimilation, and distributional effects. *American Economic Review 81*(2), 297–302.

Levitt, S. D. (1996). The effect of prison population size on crime rates: Evidence from prison overcrowding litigation. *The Quarterly Journal of Economics 111*(2), 319–51.

Levitt, S. D. (1998). Juvenile crime and punishment. *Journal of Political Economy 106*(6), 1156–1185.

Lewis, E. (2005). Immigration, skill mix, and the choice of technique. Working Papers 05-04, Center for Economic Studies, U.S. Census Bureau.

Ministero dell'Interno (2007). *Rapporto sulla criminalità in Italia. Analisi, Prevenzione, Contrasto*. Italian Ministry of Interior.

Moehling, C. and A. M. Piehl (2007). Immigration and crime in early 20th century america. NBER Working Paper No. 13576.

Munshi, K. (2003). Networks in the modern economy: Mexican migrants in the u.s. labor market. *The Quarterly Journal of Economics 118*(2), 549–599.

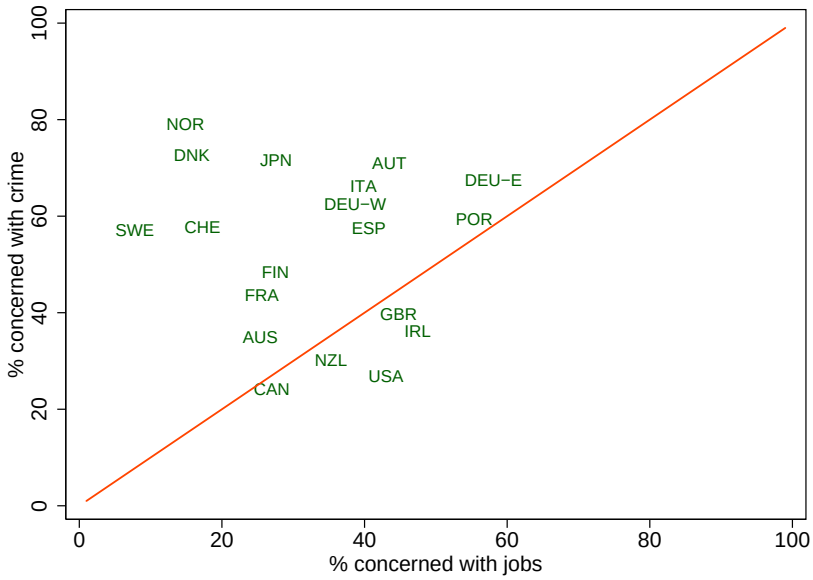
Ottaviano, G. I. and G. Peri (2006). The economic value of cultural diversity: evidence from US cities. *Journal of Economic Geography 6*(1), 9–44.

Raphael, S. and R. Winter-Ember (2001). Identifying the effect of unemployment on crime. *Journal of Law & Economics 44*(1), 259–83.

Saiz, A. (2007). Immigration and housing rents in american cities. *Journal of Urban Economics 61*(2), 345–371.

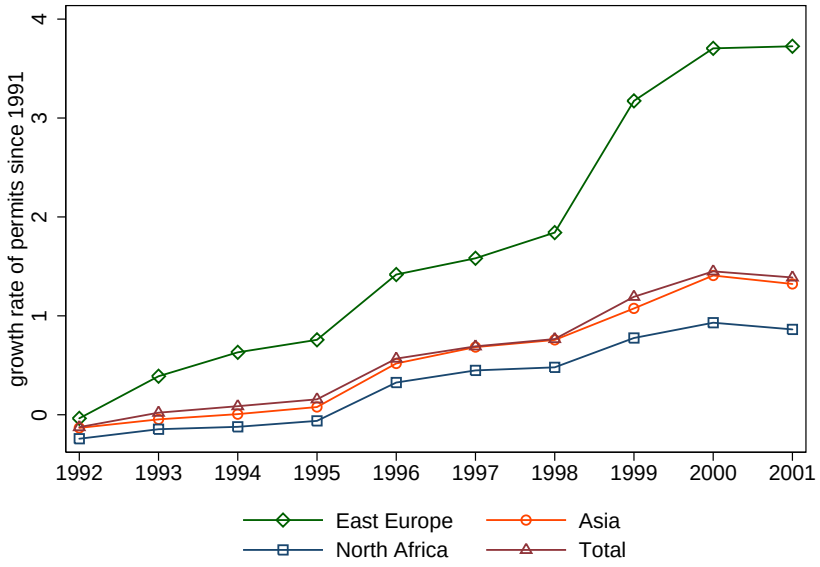
Stock, J. H. and M. Yogo (2002). Testing for weak instruments in linear iv regression. NBER Working Paper No. 0284.

Figure 1: Opinions about immigrants: crime vs. labor market concerns



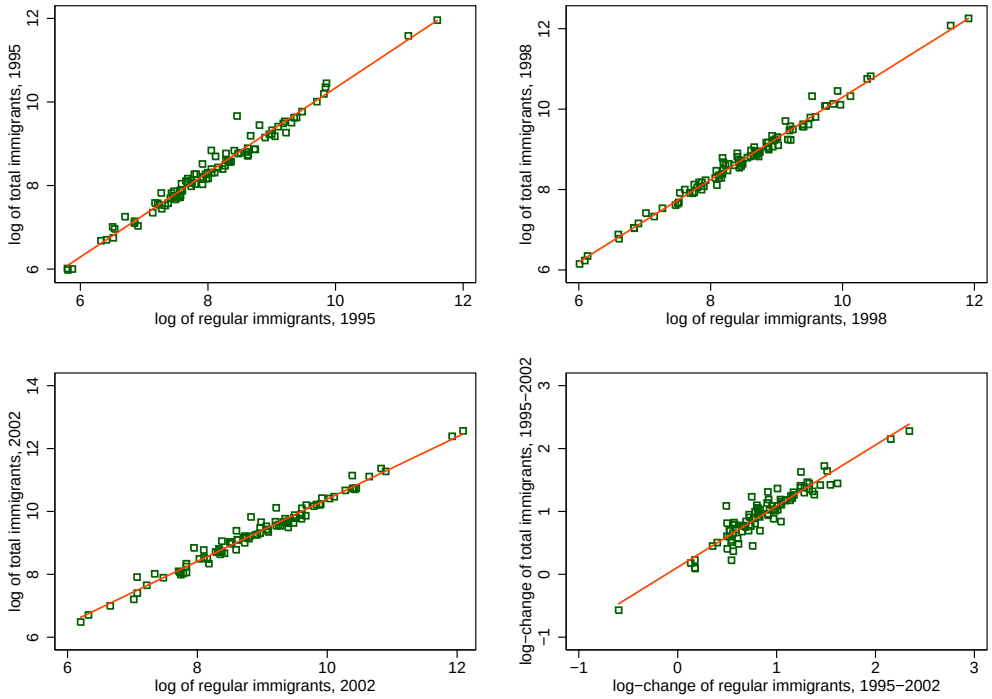
This graph presents the results of the "National Identity" survey conducted in 1995 and 2003 by the International Social Survey Programme. The vertical axis is the percentage of interviewed in each country that declared to "Strongly Agree" or "Agree" that "Immigrants increase crime rates". The horizontal axis is the percentage of interviewed in each country that declared to "Strongly Agree" or "Agree" that "Immigrants take jobs away from natives".

Figure 2: Immigrants growth rates by area of origin



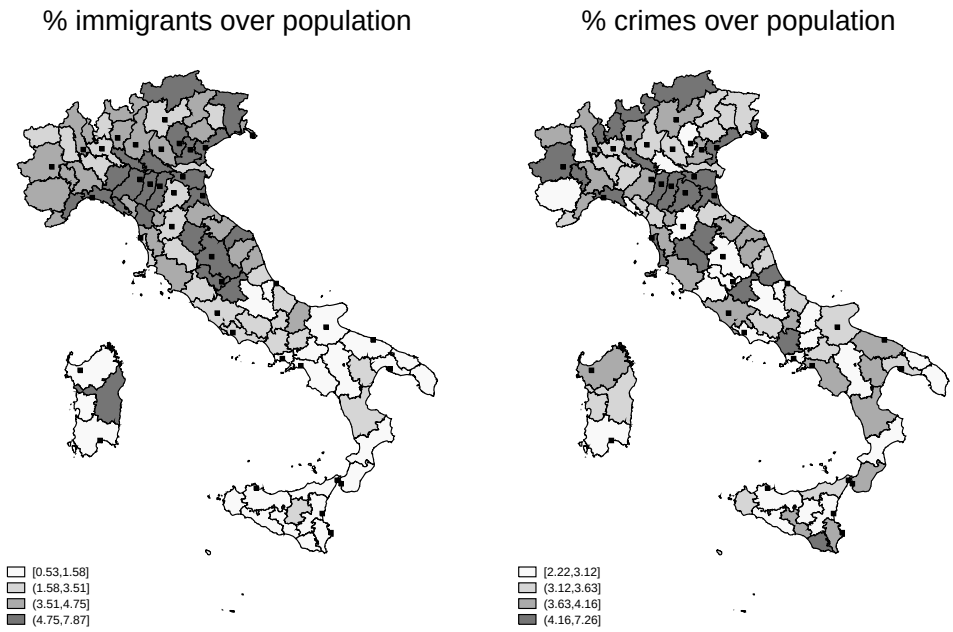
This graph plots the growth rate of the number of residence permits awarded to immigrants in Italy, distinguished by area of origin, relative to their 1991 level. The source of data for residence permits is the Italian Ministry of Interior.

Figure 3: Total and regular immigrants



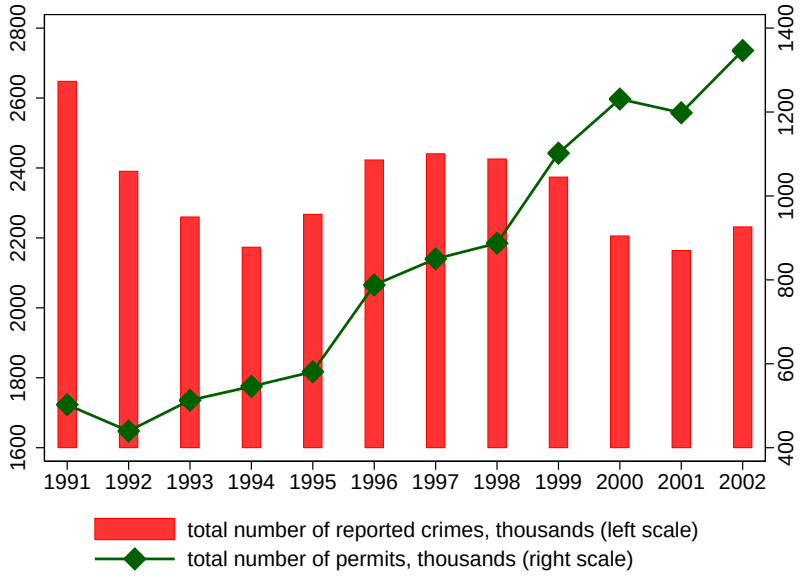
These figures plot the log of total immigrants (on the vertical axis) against the log of regular immigrants (on the horizontal axis). The first three graphs refer to the log-levels of the two variables for all years in which there was a regularization of formerly unofficial immigrants. The last graph refers to the log-change of the two variables between the first and the last regularization. Regularizations occurred in 1995, 1998 and 2002. The (estimated) number of total immigrants is given by the sum of residence permits and demands for regularization. The source of data on both residence permits and demands for regularization is the Italian Ministry of Interior.

Figure 4: Immigration and crime across provinces



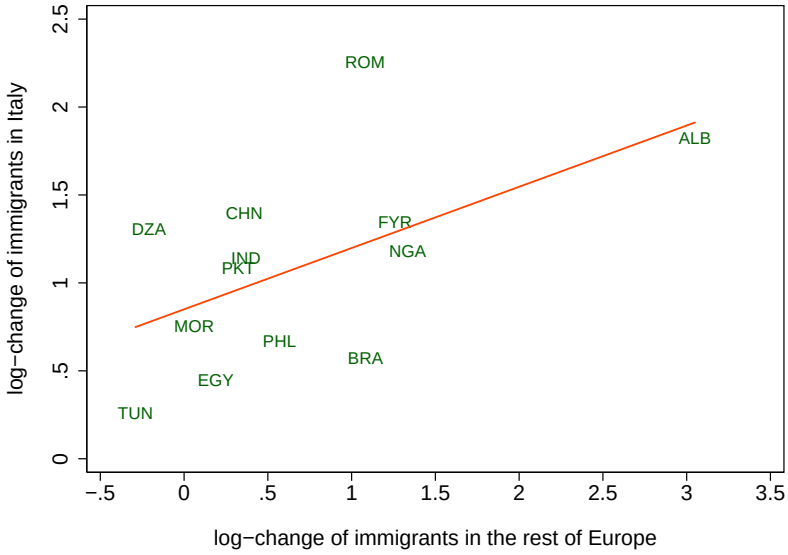
These figures show the distribution of immigrants and reported crimes across Italian provinces in year 2003. The map on the left refers to the distribution of the percentage ratio of immigrants over total population. The map on the right refers to the distribution of the percentage ratio of reported crimes over total population. In both maps provinces are colored according to which quartile of the distribution they belong to; darker colors refer to higher values. The extremes of each quartile, along with the corresponding color, are reported at the bottom of each map. The black square dots indicate cities with more than 100,000 inhabitants. The sources of data for residence permits and reported crimes are ISTAT and the Italian Ministry of Interior, respectively.

Figure 5: Immigration and crime over time



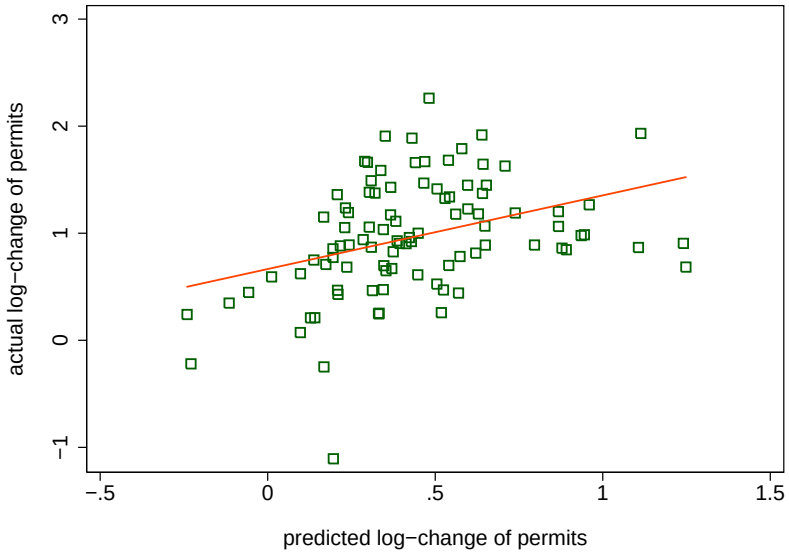
This graph shows the evolution over time of reported crimes and residence permits in Italy. The histogram refers to the number of reported crimes, in thousands; the relevant scale is on the left vertical axis. The connected line refers to the number of residence permits awarded to immigrants in Italy, in thousands; the relevant scale is on the right vertical axis. The source of data on reported crimes and residence permits are ISTAT and the Italian Ministry of Interior, respectively.

Figure 6: Immigration to Italy and to the rest of Europe



This figure plots the log-change of immigrant population in Italy during the 1991-2001 period (on the vertical axis) against the log-change of immigrant population in other European countries during the same period (on the horizontal axis), by country of origin. Immigrant population in Italy is measured by the number of residence permits, as reported by the Italian Ministry of Interior. Immigrant population in other European countries is measured using the 1991 and 2001 rounds of national census. The destination countries for which we obtained census data are Austria, Belgium, Denmark, Finland, France, Greece, Netherlands, Norway, Spain, Sweden and Switzerland. Information on the stock of immigrants in those countries was available for the following nationalities: Albania, Algeria, Brazil, China (excluding Hong Kong), Egypt, India, Morocco, Nigeria, Pakistan, Philippines, Romania, Tunisia, Former Yugoslavia.

Figure 7: Predicted and actual log-changes of immigrants



$$\Delta \ln IMMIGRANTS = \underset{(0.100)}{0.665} + \underset{(0.181)}{0.687} \Delta \ln IMMIGRANTS^{IV} + \varepsilon$$

F-stat=14.41

This figure plots the actual log-changes of immigrants in Italian provinces between 1991 and 2001 (on the vertical axis) against the predicted log-changes during the same period (on the horizontal axis). The actual number of immigrants is measured by the number of residence permits, as reported by the Italian Ministry of Interior. The predicted log-change is the weighted sum of the log-changes of immigrant population by nationality in other European countries. The weights are the shares of permits held by each nationality over total permits in that province in 1990 (see equation 5 in the main text). Immigrant population in other European countries is measured using the 1991 and 2001 rounds of national census. The destination countries for which we obtained census data are Austria, Belgium, Denmark, Finland, France, Greece, Netherlands, Norway, Spain, Sweden and Switzerland. Information on the stock of immigrants in those countries was available for the following nationalities: Albania, Algeria, Brazil, China (excluding Hong Kong), Egypt, India, Morocco, Nigeria, Pakistan, Philippines, Romania, Tunisia, Former Yugoslavia. The estimation results are reported at the bottom of the figure.

Table 1: Total and regular immigrants

	(1)	(2)	(3)	(4)
ln*IMMIGRANTS*	1.013***	1.025***	0.990***	
	(0.017)	(0.013)	(0.016)	
Δln*IMMIGRANTS*				0.973***
				(0.038)
R-squared	0.97	0.98	0.97	0.87
year	1995	1998	2002	1995-2002

Notes: This table reports the results of univariate regressions of the log of total immigrants on the log of residence permits. The first three columns refer to the log-levels of the two variables for all years in which there was a regularization of formerly unofficial immigrants. The last column refers to the log-changes of the two variables between the first and the last regularization. Regularizations occurred in 1995, 1998 and 2002. The (estimated) number of total immigrants is given by the sum of residence permits and demands for regularization. The source of data on both residence permits and demands for regularization is the Italian Ministry of Interior. Robust standard errors are presented in parenthesis. *, ** and *** denote rejection of the null hypothesis of the coefficient being equal to 0 at 10%, 5% and 1% significance level, respectively.

Table 2: Descriptive statistics

Variable	Mean	Std. dev.	Min	Max
IMMIGRANTS	9,510.67	21,239.75	210	293,159
POP	598,830	633,045	89,775	3,932,952
URBAN	14.62	20.15	0	88.11
MALE1529	10.55	1.39	6.71	13.81
UNEMP	10.54	7.16	1.70	33.30
ln*GDP*	9.55	0.26	8.94	10.11
TOTAL	24,784	41,621	973	342,434
MURDER	11	22	0	258
ASSAULT	262	318	2	2,859
RAPE	16	25	0	294
ROBBERY	373	992	2	11,554
THEFT	14,951	27,331	294	227,228
CAR	3,069	7,777	40	55,856
DRUG	404	563	10	4,412
CLEAR (total)	30.54	10.47	9.20	82.75
CLEAR (murder)	64.53	31.62	0	100
CLEAR (assault)	83.61	12.80	21.58	100
CLEAR (rape)	83.56	17.03	0	100
CLEAR (robbery)	31.10	13.10	0	96.46
CLEAR (theft)	6.78	3.15	1.51	30.06
CLEAR (car)	6.59	5.35	0	56.05
CLEAR (drug)	95.77	5.61	37.71	100

Notes: This table reports the descriptive statistics for all dependent and explanatory variables across the 95 Italian provinces during the period 1990-2003.

Table 3: Correlation Matrix

	lnIMMIGRANTS	lnPOP	lnTOTAL	lnMURDER	lnASSAULT	lnRAPE	lnROBBERY	lnTHEFT	lnCAR	lnDRUG	MALE1529	lnGDP	UNEMP	URBAN
ln*IMMIGRANTS*	1.000													
ln*POP*	0.708	1.000												
ln*TOTAL*	0.748	0.943	1.000											
ln*MURDER*	0.352	0.724	0.691	1.000										
ln*ASSAULT*	0.679	0.763	0.815	0.525	1.000									
ln*RAPE*	0.704	0.700	0.742	0.498	0.716	1.000								
ln*ROBBERY*	0.671	0.915	0.925	0.768	0.729	0.706	1.000							
ln*THEFT*	0.751	0.931	0.983	0.662	0.781	0.712	0.920	1.000						
ln*CAR*	0.542	0.910	0.908	0.797	0.697	0.630	0.930	0.901	1.000					
ln*DRUG*	0.688	0.820	0.860	0.507	0.708	0.641	0.769	0.848	0.759	1.000				
MALE1529	-0.329	0.256	0.133	0.430	0.037	-0.159	0.200	0.118	0.365	0.054	1.000			
ln*GDP*	0.549	0.072	0.179	-0.321	0.254	0.205	0.007	0.225	-0.120	0.220	-0.631	1.000		
UNEMP	-0.348	0.137	0.073	0.492	-0.034	0.028	0.221	0.022	0.325	0.003	0.598	-0.859	1.000	
URBAN	0.442	0.475	0.572	0.330	0.437	0.425	0.524	0.581	0.490	0.528	-0.056	0.216	0.058	1.000

Notes: This table reports the correlation matrix between the ratio of immigrants over total population and the ratio of reported crimes over total population, distinguished by type of crime, across the 95 Italian provinces during the period 1990-2003.

Table 4: Panel regressions: baseline

	Total Crime	Murder	Assault	Rape	Robbery	Theft	Car Theft	Drug
ln*IMMIGRANTS*	0.0997***	0.2377***	-0.0736*	-0.0211	0.1753***	0.1234***	0.0427*	-0.1683***
	(0.0220)	(0.0672)	(0.0386)	(0.0422)	(0.0333)	(0.0198)	(0.0232)	(0.0347)
ln*POP*	1.2548***	2.7254***	2.2977***	1.3101	2.8672***	2.4929***	1.1871***	-0.7717
	(0.3434)	(1.0541)	(0.7686)	(0.8779)	(0.5952)	(0.3285)	(0.4353)	(0.7174)
Obs.	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330
Provinces	95	95	95	95	95	95	95	95
Prov. FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
R-squared	0.89	0.47	0.59	0.69	0.83	0.87	0.83	0.62
F-stat.	16.52	10.12	26.18	107.4	20.98	17.98	30.91	17.52

Notes: This table presents the results of OLS estimates on a panel of yearly observations for all 95 Italian provinces during the period 1991-2003. The dependent variables are the logs of the number of crimes reported by the police (source: ISTAT). The first column refers to the total number of crimes. The other columns refer to specific types of crimes, which are reported on top of each column. The variable ln*IMMIGRANTS* is the log of total residence permits awarded to immigrants (source: Italian Ministry of Interior). Province and year fixed-effects are included in all specifications. Robust standard errors are presented in parenthesis. *, ** and *** denote rejection of the null hypothesis of the coefficient being equal to 0 at 10%, 5% and 1% significance level, respectively.

Table 5: Panel regressions: controls

	Total Crime	Murder	Assault	Rape	Robbery	Theft	Car Theft	Drug
ln*IMMIGRANTS*	0.1019***	0.1895**	-0.0062	0.0168	0.0806**	0.0929***	0.0635**	-0.0910*
	(0.0266)	(0.0783)	(0.0501)	(0.0595)	(0.0346)	(0.0188)	(0.0282)	(0.0487)
ln*POP*	1.4255***	3.8728***	1.7505*	1.5052	4.5694***	2.3072***	1.6902***	-.0013
	(0.3823)	(1.2524)	(0.9192)	(1.1001)	(0.6602)	(0.3509)	(0.5436)	(0.8917)
CLEAR	-0.0034	0.00002	-0.0088***	-0.0001	-0.0046***	-0.0298***	-0.0054**	-0.0002
	(0.0033)	(0.0006)	(0.0014)	(0.0010)	(0.0012)	(0.0037)	(0.0024)	(0.0029)
ln*GDP*	0.1372	-0.1219	-0.1797	-0.5588	-0.0995	0.1008	0.5729***	0.3203
	(0.1234)	(0.3868)	(0.2662)	(0.3623)	(0.2239)	(0.1306)	(0.1825)	(0.2802)
UNEMP	-0.0044	-0.0125	0.0141*	-0.0010	-0.0173***	-0.0063**	-0.0052	0.0142**
	(0.0029)	(0.0077)	(0.0073)	(0.0086)	(0.0052)	(0.0025)	(0.0038)	(0.0069)
URBAN	0.0028*	-0.0002	-0.0025	0.0038	0.0011	0.0037**	0.0042*	-0.0095***
	(0.0015)	(0.0054)	(0.0025)	(0.0052)	(0.0028)	(0.0016)	(0.0023)	(0.0036)
MALE1529	0.0777***	-0.1887***	0.1492***	-0.0812	-0.1757***	0.0270	0.1138***	0.2633***
	(0.0247)	(0.0649)	(0.0523)	(0.0641)	(0.0406)	(0.0218)	(0.0305)	(0.0511)
Obs.	1,045	1,045	1,045	1,045	1,045	1,045	1,045	1,045
Provinces	95	95	95	95	95	95	95	95
Prov. FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
R-squared	0.91	0.44	0.56	0.67	0.83	0.89	0.80	0.08
F-stat.	16.71	4.45	20.99	62.08	21.97	20.17	28.90	13.66

Notes: This table presents the results of OLS estimates on a panel of yearly observations for all 95 Italian provinces during the period 1991-2003. The dependent variables are the logs of the number of crimes reported by the police (source: ISTAT). The first column refers to the total number of crimes. The other columns refer to specific types of crimes, which are reported on top of each column. The variable ln*IMMIGRANTS* is the log of total residence permits awarded to immigrants (source: Italian Ministry of Interior). Province and year fixed-effects are included in all specifications. Robust standard errors are presented in parenthesis. *, ** and *** denote rejection of the null hypothesis of the coefficient being equal to 0 at 10%, 5% and 1% significance level, respectively.

Table 6: Ten-year differences regressions: OLS

	Total Crime	Murder	Assault	Rape	Robbery	Theft	Car Theft	Drug
$\Delta\ln IMMIGRANTS$	0.1972***	0.5063***	-0.1009	0.1770	0.3771***	0.2012***	0.0036	-0.3332***
	(0.0500)	(0.1619)	(0.0979)	(0.1106)	(0.0812)	(0.0486)	(0.0724)	(0.0840)
$\Delta\ln POP$	0.3912	-0.0166	1.8729	-2.5019	1.0991	1.9953**	1.6573	-0.0272
	(0.8572)	(2.5428)	(2.0755)	(2.3786)	(1.4885)	(0.7946)	(1.2313)	(1.7445)
Obs.	95	95	95	95	95	95	95	95
R-squared	0.14	0.12	0.01	0.03	0.18	0.23	0.02	0.10
F-stat.	9.83	5.47	0.62	1.42	14.57	18.38	1.03	8.85

Notes: This table presents the results of OLS estimates on the cross-section of ten-year differences between 1991 and 2001 across all 95 Italian provinces. The dependent variables are the log-change between 1991 and 2001 of the number of crimes reported by the police (source: ISTAT). The first column refers to the total number of crimes. The other columns refer to specific types of crimes, which are reported on top of each column. The variable $\Delta\ln IMMIGRANTS$ is the log-change between 1991 and 2001 of total residence permits awarded to immigrants (source: Italian Ministry of Interior). Robust standard errors are presented in parenthesis. *, ** and *** denote rejection of the null hypothesis of the coefficient being equal to 0 at 10%, 5% and 1% significance level, respectively.

Table 7: Ten-year differences regressions: IV

	Total Crime	Murder	Assault	Rape	Robbery	Theft	Car Theft	Drug
$\Delta \ln IMMIGRANTS$	0.1741	1.3499***	-0.1625	0.0346	0.9063***	0.2546**	-0.0416	-0.3266
	(0.1432)	(0.4024)	(0.3001)	(0.3288)	(0.2800)	(0.1290)	(0.2066)	(0.2239)
Obs.	95	95	95	95	95	95	95	95
R-squared	0.14	0.12	0.01	0.03	0.18	0.23	0.02	0.10
F-stat.	9.83	5.47	0.62	1.42	14.57	18.38	1.03	8.85
1^{st} stage F-stat.	14.41	14.41	14.41	14.41	14.41	14.41	14.41	14.41

Notes: This table presents the results of IV estimates on the cross-section of ten-year differences between 1991 and 2001 across all 95 Italian provinces. The dependent variables are the log-change between 1991 and 2001 of the number of crimes reported by the police (source: ISTAT). The first column refers to the total number of crimes. The other columns refer to specific types of crimes, which are reported on top of each column. The variable $\Delta \ln IMMIGRANTS$ is the log-change between 1991 and 2001 of total residence permits awarded to immigrants (source: Italian Ministry of Interior). The first-stage instrument for $\Delta \ln IMMIGRANTS$ is the weighted sum of the log-changes of immigrant population by nationality in other European countries. The weights are the shares of permits held by each nationality over total permits in that province in 1990 (see equation 5 in the main text). Immigrant population in other European countries is measured using the 1991 and 2001 rounds of national census. The 1^{st} stage F-statistic refers to the null hypothesis that the coefficient on the excluded instrument is equal to zero in the first stage. Robust standard errors are presented in parenthesis. *, ** and *** denote rejection of the null hypothesis of the coefficient being equal to 0 at 10%, 5% and 1% significance level, respectively.