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Emanuele Bracco and Luisanna Onnis

The Department of Economics  
Lancaster University Management School  
Lancaster LA1 4YX  
UK

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# IMMIGRATION, AMNESTIES AND THE SHADOW ECONOMY\*

Emanuele Bracco<sup>†</sup>      Luisanna Onnis<sup>‡</sup>

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## Abstract

This paper investigates the effects of immigration and immigration amnesties on the shadow economy. We find a robust and positive relationship between the presence of immigrants and the unobserved economic activity at the local level, but the implementation of a large immigration amnesty substantially weakens this link. Our analysis exploits newly compiled datasets of Italian immigration and shadow economy estimates for the years 1995-2006, comprising a panel of local-level aggregate statistical information, and a micro-level survey of representative households. We exploit the discontinuity created by the 2002 immigration amnesty, which increased the stock of migrants by almost 50%.

**JEL** classification: H26, J61, K37 .

**Keywords:** Shadow Economy, Immigration, Immigration Policies, Amnesties.

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<sup>†</sup>Department of Economics, Lancaster University Management School, LA1 4XY, Lancaster, United Kingdom. Email: [e.bracco@lancaster.ac.uk](mailto:e.bracco@lancaster.ac.uk)

<sup>‡</sup>Department of Economics, University of Sheffield, 9 Mappin Street, Sheffield S1 4DT, United Kingdom. Email: [l.onnis@sheffield.ac.uk](mailto:l.onnis@sheffield.ac.uk)

# 1 Introduction

Immigration and immigration policies are very often at the forefront of the political debate, especially in destination countries. The narrative relies on the effects that immigration might have on the local labor market as well as on other relevant socio-economic aspects such as public finances, local services and crime. Along this line, this paper investigates two aspects of immigration, which are, to our knowledge, yet to be explored. First, it examines the relationship between immigration and the shadow economy. Second, it analyzes whether this link is affected by immigration amnesties, which determine a substantial variation to the stock of legal and illegal immigrants in a country.

The shadow economy accounts for between a third and a half of total GDP in developing countries (La Porta and Shleifer, 2008) and more than 20% of official income in developed economies such as Belgium, Greece, Italy and Spain (Schneider, Buehn, and Montenegro, 2010). Identifying the socio-economic determinants of this phenomenon and tackling it with sound policies have always been central tasks for policy-makers and researchers.

There are various reasons to believe that the link between immigration and unobserved economic activities exists, and is relevant. First, undocumented immigrants are barred from working in the formal sector, naturally feeding the unofficial economy. Second, immigrants are often employed in low-skilled jobs, where the rate of irregularity tends to be higher. Immigrants may also lack network, language skills, or be subject to outright discrimination: for all these reasons they may be more likely to accept (or be offered) irregular jobs. More generally, and perhaps more importantly, a stronger presence of immigrants in a locality may affect the incentives of firms to use illegal workers, and generate a local labor market more reliant on illegal workforce, whether native or immigrant.

The above-mentioned link between immigration and shadow economy may be significantly weakened by immigration amnesties. Increasing the relative number of legal immigrants in a country may effectively improve their labor market conditions, their capability to be employed in high-skilled jobs and, ultimately, their propensity to work in the official economy.

In the first part of the paper, we analyze the impact of immigration on the informal sector at both individual and local level over the period 1995-2006 in Italy. The shadow economy is by definition hidden and thus it is difficult to measure. Hence, in order to obtain robust results, we adopt three different estimates of the unobserved economic activity. First, we collect the regional-level official estimates of the share of irregular employment, measured by the Italian National Statistical Institute (ISTAT). Second, through the standard Electricity Consumption approach we construct a measure of shadow economy at the province (more

disaggregate) level. Third, we measure the individual propensity to operate informally by using the Italian Survey of Household Income and Wealth (SHIW) of the Bank of Italy. As a measure of immigration we use administrative data on the issuance of residence permits at the local level (region or province) in a year. In the second part of the paper, we study the role of immigration amnesties in reducing the informal economic activity. In particular, we focus on the 2002 immigration reform, when almost 700,000 illegal immigrants were granted legal status, increasing the stock of legal immigrant by almost 50%.

In a nutshell, we document that the share of the shadow economy is affected by the presence of immigrants. However, this link is substantially weakened by the 2002 amnesty. These results are robust to instrumental variables and placebo analysis, and suggest that the relationship between underground economy and immigration is mostly driven by the presence of illegal immigrants, or, analogously, by the restrictions in granting legal status.

The paper is organized as follows: Section 2 describes the institutional background, Section 3 reviews the relevant literature, Section 4 includes the empirical analysis, Section 5 concludes.

## 2 Institutional Background on Immigration

Italy has historically been a country of emigration, with people moving towards the Americas between the 19th and 20th century, and towards Northern Europe after World War Two. Unlike other European countries like France or the UK, Italy has a very limited colonial past, and therefore did not bear the flows of immigration that followed de-colonisation. Immigration started to become a visible phenomenon only in the Eighties; early government interventions were mainly aimed at regularizing the stock of immigrants already residing in the country, rather than at managing the inflows.

Amnesties accompanied all immigration bills in 1990, 1995, 1998 and 2002. Further amnesties have been implemented in 2009 and 2012. Since 1998, the system became based on annual quotas set by the government. The so-called “Flows Decree” (*Decreto Flussi*) sets the number of new working residence permits to be issued in a year, subdivided by sector (construction, domestic services, and a residual category). These permits are contingent on job contracts, and *de facto* tend to regularize a quota of the existing (working) illegal immigrants. The 1998 immigration reform also triggered a number of bilateral agreements with some of the main countries of emigration, in order to insure repatriation of illegal immigrants, in exchange of reserved sub-quotas. Each quota is then partitioned across the

Italian provinces based on an estimated labor demand for foreign workers.<sup>1</sup>

Since the early Nineties, contrasting illegal immigration has always been at the forefront of the Italian political debate. When the centre-right coalition, which included the anti-immigration party Northern League, won with a landslide in the 2001 general elections, a new immigration bill was passed. This 2002 Immigration reform is the one on which this paper focuses the most. It was designed to be a restrictive law: it criminalized the status of illegal immigrant (that previously was just a non-criminal illicit act), and toughened the identification and deportation procedures. The general management of the inflows was unchanged, but it was improved with the latest information technology, so much so that for the first time the almost all of the amnesty applications were processed by the end of the following year (2003). The 2002 Immigration reform was passed in September 2002, and included a one-off amnesty on illegal immigrants who could prove to be working in Italy on the 10th of June 2002. Their employers had to pay a one-off regularization fee, as partial reimbursement for the evaded social security contributions. This “model” of amnesty was the same followed in 1998 and, with some variation, in all subsequent amnesties.

As amnesties have been one of the ordinary means of managing immigration, it came with little surprise that also a government nominally adverse to immigration was issuing one. However the exact timing and deadlines were largely unpredictable, as they depended mostly on the timing of the bargaining of specific aspects of the bill within the government coalition. Moreover, the government itself was surprised of the take-up of this amnesty: throughout 2003 and the beginning of 2004, about 700,000 applications were processed, and over 650,000 of them were accepted, which accounted to almost 50% of the stock of legal immigrants on the day before the amnesty.

### 3 Literature Review

This paper’s contribution is threefold: firstly, it expands the literature on the effects of immigration on economic and non-economic outcomes; secondly, it relates to the works exploring how legal status and immigration amnesties affect both the native and immigrant populations; finally, it contributes to the literature on the shadow economy and its causes.

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<sup>1</sup>The official Association of the Chambers of Commerce (*Unioncamere*) advises the government for this purpose.

### 3.1 Literature on immigration and its effects

The distributional effects of immigrants on the labor market outcomes of natives is one of the most explored issues in the immigration literature. [Borjas \(1994\)](#) finds that the relative skills of the “new” immigrants in the United States has declined over time. Moreover, even if there is a weak negative correlation between immigrants and the earnings of the natives, [Borjas \(1994\)](#) documents that immigration may have been partly responsible for the reduction in the earnings of unskilled native workers during the 1980s. [Friedberg and Hunt \(1995\)](#) find that the empirical literature does not clearly support the hypothesis of a positive relationship between immigration and the reduction in native employment. [Card \(2005\)](#) uses a cross-city research design and finds that the local labor market outcomes are only weakly correlated with immigrant densities.<sup>2</sup> More recently, [D’Amuri and Peri \(2014\)](#) focus on Western Europe in the period 1996-2010 and find that immigrants push natives towards more skill-intense jobs, and therefore have a positive effect on natives’ wages, particularly so in countries with higher labor market flexibility. Regarding the Italian labor market, [Venturini \(1999\)](#) conducts a cross-sector time-series analysis for the period 1980-1995 and finds a small to non-existent effect of the presence of immigrants on the employment of native workers. Finally, [Venturini and Villosio \(2008\)](#) find that (legal) immigrants in Italy tend to have a very different work history than native workers with analogous observables: they enjoy lower wages and have a more patchy job history, alternating frequently between regular and irregular jobs.

Another phenomenon which has been largely studied in the literature is the relationship between immigration and crime. According to [Borjas \(1998\)](#), the worse labor market conditions of the immigrants in the United States can be linked to a higher propensity of committing crimes. On the other hand, [Butcher and Piehl \(2007\)](#) identify in the risk of punishment rather than the presence of immigrants the most powerful deterrent to criminal activities. Using Italian data, [Bianchi, Buonanno, and Pinotti \(2012\)](#) show that immigration only increases the incidence of robberies, while the impact on the overall crime rate is not significantly different from zero.

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<sup>2</sup>However, [Borjas, Freeman, and Katz \(1996\)](#) and [Borjas \(2003\)](#) argue that a cross-city research design is compromised by the intercity mobility of people, goods and services. These researchers suggest to adopt an alternative time series analysis of aggregate relative wages. Nevertheless, according to these aggregate analysis the wages of unskilled native (with less than a high-school diploma) relative to high school graduates have remained nearly constant since 1980.

### 3.2 Literature on the causes of the shadow economy

Our work also relates to the literature exploring the determinants of the shadow economy. Several studies emphasize the role of social and institutional quality in shaping incentives to enter the official sector of the economy. [Enste and Schneider \(2000\)](#)’s review points out how the level of taxation and the regulatory burden are major explanatory factors of the size of the shadow economy. According to [Friedman, Johnson, Kaufmann, and Zoido-Lobaton \(2000\)](#), entrepreneurs actually go underground not to avoid official taxes, but to reduce the burden of bureaucracy and corruption. Analyzing a World Bank firm-level survey, [Dabla-Norris, Gradstein, and Inchauste \(2008\)](#) find a robust link between shadow economy, regulatory burden and the level of legal enforcement.

Other works on the informal economy focus on the inefficiency of the unofficial firms in comparison with the official ones. According to [La Porta and Shleifer \(2008\)](#), for example, unofficial firms tend to be smaller, less productive, with lower capital content and are run by less educated entrepreneurs. Therefore, growth-enhancing policies are effective instruments to substantially reduce the weight of the informal sector.

Furthermore, this paper relates also with a literature that analyzes the links between the shadow economy and additional relevant economic phenomena like inequality, financial development and banking crisis ([Chong and Gradstein, 2007](#), [Capasso and Jappelli, 2013](#), [Colombo, Onnis, and Tirelli, 2016](#)). In particular, [Capasso and Jappelli \(2013\)](#) study how areas of Italy which are financially more developed are also showing lower incidence of the shadow economy. In order to do so they introduce an indicator of the individual propensity to operate in the informal sector that is very close to that one adopted in this paper.

### 3.3 The Economic and Non-Economic Effects of Legal Status

There is a strong link between the literature that investigates the effects of gaining legal status and our analysis on the consequences of immigration amnesties on the size of the informal sector.

[Kossoudji and Cobb-Clark \(2002\)](#) estimate that immigrants who were able to get legal status through an amnesty experience a wage increase. Differently, [Kaushal \(2006\)](#), investigating the 1997 amnesty enacted in the US for Central-American immigrants, finds little to no effect on wages of amnestied immigrants. However, she shows a significant effect for the highly educated amnestied immigrants. More recently, [Lozano and Sorensen \(2011\)](#) show that the Immigration Reform and Control Act of 1986 caused an important long-run increase in the occupational wage of Mexican immigrants. Similarly, [Devillanova, Fasani, and Frattini](#)

(2014) study the 2002 amnesty program in Italy and document that the prospect of legal status significantly increases the employment probability of those immigrants that are eligible for the amnesty.

Finally, Chassamboulli and Peri (2014) develop a theoretical matching model that explains the effects of immigration policies, both in terms of border restrictions and amnesties, and calibrate it to study the impact of policy changes to the US and Mexican labor markets. They find that both decreasing deportation and increasing legalisations have positive effects on the natives' job market outcomes. This is because decreasing deportation and increasing legalisations improve the matching process and increase the available workforce. These two effects are advantageous also for natives. The positive impact of regularizations on non-labor market outcomes like crime has been also documented by Mastrobuoni and Pinotti (2011). According to these authors, the immigrant legal status decreases the propensity to commit crimes by providing immigrants with better income opportunities.

## 4 Empirical Analysis

### 4.1 Data

Both the size of the shadow economy and immigration flows are subject to substantial measurement errors and biases, this generates specific challenges to our analysis. For these reasons we use a number of techniques and data sources to insure that our results are not affected by specific measurement issues. We therefore construct separate datasets, disaggregated at either the regional or provincial level.<sup>3</sup>

In this section we analyze in details strengths and weaknesses of our estimates.

#### 4.1.1 The estimates of the shadow economy

We adopt three different estimates of the unobserved economic activity. The first one is a regional measure of the share of irregular employment obtained by the Italian National Statistical Institute (ISTAT). The ISTAT measure of irregular work is based on the concept of full-time equivalent units. The index used in this paper, in particular, is given by the percentage ratio of irregular full-time equivalent units to total full-time equivalent units.<sup>4</sup> The unofficial employment is calculated as the difference between labor demand and labor

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<sup>3</sup>Italy is subdivided in 20 regions and 95 provinces. The number of provinces has been increasing throughout the years. The immigration data in 1995 were still based on 95 provinces, therefore we decided to use this as a point of reference.

<sup>4</sup>The full-time equivalent units represent the transformation of labor provided into full-time units and are obtained from the sum of full-time and part-time jobs (main and secondary) transformed into full-time units.



supply. The labor supply data derive in turn from several sources—i.e. the ISTAT Population and Houses Census and Labor Force Survey—and are considered an exhaustive measure of the overall (official plus unofficial) labor supply.<sup>5</sup> These labor supply data also encompass information on foreign workers, both regular and irregular.

The use of several statistical and administrative sources makes the ISTAT estimate of the undeclared work a highly reliable measure of the Italian unobserved economic activity. Unfortunately, this measure is only available at the regional level, with only 20 observations per year, with obvious consequences on statistical power.<sup>6</sup>

Our second measure of the shadow economy is obtained by applying the standard Electricity Consumption (EC) approach to a panel of 95 provinces. The EC technique is largely used in the literature (La Porta and Shleifer, 2008; Chong and Gradstein, 2007; Colombo, Onnis, and Tirelli, 2016) and estimates total (observed plus unobserved) income by assuming that the ratio of electricity consumption to the overall economic activity is constant thorough time. Under such an assumption, the electricity consumption growth is used as a proxy for the growth of total GDP. Once the growth in the overall economic activity is obtained, the difference between the growth rate of official income and the growth rate of total income is imputed to the growth in the unobserved economy (Kaufmann and Kaliberda, 1996).

In this work, we obtain the growth rates of the unrecorded income at province level for the period 1995 – 2006.<sup>7</sup> Then, we peg the resulting growth rates to pre-existing base year estimates of tax evasion obtained by the Italian Revenue Agency (*Agenzia delle Entrate*) for the year 2000 (Pisani and Polito, 2006). These estimates measure the province-level value of the undeclared tax base for IRAP, a corporate tax on firm revenues. From this measure as base year, we derive two separate series of shadow economy: the value of evaded IRAP tax base as a share of GDP (*Shadow1*), and the value of evaded IRAP tax base as a share of the overall IRAP tax base (*Shadow2*).

Even if the EC approach allows us to easily obtain more disaggregated estimates of the shadow economy<sup>8</sup>, this methodology is open to criticism. A first commonly raised objection

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<sup>5</sup>Labor supply survey data are inevitably sensitive to the way the questionnaire is formulated and strongly depend on the respondents' willingness to cooperate (Enste and Schneider, 2000).

<sup>6</sup>A further problem with these data comes from some methodological changes due to the adoption of the European System of Account 95. ISTAT provides two overlapping time series: 1990-2002 and 2000-2009, with incongruent figures in the intersection of these intervals. Our results are qualitatively unaffected by the use of one, the other, or an average of the two time series for the three years of overlap. The use of time fixed effects may contribute to the stability of our estimates.

<sup>7</sup>The data on electricity consumption and official GDP are from Terna (the company owning the national electric grid) and ISTAT, respectively.

<sup>8</sup>In the absence of available province-level data on cash demand, we can't adopt other macroeconomic methods like the Currency Demand and MIMIC approaches.

to the EC technique is that not all unofficial economic activities require a considerable amount of electricity. Furthermore, other energy sources such as gas and oil can be used (La Porta and Shleifer, 2008). Therefore, this approach would be capable to capture only a part of the shadow economy. This might be particularly true for developed countries characterized by high shares of unobserved economies in sectors such as agriculture, constructions, and personal service. Nevertheless, according to the International Energy Agency statistics, there is actually evidence of high shares of electricity consumption in the Italian construction industry over the last few decades. In particular, in 1990 about 70% of the total energy consumed in the Italian construction sector was electricity. This percentage remained higher than 50% throughout the period 1990-2000.

Critics of the EC methodology also emphasize the potential downward bias caused by energy-saving technological progress. However, it cannot be taken for granted that the technological change will reduce the energy intensity of aggregate production (Jevons, 1965). In fact, following an improvement in energy efficiency, the fall in energy prices might cause a substitution effect towards more energy-intensive goods and production techniques. Furthermore, the income effect might raise household consumption of all commodities, including energy consumption.<sup>9</sup>

An overall decline in the EC shadow economy estimates could actually support the objection that the use of electricity is more efficient over time given the technological progress. Nevertheless, our measure describes a reduction in the relative size of unobserved income only for a small subset of provinces. Specifically, the mean value of the annual growth rates of the EC estimates over the period 1995-2006 is negative for 21 provinces.<sup>10</sup>

The last measure of informal activity adopted in this paper is a microeconomic indicator aimed at measuring the individual propensity to operate in the unofficial sector. In order to obtain this microeconomic measure of the shadow economy, we use the Bank of Italy's Survey on Household Income and Wealth (SHIW).

The SHIW is a biannual cross-sectional survey comprising about 8,000 households (24,000 individuals). The survey sample is a representative subset of the Italian resident population and provides detailed information on demographic characteristics, income and wealth.

The SHIW questionnaire doesn't include a direct question on the extent to which each individual operates in the unofficial sector. However, as suggested by Capasso and Jappelli

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<sup>9</sup>Allan et al. (2007) report a rebound effect between 30 and 50%. Dimitropoulos (2007) obtains even stronger rebound effects.

<sup>10</sup>Belluno, Brindisi, Caltanissetta, Caserta, Genova, Grosseto, Latina, Massa-Carrara, Matera, Napoli, Nuoro, Palermo, Ragusa, Rieti, Sassari, Savona, Taranto, Terni, Torino, Trieste and Venezia.

(2013), it is possible to infer the degree of irregular activity through the following two questions: i) *How old were you when you started working?* ii) *For how many years did you or your employer not pay social security contributions?* With these two questions, we are therefore able to construct a microeconomic measure of informal activity (*Irregularity Index*) for the years in our sample period when the survey was performed (1995, 1998, 2002, 2004, 2006). Specifically, we divide the number of years not covered by social security contributions by the length of the entire working life.<sup>11</sup>

We believe that our microeconomic index is a good indicator of the incidence of illegal jobs in a local labor market and—unlike the previously discussed aggregate measures—it allows us to control for the individual level characteristics of surveyed workers. Nevertheless, also this survey-based measure is subject to criticism, as it is well known that surveys tend to rely on respondent truthfully answering the survey questions, and under-represent categories such as (legal and illegal) immigrants. In this respect we need to stress that our microeconomic indicator aims at measuring the propensity to evade in a single locality. We are not trying to catch the propensity to evade of the immigrant population, as this would require field data that is not available to us.

To conclude, our conviction is that notwithstanding their well-known limitations, our measurements show a high degree of accuracy. We construct a regional-level time series of our four indicators (ISTAT irregular job rate, two measures from the EC approach, and the survey-based *Irregularity Index*), and check their correlation. As one can see from Figures 1-3 and Table 1, the correlation between the ISTAT figures and the other three measures of shadow economy is very high and always statistically significant.

#### 4.1.2 Immigration

Immigration data are available from 1995. In 2007 the accession to the European Union of ten (mostly Eastern European) countries triggered a change in the immigration status to many immigrants across Western Europe, including Italy. For these reasons our datasets comprises data in the interval 1995-2006.

As a measure of immigration we use the number of valid residence permits per 100,000 inhabitants issued in a province.<sup>12</sup> This measure includes only adults<sup>13</sup> and doesn't comprise the presence of undocumented immigrants. Because of this omitted variable problem—i.e.

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<sup>11</sup>Our microeconomic estimate of the informal activity doesn't include individuals who do not report years of contributions, are not part of the labor force, or who work in the public or agricultural sectors.

<sup>12</sup>Source: Interior Ministry and ISTAT.

<sup>13</sup>Children are usually included in their parents' permit.

the illegal immigrants are unobservable in official statistics—the natural positive link between irregular immigrants and the informal economic activity may bias the analysis on the impact of documented immigration on the size of the shadow economy.

In order to tackle this problem we take logarithms and include dummy variables for geographical areas and time periods. As described by [Bianchi, Buonanno, and Pinotti \(2012\)](#), this procedure may significantly reduce our omitted variable bias. Specifically, the logarithms of total immigrants ( $M^*$ ) can be defined as the sum of the logarithms of official immigrants ( $M$ ) plus geographical (province or regional) ( $\alpha_l$ ) and time ( $\delta_t$ ) fixed effects, i.e.

$$M_{l,t}^* = \alpha_l + \delta_t + M_{l,t} \quad (1)$$

[Bianchi, Buonanno, and Pinotti \(2012\)](#) state that the regularisations of previously unofficial immigrants can improve the level of accuracy of the above approximation. In particular, by using the administrative data of the three regularisations taking place in Italy in 1995, 1998 and 2002, they show that the OLS estimated coefficient of ( $M$ ) is very close to 1 with a 99%  $R^2$  coefficient.

Nevertheless, it is important to note that legal immigrants have always been highly incorporated in the Italian informal sector. As [Venturini and Villosio \(2008\)](#) note, legal immigrants in Italy tend to switch back and forth between regular and irregular jobs for a number of reasons: for example, low-skilled jobs are generally less stable and irregular jobs may be more rewarding in terms of net pay (as no social security contribution is given).

### 4.1.3 Controls

The presence of different types of measures of the shadow economy, implies the use of different datasets and, therefore, different sets of controls.

The first two datasets are based on aggregate region- and province-level measures of the shadow economy. For these two datasets we use aggregate measures as controls. In addition to the (real, log) GDP per capita, we include the turnout at the most recent European Parliament elections, as a proxy for social capital. As these elections are not directly linked to the election of a government, it is widely believed in the literature that turning out is analogous to voluntarily providing a public good.<sup>14</sup> These elections are held every five years, therefore our datasets include data from 1994, 1999, and 2004. Similarly to [Capasso and Jappelli \(2013\)](#), we also include an index of the efficiency of local civil courts as a proxy for the civil service efficiency. This is the only nation-wide measurable (and measured) output of

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<sup>14</sup>See [Palfrey and Rosenthal \(1983\)](#), [Palfrey and Rosenthal \(1985\)](#) and [Grafstein \(1991\)](#).

the central civil service, and we believe that it may help us to capture the different efficiency in enforcement. To be consistent with the aggregation level of our dependent variables, all these variables are aggregated at the regional or provincial level.

The micro-level analysis based on the SHIW survey includes individual level characteristics such as the household disposable income, age, gender, marital status, education, and whether the subject is non-employed or self-employed. Similarly to the aggregate-level data, it also includes additional controls aggregated at the regional level,<sup>15</sup> such as social capital and civil-court efficiency index.

Table 2 presents the aggregate variables, while Table 3 reports the summary statistics for the micro-level dataset.

## 4.2 Empirical Strategy

Our approach first focuses on establishing the link between the presence of immigrants and informal sector in the economy. In first instance we rely on simple OLS regressions, and then we use an instrumental-variable approach to deal with potential reverse causality problems, i.e. the possibility that localities with a stronger presence of the shadow economy might be more attractive to immigrants. Then, we analyze the effects of amnesties and their impact on the link between immigration and the informal economic activity.

### 4.2.1 The link between immigration and the shadow economy. OLS estimation

We start by performing OLS regressions on our datasets. From our panels comprising aggregate-level data we perform OLS regressions with regional/provincial and year fixed effects. The specification can be described as follows:

$$y_{l,t} = \alpha + \beta M_{l,t} + \gamma Z_{l,t} + u_l + \tau_t + \varepsilon_{l,t} \quad (2)$$

where  $y_{l,t}$  is the proxy for the size of the shadow economy in locality  $l$  at time  $t$ ,  $M_{l,t}$  is the log of immigrants per 100,000 inhabitants in locality  $l$  at time  $t$ , and  $Z$  is the matrix of controls including the GDP per capita (deflated and logged), the index of efficiency of civil courts and the turnout at the more recent European elections. Finally,  $\tau_t$  and  $u_l$  represent year and locality fixed effects, respectively, while  $\varepsilon_{l,t}$  is the error term.

Using the microeconomic dataset, our main equation is

$$y_{i,r,t} = \alpha + \beta M_{r,t} + \gamma X_{i,r,t} + \lambda Z_{r,t} + u_l + \tau_t + \varepsilon_{i,r,t}, \quad (3)$$

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<sup>15</sup>The SHIW survey only includes the regional identifiers of interviewed subjects.

where  $y_{i,r,t}$  is the indicator of irregular activities for the individual  $i$  in region  $r$  at time  $t$ ,  $M_{r,t}$  is the log of immigrants per 100,000 inhabitants in region  $r$  at time  $t$ ,  $X$  is the set of the individual demographic and socio-economic indicators, and  $Z$  comprises the additional regional variables. Finally,  $u_l$  and  $\tau_t$  refer to locality<sup>16</sup> and time fixed effects, while  $\varepsilon_{i,r,t}$  is the error term.<sup>17</sup>

The main variable of interest, i.e. immigration, is expected to be positively related to the informal activity, i.e.  $\beta > 0$ . The reasons to believe this are various. According to [Del Boca and Venturini \(2003\)](#), immigrants in Italy earn significantly less than natives. This is partly due to the fact that they are on average younger and low-skilled. Moreover, immigrants also experience worse labor market outcomes than natives with similar individual characteristics, possibly because of discrimination or lack of network. On this ground, we expect a significantly high incorporation of immigrants in the irregular market. Furthermore, having less bargaining power and a weaker support network, immigrants may be relatively more willing to take irregular jobs than the indigenous population. More generally, the presence of immigrants in a locality may modify the labor market conditions, generating a labor market equilibrium which is relatively more reliant on illegal workers, irrespective of their nationality.

We also expect that women, younger individuals, individuals with lower levels of education and who are not married, unemployed and self-employed workers are more likely to operate irregularly. At the same time, we expect a negative relationship between disposable income and the probability of working in the informal sector.

Finally, we expect a negative relationship between the measures of GDP, social capital and civil service efficiency and the propensity to operate in the shadow economy (see [Capasso and Jappelli, 2013](#)).

The results in [4](#) and [Tables 5](#) show the strength of the link between immigration and shadow economy. Specifically, the OLS regressions using aggregate data underline a strong significant relationship between the shadow economy and immigration. In [Table 4](#), one can see how for each of the three aggregate measures of the informal economic activity, and whether controls are included or not, a one percent increase in the immigrant population is correlated with an increase of the share of irregular jobs by 1.6% (columns 1 and 2), and an increase in the shadow economy of at least 0.7% of GDP (columns 3 and 4), or 1.1% of IRAP

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<sup>16</sup>The local fixed-effects refer to the following four macro-area: North-West, North-East, Centre, South, Islands.

<sup>17</sup>The microeconomic dataset is a repeated cross-section and includes the following waves: 1995, 1998, 2000, 2002, 2004 and 2006.

tax base (columns 5 and 6).

The micro-level analysis documents that a 1% increase in the share of immigrant in the population is correlated with a 2.7% increase in the *Irregularity Index* (see Table 5). It must be highlighted once more how this regression aims to capture the effect in the propensity of evading social security taxes (whether the subject is Italian or not), caused by the presence of immigrants. Our conjecture is that a job market with a heavier presence of immigrants generates different incentives with respect to labor-law compliance, because of the competition, especially in some sectors, between indigenous and immigrant workforces.

All the control variables (but age) have the expected signs in the microeconomic estimates (see Table 5). On the contrary, the province-level data do not show any significant relationship between social capital, civil service efficiency and the size of the informal sector (Table 4, columns 4 and 6), while the link between GDP and shadow economy is as expected negative and statistically significant. Furthermore, by using the regional-level data the relationship between the control variables and the irregular job rate is always positive and significant (Table 4, columns 2).

#### **4.2.2 The link between immigration and the shadow economy. Instrumental variable analysis**

The causal nexus between immigration and unobserved economic activity could be in the opposite direction to the one described above: we cannot exclude the possibility that immigrants are attracted to geographical areas where the demand of undeclared work is higher.

Taking into consideration this potential endogeneity problem, we re-estimate the link between the shadow economy and immigration by adopting a Two-Stage Least Square (2SLS) approach requiring an instrument for the immigration variable.

The choice of this instrument is based on a specific strategy which has been widely used in the literature (see Card, 2001, Card, 2005, Bianchi, Buonanno, and Pinotti, 2012, D’Amuri and Peri, 2014). In particular, in order to control for the “assortative matching” of immigrants into localities with larger availability of illegal jobs, we construct an instrumental variable from the re-allocation of the stock of immigrants in a given year across localities, according to the distribution that each national group had either at the beginning of the data series, or a few years before that.

We apply this technique using the earliest available data on immigrants in our possession, i.e. year 1991. In other words, for each nationality present in Italy, we calculate the stock of immigrants from that country in a given year, and re-allocate them across localities (regions



or provinces) according to the way they were distributed in 1991.<sup>18</sup>

This method relies on the observation that new waves of immigrants tend to exploit their national networks and settle in locations where a community of immigrants from the same country already exists.

Therefore, our instrumental variable for immigration can be written as

$$m_{lt}^{IV} = \sum_j \lambda_{lj} m_{jt}, \quad \text{with } \lambda_{lj} = \frac{m_{lj1991}}{m_{j1991}} \quad (4)$$

where  $j$  is the country of origin of the immigrant,  $l$  is the Italian locality (region or province, depending on the dataset) of residence, and  $t$  the year.

The 2SLS estimation results are reported in Tables 6 (aggregate datasets) and 7 (micro-level dataset). As in the previous tables, we use all the measures of the shadow economy, and report the regressions both with and without controls. These results strongly confirm the ones obtained by OLS, showing an even more pronounced link between the presence of immigrants and the incidence of informal economic activity.<sup>19</sup>

In particular, focusing on the aggregate datasets (Table 6), we can see that an increase by 1% in the presence of immigrants in a province generates a 7% increase to the irregular job rate (column 2), a 5% increase to the shadow economy as a share of GDP (column 4), and a 9% increase to the evaded IRAP tax base (column 6).

Similarly, looking at our micro-level dataset (Table 7), we can see how the effect of immigration on the shadow economy appears even stronger under an IV analysis: up to almost 0.4% increase in the propensity to evade for a 1% increase in the immigrant population.

### 4.2.3 The role of amnesties

The second part of this empirical analysis focuses on the effects of amnesties on both the informal economic activity and the relationship between immigration and the shadow economy. In particular, our purpose is to exploit the strong discontinuity shown by the Italian immigration flows data generated by the 2002 Bossi-Fini Immigration Reform (Figure 4).

As already mentioned, amnesties have been a regular fixture in the legislation of immigration in Italy. As one can see from Table 8, roughly every five years, in correspondence

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<sup>18</sup>We perform this exercise using both the top 20 countries of origin in 1991, covering more than 90% of the stock of immigrant in each year, and all countries of origin. The results are hardly distinguishable, and we report only the former. Of course, we correct the coding in order to encompass the geopolitical changes, taking as a point of reference the countries existing in 1991.

<sup>19</sup>According to the standard diagnostic tests, the instrument for immigration is not weak and explains well the endogenous variable. The results are available upon request.



with major or minor immigration reforms, an amnesty has been issued. The peculiarity of the 2002 amnesty lies in the fact that the take-up was much larger than anticipated: the applications equalled almost 50% of the stock of legal immigrants, together with an acceptance rate of over 90% (and a relatively quick processing time).

The details on the eligibility criteria were very similar to the previous (1998) and successive (2009, 2012) amnesties, but the specific deadlines and cut-offs were largely unpredictable: the bill was passed in September, and the main eligibility criterion hinged on the illegal immigrant being able to prove to be in work 90 days before the bill was passed. Moreover, differently from previous amnesties, applications had to be filed by employers and not by the applicant themselves<sup>20</sup>.

The 2002 immigration amnesty has been implemented simultaneously in the whole country. This implies that we cannot exploit any time variation across provinces. Nevertheless, we can exploit the different intensity of the treatment, i.e. the different levels of the take-up of the amnesty in each province.

Figure 5 shows three maps of Italy, at the provincial level, and it highlights the quartiles of the weight of the shadow economy as from the Revenue Agency calculation (left, year 2000), pre-amnesty immigration (centre), and amnesty take-up (right). One can observe how these three—unconditional—geographic distributions differ. Specifically, the shadow economy prevails in the centre-south, but with peaks of non-compliance in the North-West, and of compliance in the South. The documented immigration is mostly concentrated in the more productive areas of the North and Centre-North, and the amnestied immigrants follow a similar distribution, but with visible local differences.

For our purpose we estimate, with both OLS and 2SLS techniques, the following equation,

$$y_{p,t} = +\alpha + \beta M_{p,t} + \gamma P_{p,t} + \lambda P_{p,t} * M_{p,t} + \gamma Z_{p,t} + u_p + t + \varepsilon_{p,t} \quad (5)$$

where  $y_{p,t}$  is the proxy for the size of the shadow economy in province  $p$  at time  $t$ ,  $M_{p,t}$  is the log of immigrants per 100,000 inhabitants in province  $p$  at time  $t$ ,  $P$  is the policy dummy variable, which takes value 1 for observations after the amnesty ( $year \geq 2003$ ), and  $Z$  is the set of controls. We also add the interaction between immigration and the policy variable. As what concerns the IV estimation, as in Aghion, Bloom, Blundell, Griffith, and Howitt (2005), we instrument both the immigration variable and interaction term. The instrument for the former variable is the same discussed in Section 4.2.2 while the instrument for the latter variable is the product between  $m^{IV}$  and  $P$ . As the policy would be perfectly collinear

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<sup>20</sup>Only domestic-service workers were required to file their own applications.

with the year fixed effects, we slightly change our strategy and include a linear year trend  $t$ .<sup>21</sup>

For this econometric estimation as in equation (5) we cannot use our micro-level dataset. The SHIW survey does not take place every year and hence it does not reflect a continuous time dimension. We also decided not to use the official ISTAT measure of irregular jobs for two reasons. First, the sample size is quite small, with only twenty observations per year; secondly—and most importantly—the amnesty falls very closely to the moment in which ISTAT changed the measurement of this rate, making the outcome of this analysis very unreliable. We, therefore, concentrate on the aggregate province-level dataset with the shadow estimates *Shadow1* and *Shadow2*.

The overall effect of immigration on the shadow economy is  $\beta$  before the amnesty and  $\beta + \lambda$  afterwards, while the effect of the policy on the shadow economy is  $\gamma + \lambda\bar{M}$ , where  $\bar{M}$  is the average immigration level from the policy year onwards.

The OLS estimation results are reported in Table 9. The nexus between shadow economy and immigration changes visibly because of the amnesty. Before the amnesty there is a strong and significant link between the two; after the amnesty this link is substantially weakened if not completely wiped out. To check this we perform an F-test of the overall significance and magnitude of the coefficients  $\beta + \lambda$  for the full-fledged regressions (columns 2 and 4 of Table 9), corresponding to the marginal effect of immigration on the shadow economy after the amnesty. The results confirm that the overall marginal effect is positive, but very far from being significant (a 0.31 p-value for the regression reported in column 2).

We also check the impact of the amnesty on the overall level of the shadow economy, being aware that this effect is subject to greater measurement error, given the contemporaneous implementation of the reform across the country. Performing the relevant F-test—i.e. checking whether  $\gamma + \lambda\bar{M} = 0$ —we find a negative and significant effect, which is equal to  $-0.37$  in case of the column 2 regression,<sup>22</sup> implying that the levels of the shadow economy have been negatively affected by the amnesty.

The 2SLS estimation results reported in Table 10 are stronger than the OLS outcomes. The link between immigration and the share of shadow economy is substantially decreased after the amnesty, and is only marginally significant. Focusing on the regression reported in column 2, the significance of the post-amnesty link between immigration and shadow economy

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<sup>21</sup>The results are unaffected if we alternatively include a square or logged year trend. Moreover, the results showed in Tables 5-6 are not affected by the use of a year trend rather than of a year fixed effects. These results are available upon request.

<sup>22</sup>Results for the regressions using *Shadow2* as a dependent variable are analogous and available upon request.

is only at the 10% level, and the marginal effect passes from 2.97 (before the amnesty) to 0.94 (after the amnesty). The effect of the amnesty on the level of shadow economy is still negative (-0.37), and significant at the 10% level.

To summarize, according to the OLS and 2SLS results, the link between immigration and shadow economy is at least drastically reduced, if not completely wiped out, by the amnesty.

Our hypothesis is that the presence of immigrants contributes to the shadow economy as long as it provides a supply of workers who are willing to work illegally: this willingness is strongly correlated with (il)legal status. A strong presence of workers willing (or constrained) to take up illegal jobs affects the labor market options also of native, generating a labor market equilibrium which is more reliant on illegal jobs. Alternatively, one may say that the propensity to work illegally is similar for legal immigrants and indigenous population. The capacity of the government to absorb migration waves into the legal migrant population is therefore vital to curb the presence of irregular work, and the social security and tax evasion which is attached to them.

As an additional robustness check we perform a ‘placebo’ analysis, in which we test the same effects for every year in our dataset, i.e. as if the policy was implemented in each year from 1996 to 2005. This additional analysis helps us to verify whether the actual policy impact, corresponding to the year 2003, can be observed in similar ways also for other years of our sample, and whether this confirms or weakens our belief that this effect is indeed to be linked with the amnesty.

To this aim, we re-estimate equation (5), with both OLS and IV techniques, testing for the effects on a number of placebo policies, for each year of our dataset. In other words, we perform the same analysis as in equation (5), controlling for a (fake) policy in each year from 1996 to 2005.

In Tables 11 and 12 we report the test of the placebo and the immigration effects for each year of placebo treatment. Note that the 2003 entry corresponds to the actual amnesty, and reports the results of the F-tests described in the previous paragraphs.

The placebo analysis largely confirms our results. The nexus between the presence of immigrants and the share of the shadow economy fades away in correspondence with the amnesty. More precisely, looking at the estimates in Table 11, the link between these two phenomena stops being statistically significant at the 5% level from 2002, the year in which the policy was passed. This might suggest an anticipation effect of the first few months of implementation of the amnesty.

The policy effect in Table 12 is less robust to this analysis, showing either a significant

and negative effects only for placebo treatments on or after 2003 (OLS analysis), or a positive effect before the policy turning negative (and mostly insignificant) after the policy (IV analysis).

## 5 Conclusions

This paper explored the link between the shadow economy and the presence of immigrants in a country, and the effects of immigration amnesties on this link. To this aim we investigated the case of Italy in the period 1995-2006. We collected and calculated a number of different measures of shadow economy: the official irregular job rates, our own measure of shadow economy based on the physical input approach and finally a microeconomic approach based on an a repeated cross-section of representative households. Our results show a strong correlation between the official measures of the shadow economy, and allow us to establish a robust link between the propensity to evade or share of the shadow economy in a country on the one hand, and the presence of immigrants on the other hand.

Our explanation relies on a number of considerations: firstly, illegal immigrants are forced to work in the shadow economy. Secondly, many legal immigrants are employed in the low-skilled sector, where jobs are less secure and more likely to be irregular. Finally, the wider availability of illegal workers may concur to the establishment of a job-market equilibrium which is more reliant on illegal work.

Our main finding is that an increase by 1% of the immigrant population leads to a 0.4% increase in the propensity to evade, according to our survey-based analysis, to a 5% increase in the overall share of the shadow economy and to a 7% increase in the share of irregular jobs using our aggregate dataset. This link is robust to various specifications, including instrumental variables.

We then check how this dynamic is affected by immigration amnesties: this is particularly interesting as these tend not to affect the overall number of immigrant in a country, at least in the short run, but only to modify the relative size of legal and illegal immigrant populations. Our analysis shows that amnesty programs tend to reduce this link between immigration and shadow economy dramatically, suggesting that the main channel through which immigration and the informal sector are linked is the effect on the labor market equilibrium of the presence of illegal immigrants or—analogously—the lack of legal means to regularize the inflows of migrants.

## References

- Aghion, P., N. Bloom, R. Blundell, R. Griffith, and P. Howitt (2005). Competition and innovation: an inverted-u relationship. *The Quarterly Journal of Economics* 120(2), 701–728.
- Allan, G., N. Hanley, P. McGregor, K. Swales, and K. Turner (2007). The impact of increased efficiency in the industrial use of energy: A computable general equilibrium analysis for the United Kingdom. *Energy Economics* 29(4), 779–798.
- Bianchi, M., P. Buonanno, and P. Pinotti (2012). Do Immigrants Cause Crime? *Journal of the European Economic Association* 10(6), 1318–1347.
- Borjas, G. J. (1994). The Economics of Immigration. *Journal of Economic Literature* 32(4), 1667–1717.
- Borjas, G. J. (1998). To Ghetto or Not to Ghetto: Ethnicity and Residential Segregation. *Journal of Urban Economics* 44(2), 228–253.
- Borjas, G. J. (2003). The Labor Demand Curve Is Downward Sloping: Reexamining The Impact Of Immigration On The Labor Market. *The Quarterly Journal of Economics* 118(4), 1335–1374.
- Borjas, G. J., R. B. Freeman, and L. Katz (1996). Searching for the Effect of Immigration on the Labor Market. *American Economic Review* 86(2), 246–51.
- Butcher, K. F. and A. M. Piehl (2007). Why are Immigrants’ Incarceration Rates so Low? Evidence on Selective Immigration, Deterrence, and Deportation. NBER Working Papers 13229, National Bureau of Economic Research, Inc.
- Capasso, S. and T. Jappelli (2013). Financial development and the underground economy. *Journal of Development Economics* 101(C), 167–178.
- 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? *Economic Journal* 115(507), F300–F323.
- Chassamboulli, A. and G. Peri (2014). The Labor Market Effects of Reducing Undocumented Immigrants. NBER Working Papers 19932, National Bureau of Economic Research, Inc.

- Chong, A. and M. Gradstein (2007). Inequality and Institutions. *The Review of Economics and Statistics* 89(3), 454–465.
- Colombo, E., L. Onnis, and P. Tirelli (2016). Shadow economies at times of banking crises: Empirics and theory. *Journal of Banking and Finance* 62, 180–190.
- Dabla-Norris, E., M. Gradstein, and G. Inchauste (2008). What causes firms to hide output? The determinants of informality. *Journal of Development Economics* 85(1-2), 1–27.
- D’Amuri, F. and G. Peri (2014). Immigration, Jobs, And Employment Protection: Evidence From Europe Before And During The Great Recession. *Journal of the European Economic Association* 12(2), 432–464.
- Del Boca, D. and A. Venturini (2003). Italian Migration. IZA Discussion Papers 938, Institute for the Study of Labor (IZA).
- Devillanova, C., F. Fasani, and T. Frattini (2014). Employment of Undocumented Immigrants and the Prospect of Legal Status: Evidence from an Amnesty Program. IZA Discussion Papers 8151, Institute for the Study of Labor (IZA).
- Dimitropoulos, J. (2007). Energy productivity improvements and the rebound effect: An overview of the state of knowledge. *Energy Policy* 35, 6354–6363.
- Enste, D. H. and F. Schneider (2000). Shadow Economies: Size, Causes, and Consequences. *Journal of Economic Literature* 38(1), 77–114.
- Friedberg, R. M. and J. Hunt (1995). The Impact of Immigrants on Host Country Wages, Employment and Growth. *Journal of Economic Perspectives* 9(2), 23–44.
- Friedman, E., S. Johnson, D. Kaufmann, and P. Zoido-Lobaton (2000). Dodging the grabbing hand: the determinants of unofficial activity in 69 countries. *Journal of Public Economics* 76(3), 459–493.
- Grafstein, R. (1991). An evidential decision theory of turnout. *American Journal of Political Science* 35, 989–1010.
- Jevons, W. (1965). The coal question: an inquiry concerning the progress of the nation, and the probable exhaustion of our coal-mines. Technical report, A.M. Kelley, New York.

- Kaufmann, D. and A. Kaliberda (1996). Integrating the unofficial economy into the dynamics of post-socialist economies : a framework of analysis and evidence. Policy Research Working Paper Series 1691, The World Bank.
- Kaushal, N. (2006). Amnesty Programs and the Labor Market Outcomes of Undocumented Workers. *Journal of Human Resources* 41(3).
- Kossoudji, S. A. and D. A. Cobb-Clark (2002). Coming out of the Shadows: Learning about Legal Status and Wages from the Legalized Population. *Journal of Labor Economics* 20(3), 598–628.
- La Porta, R. and A. Shleifer (2008). The Unofficial Economy and Economic Development. *Brookings Papers on Economic Activity* 39(2 (Fall)), 275–363.
- Lozano, F. A. and T. A. Sorensen (2011). The Labor Market Value to Legal Status. IZA Discussion Papers 5492, Institute for the Study of Labor (IZA).
- Mastrobuoni, G. and P. Pinotti (2011). Legal status of immigrants and criminal behavior: evidence from a natural experiment. Temi di discussione (Economic working papers) 813, Bank of Italy, Economic Research and International Relations Area.
- Palfrey, T. R. and H. Rosenthal (1983). A Strategic Calculus of Voting. *Public Choice* 41(1), 7–53.
- Palfrey, T. R. and H. Rosenthal (1985). Voter Participation and Strategic Uncertainty. *American Political Science Review* 79(1), 62–78.
- Pisani, S. and C. Polito (2006). Analisi dell’evasione fondata sui dati irap. anni 1998-2002. Documenti di lavoro dell’ufficio studi, Agenzia delle entrate. Ministero dell’Economia e delle Finanze.
- Schneider, F., A. Buehn, and C. E. Montenegro (2010). Shadow Economies All over the World: New Estimates for 162 Countries from 1999 to 2007. Working Papers wp322, University of Chile, Department of Economics.
- Venturini, A. (1999). Do immigrants working illegally reduce the natives’ legal employment? Evidence from Italy. *Journal of Population Economics* 12(1), 135–154.
- Venturini, A. and C. Villosio (2008). Labour-market assimilation of foreign workers in Italy. *Oxford Review of Economic Policy* 24(3), 518–542.

Figure 1: Correlation between Irregular Job Rate (ISTAT) and Shadow1. Labels=Regions

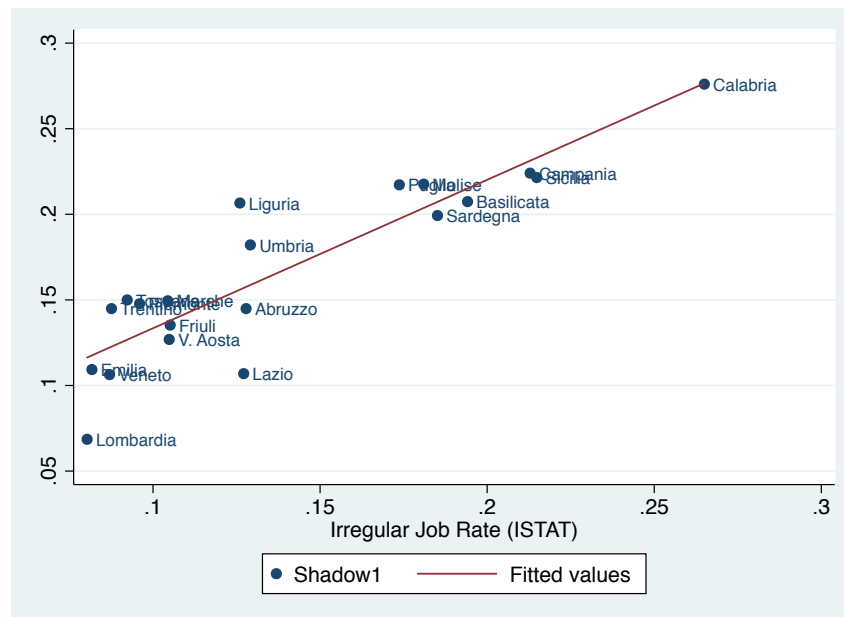


Figure 2: Correlation between Irregular Job Rate (ISTAT) and Shadow2. Labels=Regions

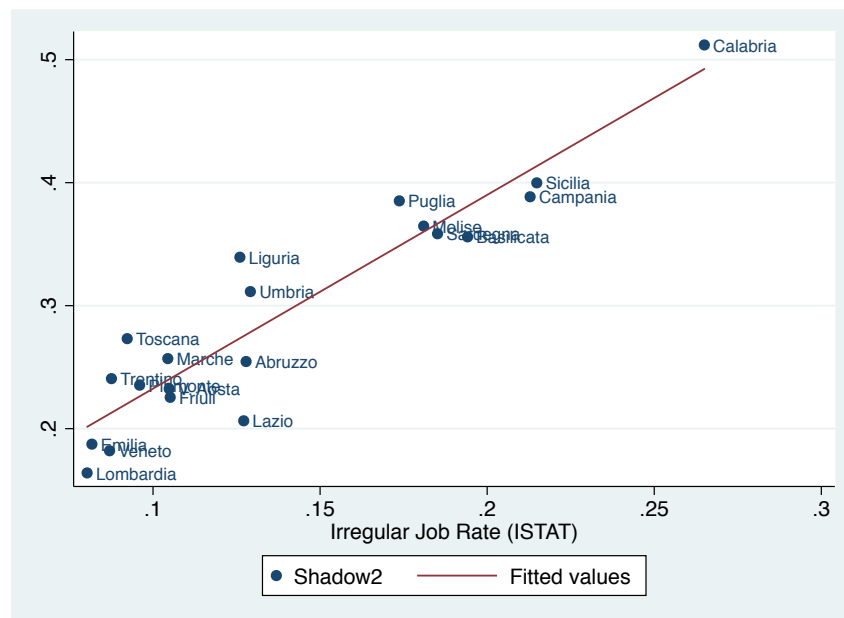




Figure 3: Correlation between Irregular Job Rate (ISTAT) and Irregularity Index (SHIW).  
Labels=Regions

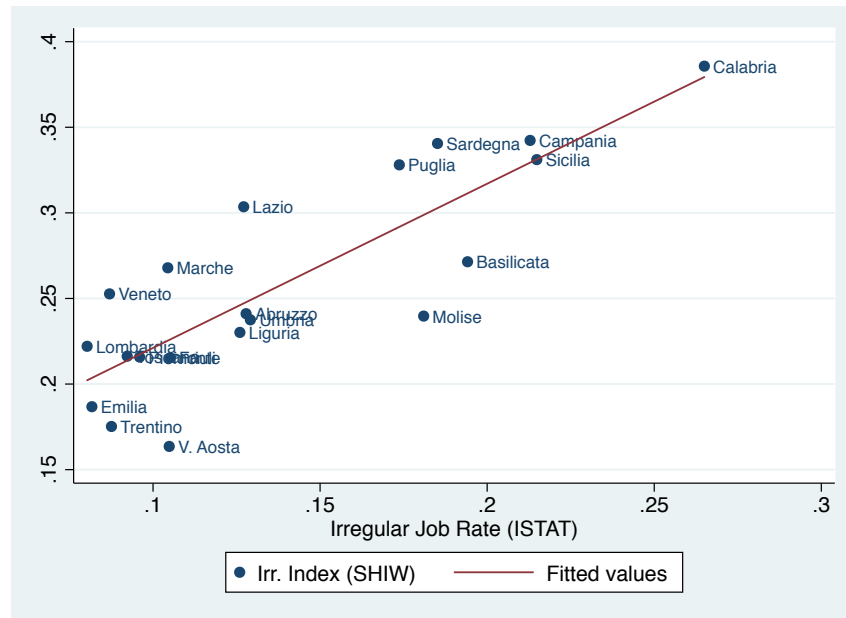


Figure 4: Number of Residence Permits, in thousands

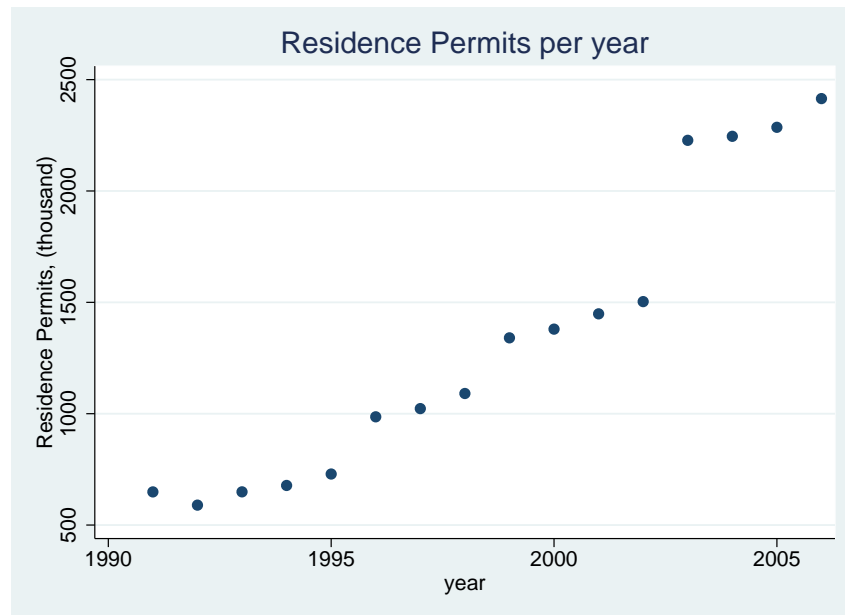


Figure 5: Quartile Distribution at the province level.

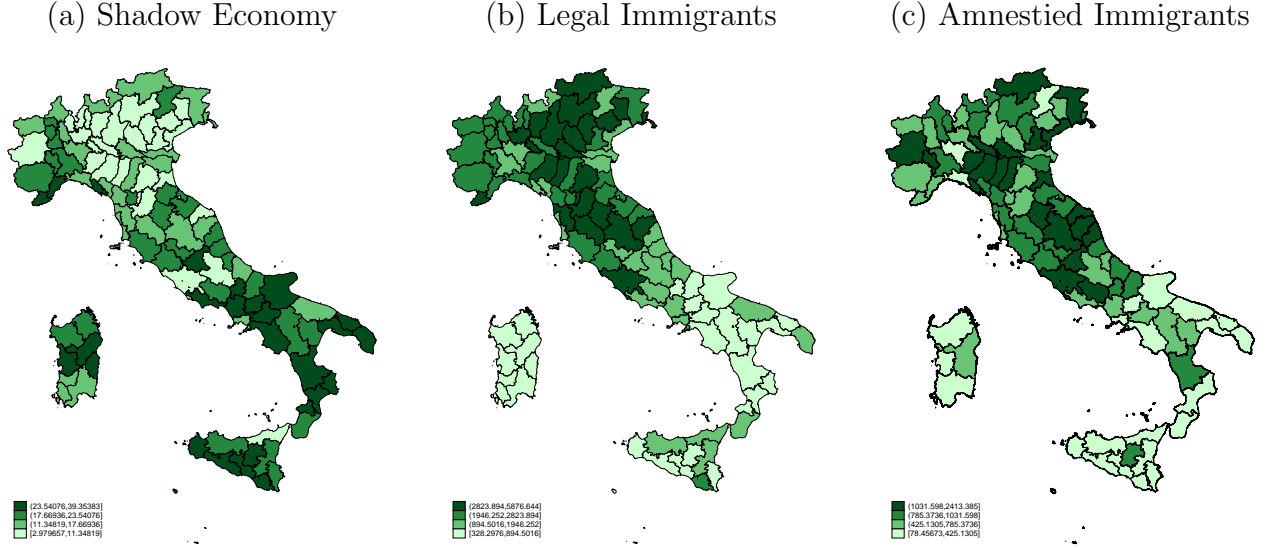


Table 1: Correlation table: ISTAT Irregular Job index vs. own shadow economy indices.

Variables	Shadow1 (IRAP/GDP)	Shadow2 (IRAP/ IRAP Base)	Irr. Index (SHIW)
Irregular Job Rate (ISTAT)	0.80 (0.00)	0.84 (0.00)	0.68 (0.00)

Table 2: Summary Statics: Region- and Province-level Aggregate Datasets

Variable	Mean	Std. Dev.	N
Regional Level Variables			
ISTAT Irregular Job Rate	14.624	5.276	300
Immigration (res. permits per 100k inhab., log)	7.545	0.774	240
GDP per capita. Log	3.182	0.27	240
Social Capital	0.721	0.061	240
Civil service efficiency	1.269	0.215	240
Provincial Level Variables			
Shadow1 (evaded IRAP /GDP)	18.365	7.959	1140
Shadow2 (evaded IRAP / IRAP taxbase)	31.946	13.641	1140
Immigration (res. permits per 100k inhab., log)	7.483	0.816	1140
GDP per capita. Log	3.158	0.274	1140
Social Capital	0.736	0.073	1140
Civil service efficiency	1.239	0.286	1140

Table 3: Summary statistics - Micro-level Dataset

Variable	Mean	Std. Dev.	N
Irregularity Index	25.312	28.407	39939
Immigration (res. permits per 100k inhab., log)	7.78	0.709	40579
Disp. Income, Log.	9.768	1.042	36995
Age	42.784	12.388	40579
Age sq.	1983.909	1059.075	40579
Male	0.601	0.49	40579
Married	0.680	0.466	40579
Education	3.711	1.403	40579
Non-employed	0.283	0.451	40579
Self employed	0.196	0.397	40579
Civil service efficiency	1.268	0.203	40579
Social Capital	0.746	0.059	40579

Table 4: Effect of Immigration on the Shadow Economy, OLS estimate

	(1)	(2)	(3)	(4)	(5)	(6)
	Irr. Job Rate	Irr. Job Rate	Shadow1	Shadow1	Shadow2	Shadow2
Immigration	1.581** (2.17)	1.624** (2.47)	1.028*** (4.69)	0.678*** (3.59)	1.684*** (4.37)	1.093*** (3.25)
GDP (pc., log)		13.21*** (3.28)		-14.51*** (-9.99)		-24.89*** (-10.62)
Social Capital		8.229** (2.02)		3.054 (1.51)		4.953 (1.31)
Civil Service Efficiency		1.960*** (3.32)		0.252 (1.30)		0.458 (1.28)
Controls	N	Y	N	Y	N	Y
Local FE	Reg	Reg	Prov	Prov	Prov	Prov
Time FE	Y	Y	Y	Y	Y	Y
N	240	240	1140	1140	1140	1140
r2	0.957	0.966	0.974	0.977	0.972	0.975

*t* statistics in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Table 5: Effect of Immigration on propensity to evade: OLS estimate.

	(1)	(2)	(3)	(4)	(5)
	Irr. Index	Irr. Index	Irr. Index	Irr. Index	Irr. Index
Immigration	2.343*** (2.62)	3.321*** (3.95)	3.876*** (4.65)	3.313*** (4.09)	2.748*** (3.42)
Disp. Income, Log.		-6.891*** (-22.39)	-6.360*** (-21.16)	-4.807*** (-15.68)	-4.735*** (-15.54)
Education			-2.133*** (-15.87)	-1.587*** (-11.35)	-1.594*** (-11.40)
Age				0.651*** (5.43)	0.631*** (5.28)
Age sq.				-0.00760*** (-5.47)	-0.00741*** (-5.34)
Male				-4.952*** (-12.61)	-5.081*** (-12.91)
Married				-2.962*** (-6.59)	-2.940*** (-6.54)
Non-employed				14.48*** (22.61)	14.51*** (22.72)
Self employed				5.779*** (12.51)	5.707*** (12.36)
Civil service efficiency				-3.474*** (-2.68)	-3.720*** (-2.87)
Social Capital					-35.31*** (-7.90)
Time and Area FE	Y	Y	Y	Y	Y
N	39939	36398	36398	36398	36398
r2	0.0418	0.117	0.130	0.178	0.180

*t* statistics in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Table 6: Effect of Immigration on Shadow Economy - IV approach. First Stage at the bottom.

	(1)	(2)	(3)	(4)	(5)	(6)
	Irr Job Rate	Irr Job Rate	Shadow1	Shadow1	Shadow2	Shadow2
Immigration	10.35*** (3.64)	7.005*** (2.63)	4.504*** (4.55)	5.053*** (5.12)	8.026*** (4.43)	9.065*** (5.00)
GDP per capita. log		18.75*** (3.40)		-11.30*** (-7.20)		-19.04*** (-7.29)
Social Capital		1.644 (0.31)		-1.169 (-0.50)		-2.742 (-0.62)
Civil service efficiency		2.477*** (3.96)		0.553** (2.57)		1.006** (2.55)
N	240	240	1140	1140	1140	1140
r2	0.914	0.951	0.968	0.968	0.965	0.965
First Stage						
Instrument	0.664*** (4.86)	0.672*** (4.06)	0.733*** (10.59)	0.744*** (9.71)	0.733*** (10.59)	0.744*** (9.71)
Controls	N	Y	N	Y	N	Y
Local FE	Reg	Reg	Prov	Prov	Prov	Prov
Time FE	Y	Y	Y	Y	Y	Y
N	240	240	1140	1140	1140	1140
r2	0.914	0.951	0.957	0.959	0.957	0.959

*t* statistics in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Table 7: Effect of Immigration on propensity to evade - IV approach. First Stage in even columns.

	(1)	(2)	(3)	(4)
	Irregularity Index	Immigration	Irregularity Index	Immigration
Immigration	0.300*** (3.84)		0.416*** (5.57)	
Instrument		0.475*** (84.68)		0.495*** (80.21)
Disp. Income, Log.			-0.237*** (-15.85)	-0.00147 (-1.08)
Constant	-3.053*** (-5.31)	3.950*** (96.62)	2.080*** (3.15)	3.491*** (47.20)
Controls	N	N	Y	Y
Time and area FE	Y	Y	Y	Y
N	26498	26498	23331	23331
r2	0.0233	0.942	0.179	0.944

*t* statistics in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Table 8: Amnesties: number of amnestied immigrants, and number of pre-amnesty legal immigrants

Bill	year	amnesty	pre-amnesty “stock”
Scalfaro	1986	105,000	not av.
Martelli	1990	217,626	not av.
Dini	1995	244,492	729,159
Turco-Napolitano	1998	217,124	1,090,820
Bossi-Fini	2002	704,350	1,503,286

Table 9: Amnesty Effect - OLS estimates

	(1)	(3)	(3)	(4)
	Shadow1	Shadow1	Shadow2	Shadow2
Amnesty ( $\gamma$ )	3.995*** (3.59)	6.160*** (6.81)	7.303*** (3.73)	11.08*** (6.83)
Immigration ( $\beta$ )	1.029*** (4.68)	1.003*** (5.42)	1.688*** (4.31)	1.647*** (4.98)
Amn. x Imm. ( $\lambda$ )	-0.500*** (-3.58)	-0.820*** (-7.28)	-0.908*** (-3.68)	-1.464*** (-7.23)
GDP per capita. log		-15.75*** (-10.97)		-27.17*** (-11.53)
Social Capital		0.782 (0.45)		1.023 (0.32)
Civil service efficiency		0.172 (1.06)		0.295 (1.00)
Trend	0.0442 (1.59)	0.341*** (10.30)	0.0896* (1.85)	0.599*** (10.51)
Controls	N	Y	N	Y
Local FE	Prov	Prov	Prov	Prov
Time FE	Y	Y	Y	Y
N	1140	1140	1140	1140
r <sup>2</sup>	0.974	0.978	0.971	0.975

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 10: Amnesty Effect - IV estimates (First Stage at the bottom)

	(1)	(2)	(3)	(4)
	Shadow1	Shadow1	Shadow2	Shadow2
Amnesty	2.971** (2.00)	4.382*** (3.50)	5.257** (2.06)	7.711*** (3.52)
Immigration	1.150** (2.02)	1.608*** (3.37)	1.928* (1.88)	2.723*** (3.12)
Amn. x Imm.	-0.374** (-2.04)	-0.606*** (-3.97)	-0.655** (-2.09)	-1.057*** (-3.95)
GDP per capita. log		-14.98*** (-11.79)		-25.75*** (-12.29)
Social Capital		0.817 (0.49)		1.115 (0.36)
Civil service efficiency		0.153 (0.98)		0.259 (0.91)
Trend	0.0657 (0.64)	0.469*** (4.58)		
Controls	N	Y	N	Y
Local FE	Prov	Prov	Prov	Prov
Time FE	Y	Y	Y	Y
N 1140	1140	1140	1140	
r2	0.974	0.977	0.971	0.975
First Stage				
Instr. (Immigration)	0.756*** (14.95)	0.810*** (16.29)	0.756*** (14.95)	0.810*** (16.29)
N	1140	1140	1140	1140
r2	0.957	0.959	0.957	0.959

*t* statistics in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01



Table 11: Placebo Analysis - Immigration Effect (Shadow1)

	OLS		IV	
	$\beta + \lambda$	p-value	$\beta + \lambda P$	p-value
1996	0.71***	0.00	2.58***	0.00
1997	0.46***	0.01	1.65***	0.00
1998	0.44***	0.01	1.47***	0.00
1999	0.38**	0.02	1.10**	0.03
2000	0.41**	0.01	1.29***	0.01
2001	0.36**	0.03	1.01**	0.03
2002	0.27	0.10	0.85*	0.08
2003 (Policy)	0.18	0.31	0.94*	0.09
2004	0.01	0.97	0.45	0.38
2005	-0.11	0.59	0.46	0.44

Table 12: Placebo Analysis - “Policy” Effect (Shadow1)

	OLS		IV	
	$\gamma + \lambda \bar{M}$	p-value	$\gamma + \lambda \bar{M}$	p-value
1996	-0.69***	0.00	-0.92***	0.00
1997	0.21	0.25	0.34*	0.06
1998	0.15	0.32	0.30**	0.03
1999	0.20	0.21	0.36**	0.02
2000	0.26**	0.05	0.42***	0.00
2001	0.06	0.59	0.20*	0.07
2002	-0.19*	0.09	-0.08	0.46
2003 (Policy)	-0.37***	0.01	-0.37*	0.08
2004	-0.36***	0.01	-0.24	0.11
2005	-0.32**	0.03	-0.15	0.41