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DOES THE UNDERGROUND ECONOMY HOLD BACK FINANCIAL DEEPENING? EVIDENCE FROM THE ITALIAN CREDIT MARKET

by Giorgio Gobbi* and Roberta Zizza*

Abstract

The paper investigates the relationship between the underground economy and financial deepening. Entrepreneurs can only access external finance by disclosing credible information in formal documentation. This may be impossible for many informal producers, who lack proper accounting records. Similarly, irregular workers may have difficulty borrowing to finance consumption and house purchases. Using panel data on local credit markets in Italy, we find that the share of irregular employment has a strong negative impact on outstanding credit to the private sector. According to our estimates, a shift of 1 per cent of employees from regular to irregular work corresponds to a decline of 1-2 percentage points of GDP in the volume of business lending and of 0.3 percentage points in outstanding credit to households. By contrast, the feedback effects of financial deepening on the size of the informal sector are weak and statistically not significant. Applying a difference-in-difference approach that exploits the exogenous variation induced by the regularization programme for immigrant workers launched in 2002, we also find that irregular labour has a negative effect on banks' decisions to enter local credit markets.

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Keywords: irregular employment, bank lending, school drop-out, entry, branching, regularisation programme.

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1. Introduction[1]

Shadow or underground economic activity accounts for a sizeable proportion of employment and output in emerging market economies and in developing countries. [2] Rates of participation in the unofficial economy are also quite high in several advanced economies. An extensive literature has explored measurement issues and the causes of this phenomenon (Schneider and Enste, 2000; Schneider, 2006). A recent strand of research has begun to assess the relationships between informal activities and the regular sectors of the economy. This paper contributes to this area and provides an analysis of the impact of the informal economy on the amount of credit granted by banks and other financial intermediaries (OFIs) to business firms and households. A straight negative correlation emerges when one looks at cross-country data for high-income OECD members (Chart 1).[3] The size of the informal sector may well be a factor affecting the different development of credit markets across time and across countries. This would provide new insights with respect to the channels through which the differences in institutional settings lead to cross-country heterogeneities in financial structures (Djankov *et al.*, 2007).

Business firms' accounts, financial statements and other records provide financial intermediaries with basic information for gauging the creditworthiness of would-be borrowers. Firms who hide part of their activity and accordingly cook their books in order to avoid tax obligations may therefore be unable to raise external finance in the official credit markets. The same constraints could also be at work for other sources of financing, such as recourse to the capital market, although this is not really an option for small and medium-sized firms, among which those operating informally are mainly concentrated.

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[2] By underground economy we mean those activities (production, labour) which are deliberately concealed from the authorities in order to escape the payment of taxes and social security contributions or to avoid having to meet legal standards (minimum wages, number of hours worked, safety and health standards, and so on; OECD (2002)). In this paper the terms 'underground', 'shadow', 'informal', 'irregular', 'hidden' will be considered as synonyms and used interchangeably.

[3] The comparison has been restricted to the subset of OECD members classified as 'high income', arguably a fairly homogeneous panel of countries.

Both demand and supply effects play a significant role, unambiguously pointing to a negative relationship between credit granted and size of the shadow sector. On the one hand irregular firms do not demand credit because they cannot provide assets that are eligible as collateral or meet the minimum disclosure requirements to be risk-assessed in the official credit markets.

The problems faced by irregular firms in raising funds are also often referred to as a reason for the anti-cyclical behaviour of the underground economy. The scarcity of capital available to informal entrepreneurs makes it more difficult for them to invest, sometimes forcing them to use low productivity technology, thus depressing economic growth during expansionary phases as well. If irregularity is regarded as a transitory state for "infant" activities (the so-called "development shadow sector" view, as opposed to the "marginal shadow sector" view), an irregular firm which is credit constrained could be locked into an irregularity trap and never realize its productive potential.

Household access to credit can also be affected by the size of the underground economy. Irregular workers may be unable to provide banks and other financial institutions with the documentation that supports their ability to service the debt (e.g. payslips). Furthermore, in areas with high levels of irregularity it is likely that an above average number of dwellings will not fully comply with the relevant laws and not be eligible as collateral.

On the other hand there are several channels through which the underground economy can influence the size and structure of the financial industry.

First, a negative externality may arise as the opaqueness of irregular activities in a local credit market could spill over to the regular sector and reduce the overall ability of banks to screen and monitor borrowers. This is likely to occur when the borderline between regular and irregular activities is fuzzy as in the case where a large number of firms operate only partially underground.

Second, being informal could imply not only limits on the amount of credit granted, but possibly a higher cost of borrowing, since the features usually characterizing irregular firms – small size, opaqueness, limited capital, simple internal organisation – cause financial intermediaries to classify them as riskier borrowers. The resulting higher cost can consist in either a higher interest rate or more assets pledged as collateral for the credit granted. Some authors have investigated the existence of a specialization among lenders in the private credit

market and found that non-bank intermediaries seem more prone to lend at a higher interest rate to business firms rationed by banks (Carey *et al*., 1998).

Finally, and most importantly, the limited demand for loans and other financial services of informal firms and households is likely to affect the market structure of the supply side. A negative impact of the irregular economy on the size of bank branch networks can also have adverse welfare effects for the regular sector.

The number of banks and bank branches operating in a local market is an important factor in determining the supply characteristics of retail banking and financial services. Although advances in information and communication technology have broadened the range of transaction facilities available to consumers, in most countries the vast majority of these services are still distributed by bank branches. In particular, according to a large body of literature, close proximity between lenders and borrowers reduces the attrition due to asymmetric information in lending to opaque borrowers such as small business firms. Degryse and Ongena (2005) show that loan rates increase with the distance between the firm and competing banks owing to spatial price discrimination induced by borrowers' mobility costs. Brevoort and Hannan (2004) using data on the US lending markets report that distance is negatively associated with the likelihood of a local commercial loan being granted. Bofondi and Gobbi (2006) find that banks lending from outside the local markets in which firms are based have default rates that are twice as high as lenders from inside. Borrowers are not the only recipients of the benefits from bank branch density. Using Italian micro data, Bofondi and Paiella (2004) show that the probability of a household holding a bank account is positively correlated with the number of branches.

Moreover, whenever a large number of bank branches is economically viable in a local market it is likely that several different banks are operating there, sweeping away monopolistic rents. But underground activities add to the informational opaqueness of local credit markets and thus raise the entry costs for outside banks (Gobbi and Lotti, 2004).

The relationship between the underground economy and the credit market has rarely been investigated in either the theoretical or the empirical economic literature. Usually, exclusion from the official financial markets is mentioned among the costs that firms bear as a result of being informal.

In Johnson *et al.* (2000) a measure of participation in the official financial market, given by the percentage of firms that received credit in a given time span, is found to have no

impact on the decision to operate underground in a panel of transition countries. However, the firms included in the sample are all known to the authorities, hence their activity is at most only partially hidden, allowing them a degree of access to the official financial system.

A few recent papers have included the banking sector in a general equilibrium model with a shadow economy. Dabla-Norris and Feltenstein (2005) model the cost of operating underground in terms of limited ability to borrow from the banking system. A simulation carried out on data from Pakistan shows that as the government moves to a high-tax regime, firms start by moving partially into the underground economy; they then move gradually back into the legal economy because, since they are not paying taxes, credit is restricted and hence the availability of capital. Conversely, a low-tax regime eliminates the underground economy and reduces credit rationing, but it is not sustainable over time, as both the budget and the trade deficits deteriorate.

Antunes and Cavalcanti (2007) also propose a general equilibrium model where the benefit from being formal is better access to outside finance. Each individual has three occupational options – to be a worker or a formal or an informal entrepreneur – and the choice depends on the quality of his project ("ability") as well as on his bequests. Only high productivity projects are chosen by formal entrepreneurs. A calibrated version of the model makes it possible to evaluate how much of the difference between the United States and southern Europe in the size of the informal sector is due to entry barriers (regulation costs) and credit market imperfections (enforcement of financial contracts). They find that the former account for most of the difference.

Straub (2005) presents a model linking the choice to operate in the shadow economy to the initial endowment of capital, to the efficiency of the credit market and to the cost of registering formally. The empirical evidence, based on cross-country firm-based data, gives credit to the idea that becoming at least partially formal and accessing the formal credit market are two parts of the same decisional process.

Although the literature provides useful insights and some valuable evidence, to the best of our knowledge there are no papers which provide systematic empirical support for the existence of links between underground activities and the development of the credit market. This could also be due to the scarcity of reliable data on the shadow economy. In what follows we investigate this relationship for the Italian economy, which we believe is particularly interesting for a number of reasons. First of all, Italy has a large irregular

economy compared with other industrialized countries; according to official estimates,[4] the value added produced by the irregular sector in 2003 accounted for 15-17 per cent of total GDP. The underground sector also accounted for about 13 per cent of total employment, measured in terms of standard labour units. Moreover, there is a high degree of geographical heterogeneity to be explained, as the standard reasons for the heterogeneity found in cross-country analyses (e.g. differences in fiscal and regulatory burden, in institutions and in legal settings[5]) should not apply to a within-country context.

We perform two exercises, which are described in sections 2 and 3.

First, applying panel data techniques to local credit markets since the mid-1990s, we relate the ratio of bank credit to GDP to the share of irregular workers in total employment. The opposite direction of causality, running from the availability of credit to the size of the shadow sector, is taken into account as well and endogeneity problems are taken care of. As expected, we find that there is a strong negative link between these two variables and that, both for firms and households, a non-negligible proportion of the variation in the ratio of bank credit to GDP can be traced back the size of the irregular activities. The same pattern also emerges whenever we enrich the analysis with the loans granted by other financial institutions. On the contrary, we do not detect any significant feedback effects from the ratio of credit to GDP to the rate of irregular work.

Second, we evaluate whether entry decisions by banks into local markets are affected by the degree of irregular employment, which allows us to determine whether there are supply effects at work. Applying a difference-in-difference approach which exploits the exogenous variation induced by the regularisation programme for immigrant workers launched in 2002, we estimate a negative effect of the size of the underground sector on the establishment of bank branches. We interpret this result as evidence of a negative externality brought about by the underground economy. Owing to information asymmetries and transaction costs, the reach of retail banking markets is rather limited and the entry deterrence exerted by informal activities is likely to restrain the supply of banking and financial services to small business firms and to households.

[4] See Appendix A for a detailed description of these data.

[5] See Roma (2001), Zizza (2002) and Lucifora (2003) for an extensive discussion of these issues.

2. Modelling the amount of credit granted in local markets. Is there a role for underground labour?

2.1 Data and empirical specification

Our first empirical test is based on the specification of a set of regressions where the ratio of credit to GDP (y) is a function of the measure of the irregular employment in the private sector (IRR), of J variables describing the local economy (LE_j, j = 1,…,J) and of K structural indicators related to the banking industry (BI_k, k = 1,…,K). We include market-specific fixed effects ($\boldsymbol{x}_i$) to take account of structural differences in the economies at the local level and other characteristics that are persistent over time and not captured by our control variables (for example, cultural differences or initial conditions). Common (economy-wide) time patterns across markets are accounted for by year dummies ($\boldsymbol{z}_t$). Thus the basic equation to be estimated is:

$$[1] \quad y_{it} = \alpha + \beta IRR_{it} + \Sigma_j \chi_j LE_{jit} + \Sigma_k \delta_\kappa BI_{kit} + \boldsymbol{x}_i + \boldsymbol{z}_t + e_{it}$$

First, we use a dataset referring to the 20 Italian regions over the period 1995-2003 because this is the geographical breakdown available from official estimates of the underground economy.

As our dependent variable, we choose alternatively the following credit aggregates as ratios to GDP: i) outstanding credit to the non-financial business sector including both corporate and non-corporate enterprises; and ii) outstanding credit to consumer households.[6] Charts 2 and 3 show a negative and quite strong correlation of these variables with the size of the irregular workforce in 2003, although a number of factors are likely to influence the amount of both credit and irregular employment. We alternatively consider bank lending only and bank lending combined with the loans granted by non-bank financial institutions, the latter in order to check whether it is possible to uncover substitution effects on the supply side of the credit market. Data on credit granted by non-bank financial institutions are available for the period 1997-2003 and only for those supervised by the Bank of Italy, which are the largest ones and presumably account for a large share of non-bank lending.

[6] We have also considered the outstanding credit to small businesses with less than 20 employees registered as sole proprietorship or partnerships. However, owing to the lack of a suitable scale factor (e.g. output produced by small firms), the interpretation of the impact of the irregularity rate would not be clear-cut, reflecting both the depressing effect of the shadow economy on the size of the credit market and the well known positive association between the number of small firms and recourse to irregular employment.

The set of variables accounting for local economic conditions includes the log of per capita GDP (*LNGDPPC*), the lagged average size of firms (*SIZE*), the lagged shares of agriculture, construction and services in terms of value added (*SHAREAGR*, *SHARECON*, *SHARESER* respectively) and a measure of the efficiency of the judiciary system *(ENFORCE)*.

The inclusion of *LNGDPPC* is pretty standard as a measure of overall economic development in cross-country studies on financial deepening (see Cottarelli *et al.*, 2005, for a recent example). Firm *SIZE* is measured as the average number of employees in the private sector. Sectoral value added shares account for changes in output composition that can induce changes in firms' demand for credit. The variable *ENFORCE* is computed as the average number of days that it takes a bankruptcy procedure to be completed in the courts. The importance of the efficiency of the legal system in determining the development and functioning of credit markets has been extensively explored in the literature (see Djankov *et al.*, 2007, for a recent investigation of this issue based on cross-country data); in particular, Bianco *et al.* (2005) produce empirical evidence that in Italian provinces with longer trials or large backlogs of pending trials, credit is less widely available.

We have included two controls for the structure of the banking industry. The first is the standard Herfindahl market concentration index (*HERF*), computed using the shares of branches. As long as market concentration is correlated with the level of competition in the market, we expect the estimated coefficient of *HERF* to show a negative sign. The second is a measure of branch density (*BRANCHPC*) given by the number of bank branches per thousand inhabitants. Several studies have shown that physical proximity between lenders and borrowers can help to alleviate problems arising from asymmetric information.[7] Hence the density of bank branches is expected to be positively correlated with the overall availability of credit. Table A1 in Appendix A contains a synoptic presentation of the variables used in the regressions and their descriptive statistics.

Although regions are the areas considered by Italian antitrust regulation on credit markets, for the vast majority of firms the relevant credit market is likely to be smaller. According to the information gathered by the Central Credit Register, in nine cases out of ten a firm establishes its credit relations with bank branches located in its headquarters' municipality or in one very close to it. Against this background we replicate our estimates

[7] See Bofondi and Gobbi (2006) for a detailed discussion of the issue.

using as a definition of local markets the 103 provinces, the smallest local government units for which a satisfactory set of economic statistics exists; they are very similar to the US counties in terms of size. Data for irregular labour have been obtained from regional official data by computing the irregularity rate for each province as the weighted average across sectors of economic activity of the irregularity rates of the corresponding region, with weights given by the size of the sector in the province. Table A2 in Appendix A presents definitions and descriptive statistics of the provincial variables.

2.2 Concerns and possible solutions for the endogeneity of the irregularity rate

The variable *IRR* in equation *[1]* is likely to be endogenous for several reasons. First, from a microeconomic perspective both the amount of credit demanded by firms and the quantity of irregular work employed originated from the same decision-making process. As an example one can imagine a firm which can choose between two technologies. The first is a capital intensive production plan which requires external finance and has to be run employing regularly registered workers. The second is a labour intensive activity for which credit is not required and irregular work can be employed. The decision to demand credit and employ irregular workers is one and the same.

A different issue is that, as predicted by some theoretical models (e.g. that built by Straub, 2005) an ampler supply of credit may mitigate the costs of being formal or reduce the advantage of going underground; hence the causality link between credit and the rate of irregularity may run in both directions.

Tackling these problems is a very difficult task because of the intrinsic opacity of the informal sector, which dramatically reduces the potential number of truly exogenous variables that can be used as instruments. Several variables which are supposed to influence the development of the underground economy (for example, the unemployment rate, the level of productivity, the firm size) are also expected to be linked to the extension of credit. The identification of a proper instrument is particularly difficult when dealing with geographical areas – such as the Italian regions – a priori characterized by the same institutional and legal settings.

In our view endogeneity should arise mainly when dealing with measures of credit granted to firms. The occupational choice of workers – remaining regular versus going underground – seems in fact harder to put in connection with the availability of funds:

obviously an agent could be induced to search for a job if he can borrow neither from banks, nor from other financial institutions, but this should not introduce a preference for an irregular work position.

In the set of regressions referring to firms our strategy to cope with endogeneity consists of resorting to an instrumental variable approach, as well as of estimating a simultaneous two-equation model. The latter specification, besides, allows us to assess whether the relationship between credit and underground labour is one or two-way.

As an instrument for the rate of irregular employment the rate of drop-out at the second year of secondary school (*DROPOUT*) seems a good candidate,[8] on the grounds of a strict connection between educational attainment and employment opportunities. On the supply side, low-skilled workers are plausibly less choosy and could often find themselves needing to accept an irregular position; on the demand side, areas characterized by a low level of education of the labour force may suffer from a negative externality inducing firms to increase revenues by evading taxes and eluding laws rather than by adopting new technologies.

Examination of the data confirms that the school drop-out rate is positively correlated with the size of the underground labour force across regions (see Chart 4). Findings from previous research corroborate our choice. Boeri and Garibaldi (2002), using an *ad hoc* survey carried out in Sicily, an Italian region where the underground economy is traditionally flourishing, found that irregular jobs involve mainly workers at the lower end of the skill distribution. This is also supported by the fact that underground labour is particularly common in agriculture, in the construction sector, in services to households and in labour intensive manufacturing branches (such as textiles and clothes, leather and shoes). Later the same authors confirmed these results nationwide on the basis of two other sources of information: the Istat Labour Force Survey and the Bank of Italy Survey of Household Income and Wealth (Boeri and Garibaldi, 2005). Ahn and de La Rica (1997) observe for the Spanish economy that education increases the probability of working in the formal sector.

In order for our instrument to be legitimate we need its partial correlation with the endogenous regressor to be different from zero. One might imagine that the underground economy is not caused by dropping-out from school and that the reverse causality occurs. We

[8] The drop-out rate at the first year (corresponding to an age of 14 according to the Italian education system) is also available, but since in Italy – in compliance with the ILO standards – children aged less than 15 may not be employed, we preferred a measure accounting for the education choices of those eligible for employment.

have tested this argument against the individual data provided by the Surveys of Household Income and Wealth carried out between 1998 and 2004 by the Bank of Italy (results are available from the authors upon request). The probability of dropping out of secondary school has been found not to depend on the size of the irregular economy in the region, after controlling for parents' education, parents' occupation and time and regional fixed effects. *DROPOUT* also features with a lag in the first-stage equation.

We argue that after conditioning on some relevant covariates, schooling attainment is uncorrelated with the other determinants of the extent of credit. It is in fact plausible that the schooling achievement of the entrepreneur (in the case of a sole proprietorship) or of the workforce of a firm asking for a loan is not a parameter used by banks to gauge the credit-worthiness of the would-be borrowers; in fact schooling does not appear in the list of information collected by banks according to the World Bank (2003) 'Doing business survey'. We also postulate that schooling decisions are not affected by borrowing constraints, as supported by a huge body of literature (Keane and Wolpin, 2001; Cameron and Heckman, 2001; Cameron and Taber, 2004). These results, referring to the United States, where costly private schools are fairly common, are reasonably extendable to Italy, where a free-of-charge, public education system prevails.[9]

In the simultaneous equation model *DROPOUT* is included as a determinant of the rate of underground employment, with a positive expected sign; the same set of variables accounting for the local economic conditions in equation *[1]* is considered. Thus, the model consists of equation *[1]* and of the following one, with all the symbols as explained above:

$$[2] \quad IRR_{it} = \alpha + \beta y_{it} + \Sigma_j \chi_j LE_{jit} + \delta DROPOUT_{it} + \mathbf{x}_i + \mathbf{z}_t + e_{it.}$$

2.3 Results

The results of the regressions of the ratio of bank credit to GDP for non-financial firms are reported in Table 1. The first robust result from estimates on regional data (columns (A)-(D)) is that the amount of shadow employment (*IRR*) has a negative and large impact on bank lending to the overall business sector. From the IV regression it emerges that a shift of one percentage point in regional employment from the regular to the irregular sector leads to a

[9] We have also tested for endogeneity by using the regression-based form of the Hausman test (Wooldridge, 2002). Results broadly confirm our a priori beliefs: the null hypothesis of exogeneity is not rejected for credit granted to households, while we detect endogeneity at the 10 per cent significance level for credit granted to firms.

reduction of the ratio of bank credit to GDP of 2.1 percentage points (column B). According to our estimates, moving from the first quartile to the third quartile of the distribution of *IRR* in our sample, the effect on the dependent variable is equal to 15 percentage points, which compares with an interquartile range of the ratio of bank credit to GDP of 19 percentage points (Table A1). Fixed effect estimates (column A) point to a weaker effect, though still highly significant and statistically indistinguishable from the IV specification due to much wider standard errors in the latter case.

The signs of the estimated coefficients of the variables controlling for the structural characteristics of the banking industry turn out as expected in all the specifications and their magnitudes change very little. The market concentration index is negatively correlated with the total amount of credit, while loans are more abundant where the density of bank branches is higher. The coefficients of the variables intended to control for the characteristics of the local economy – *LNGDPPC*, *SIZE*, *ENFORCE*, sectoral shares – are almost never statistically different from zero, plausibly reflecting their limited variability over the sample period. *DROPOUT* serves as a relevant instrument for the rate of irregular employment, showing a largely significant coefficient in the first-stage regression[10] (columns B and F).

Results of the 3SLS estimation are intended to reveal feedback effects from the availability of credit to the size of the irregular sector. The pattern of the coefficients in the credit equation (column C) is consistent with that obtained from the IV regression. A shift of one percentage point of employees from regular activities to irregular ones corresponds to a decline of 2.2 percentage points in the ratio of bank credit to GDP. In the equation for irregular employment (column D) the identification variable *DROPOUT* enters with the expected – positive – sign and is statistically different from zero at the usual significance levels; the feedback effect from credit to the size of the irregular sector is not statistically significant, suggesting that the link between the underground economy and financial deepening is essentially one-way.

Looking at the outstanding loans to non-financial firms granted by both banks and other financial institutions, the magnitude of the negative impact of the irregular economy on the size of total lending is much the same as that for bank lending only (Table 2, columns (A)-(D)). Therefore, loans from non-bank financial intermediaries do not substitute loans from banks in the local economy where the irregular workforce is large. One explanation is that the

kind of financial intermediaries we are considering are by and large specialized in lending activities such as leasing and factoring, which as in the case of banks require borrowers to keep records not usually available to irregular firms. Further investigations, not reported here for the sake of brevity, show instead that the loans by non-bank financial intermediaries not concerned with factoring or leasing activities tend to be positively correlated with the ratio of irregular workers.

Last, Table 3 (columns (A)-(B)) contains the results of the estimates of the ratio of credit to GDP for the household sector based on a simple two-way fixed effects model. Considering only bank loans, the dependent variable in our sample ranges from 11 to 17 per cent and the average is 14 per cent; consumer credit and other loans granted by non-bank financial institutions add some 3 percentage points to these figures (Table A1). The size of the irregular sector also has a negative impact on the total amount of household borrowing, but the effect appears to be larger for bank loans. A shift of one percentage point of the workforce from regular to irregular employment reduces the ratio of bank credit to GDP for households by 0.39 points. Including the loans of other financial institutions, the ratio falls by 0.28 points. As in the set of regressions for outstanding credit to business firms, the market concentration index is negatively correlated with the supply of credit to households and loans to households are more abundant where the density of bank branches is higher.

In the specifications referring to provinces (columns (E)-(F) in Tables 1 and 2 and columns (C)-(D) in Table 3) we dropped the firm-size and efficiency-of-the-judiciary-system variables owing both to their lack of significance in the regional estimates and to the unavailability of reliable proxies at this level of geographical breakdown. We also dropped the sectoral shares as they have been used in the construction of the irregularity rate. The signs and magnitudes of the coefficients of the irregularity rate on the ratio of credit to GDP are left unaffected when the regressions are run on provincial data.

3. Entry decisions by banks in local credit markets and underground labour

In this section we investigate whether bank entry into local credit markets depends on the size of the underground economy. We use only provincial data because banks' decisions

[10] According to Stock, Wright and Yogo (2002) the F-statistic on the excluded instrument in the first-stage regression must be above 10 to rule out weak instruments.

to establish new branches are likely to be influenced by the economic conditions of relatively small areas, which represent the potential markets (Felici and Pagnini, 2007). We address the problem of endogeneity by using the regularisation programme for immigrant workers launched in 2002 as an instrument for irregular labour.

3.1 The regularisation programme for immigrant workers in 2002

In Italy much effort has been put into combating undeclared work. Several policy measures have been taken since the mid-1990s (for a comprehensive review, see European Commission, 2004). However, direct policy measures, that is interventions explicitly targeted at the reduction of the underground economy, have produced disappointing results. Among them, the introduction of Realignment Contracts (implemented in 1996), the establishment of the Committee for the emergence of the underground economy (1998) and the Regularisation Campaign (2001-2003).[11]

There is some evidence that firms may have preferred more "hidden" indirect methods of regularisation. Among them, in particular, the incentives introduced in 1998, in the form of a tax credit payable to firms that either hired a new worker with a permanent contract or transformed a fixed-term contract into an open-end one.[12] In fact many firms claiming the tax credit experienced a sharp increase in the number of their workers.

A policy intervention that has been effective in bringing underground workers out of the shadows is the regularisation programme for unauthorized migrants launched in 2002 (Law 189/2002, the so-called Bossi-Fini Law). The programme ran from September 2002 to November 2002) and involved about 700,000 workers; about half of them were domestic workers, the others were distributed among agriculture, construction, tourism and manufacturing (mainly metallurgy, textiles and footwear). To apply a migrant had to provide proof of employment.

The effect on the size of the irregular labour market is apparent from the data, as it is likely that many of these immigrants were engaged in underground activities before the regularisation. According to Istat, the irregularity rate decreased in 2002 by almost one

[11] In particular, with the Regularisation Campaign the Government expected to regularise about 900,000 workers; at the end of the program, only 3,854 new workers benefited from the regularisation.

[12] See Cipollone and Guelfi (2003) for a description and an evaluation of this policy measure. The tax credit was introduced by the Finance Law for the year 1998 and then prolonged, initially until the end of 2003 and later until the end of 2006. The incentive was first targeted at small firms in the South of Italy, but it was later extended to all firms and to all regions, though remaining much more generous for the southern regions.

percentage point with respect to the previous year (from 15.1 to 14.2 per cent); in 2003 it declined further to 13.4 per cent, its lowest level for ten years.

3.2 Data and empirical strategy

The outcome variable describing banks' entry decisions is given by the number of new branches (both *de novo* banks and branching by existing banks,[13] *ENTRY*) opened in the 103 Italian provinces in each year over the period 1996-2003.

We want to test here whether the size of the underground economy has an effect on branching decisions and whether, as we have discussed so far, this effect is negative. In this case as well the problem of endogeneity must be addressed and we again resort to an instrumental variable strategy. This time we take advantage of the implementation of the regularisation programme that is, conditional on a number of covariates, arguably uncorrelated with other factors shaping the entry decision.

We use this policy intervention in a difference-in-difference setting, where identification is achieved by differentiating the outcome variable between a "treatment" group and a "control" group, both observed pre and post treatment.[14]

The regularisation programme involved all the Italian provinces; however, its impact has been very heterogeneous across them,[15] permitting "high programme" and "low programme" areas to be identified. As in Duflo (2001), this distinction is made according to the sign of the residuals in a regression able to take into account how intense the programme was in each province. Specifically "high programme" provinces are those for which the residual of a regression of the number of regularized workers on the number of persons employed and on the surface area of the province is positive. The first regressor measures the size of the local labour market, the second is meant to represent all factors connected to space, such as land, housing and infrastructure, etc. which are likely to be affected by an increase in the population. A substantial part of the variation across provinces can be

[13] We have excluded banks that enter by acquiring an existing bank, since the acquired bank was already in the market, though under different ownership.

[14] The tax credit policy would be a more questionable instrument, since the regions benefiting from it were those with a larger underground economy, representing *de facto* an endogenous intervention. Moreover, its period of application was very long, so that its effects were presumably too diluted to be found in the data.

[15] This point is illustrated in Chart B1 in Appendix B, which shows the distribution across provinces of the percentage ratio of regularized workers to the total stock of employment. This ratio ranges from only 0.3 per cent (Nuoro, a province in Sardinia) to 6.1 per cent (Prato, in Tuscany), with a median value of 2.2 per cent.

explained by these two variables, as the R-squared is equal to 0.74 (see Appendix B for further details).[16]

In the absence of the programme, we expect banks' branching behaviour not to be systematically different in the two groups. In order to perform this falsification (or placebo) exercise, we also compare treatment and control groups in the periods 1996-1998 and 1999-2001.

Descriptive statistics of the treatment and control groups are shown in Table 4. A preliminary look at the data seems not to corroborate our prediction. On the one hand, as reported before, the rate of irregularity in treated provinces experienced a sensible decrease after the intervention. On the other, the average number of branches opened in the period 2002-2003 (the *post-treatment period*) was equal to 9.5, which compares to an average of 11.6 in the three preceding years (the *pre-treatment period*); the number of new branches decreased both in the treatment and in the control groups in the post-treatment period. However this descriptive analysis fails to consider the cyclical position of the Italian economy in the period under examination (see Chart 5). The post-treatment period was characterized by stagnation (0.3 per cent growth on average), which contrasts with the rapid growth (above 2 per cent) recorded in the pre-treatment period. Moreover, as the intervention was launched in the second half of 2002, and as banks take some time to set up new branches, it is likely that the actual post-treatment period started later (i.e. in 2003).

We therefore need a more formal analysis that takes conditioning variables into account. Moreover, we will also consider year 2003 alone as the post-treatment period. We perform both reduced and structural form estimates of the relationship between bank branching and the regularisation programme. In the reduced form equation we regress the number of new branches on the instrument *I*, on a set of covariates and on market and year fixed effects:

$$ENTRY_{it} = \alpha + \beta I_{it} + \Sigma_j \chi_j CONTROLS_{jit} + \mathbf{x}_i + \mathbf{z}_t + e_{it}$$

where $I_{it} = post_t * treat_i$; *post* is a dummy equal to one from year 2002 onwards (in year 2003 alone in our alternative exercise) and *treat* is a dummy equal to one for treated ("high

[16] The results that follow are left unaffected by choosing alternative specifications for this regression equation (e.g. inclusion of sectoral shares, which proved to be not significant in the regression, or replacement of employment with working age population), as by and large they give the same division of provinces into the two categories.

programme") provinces. Since the number of entries is a non-negative count, we resort to the traditional Poisson regression model; to deal with overdispersion,[17] we scale the standard errors using the square root of the Pearson Chi-square distribution.

In the structural model the number of new branches is set to depend instead on the irregularity rate (*IRR*), on a set of covariates and on market and year fixed effects:

$$ENTRY_{it} = \alpha + \beta IRR_{it} + \Sigma_j \chi_j CONTROLS_{jit} + \mathbf{x}_i + \mathbf{z}_t + \varepsilon_{it} \ ;$$

in addition, in the first stage we estimate the effect of the instrument on the irregularity rate, with symbols as above:

$$IRR_{it} = \alpha + \beta I_{it} + \Sigma_j \psi_j CONTROLS_{jit} + \mathbf{x}_i + \mathbf{z}_t + \xi_{it} \ .$$

As further determinants of entry we include standard characteristics of the market (see for example Amel and Liang, 1997). In particular, we have a measure of the size of the market in terms of population (*POP*) and of the growth of this size (*ΔPOP*); the per capita income of the market (*GDPPC*) and its growth (*ΔGDPPC*); the number of branches already existing in the market at the beginning of the period (*BRANCHES*); an indicator of profitability, given by the spread between interest rates on loans and deposits (*SPREAD*); market concentration, measured by the Herfindahl index computed using the share of branches (*HERF*; see Table A2 for definitions and descriptive statistics of the variables used in this exercise).[18]

3.3 Results

Table 5 summarizes the results of the different estimates performed. If both 2002 and 2003 are kept as the post-treatment period and if we take the period 1999-2001 as the pre-treatment period we obtain, as expected, that in the structural form the irregularity rate affects the number of new branches negatively (-0.264; column (B)); the treatment has in turn a significant and negative relationship with the irregularity rate in the first stage (column (C)). A one percentage point decrease of the irregularity rate should on average be reflected in

[17] As often happens with count data models, our outcome variable exhibits a variance that is much larger than the mean, hence violating the property of equidispersion that is typical of the Poisson distribution.

[18] As the index is calculated on the basis of branches, it is introduced with a lag of one year to avoid endogeneity problems.

almost 3 additional new branches per province.[19] Looking at the reduced form the results are in the same direction, as the Regularisation dummy exhibits a positive coefficient (column (A)). The period 1999-2001 is then used as the post-treatment period in the placebo exercise, with 1996-1998 taken as the pre-treatment period (in the bottom part of the table). No effect emerges from this falsification exercise. As anticipated, we also restricted the post-treatment period to the year 2003 alone. Basically we get the same results, except for the fact that the deterrent effect of the irregularity rate on bank branching is now slightly stronger (-0.364; column (E)), though not statistically distinguishable from the coefficient obtained in the first exercise. Again there is no effect of the treatment in the placebo exercise except for the first stage, as the estimates of the irregularity rate have incorporated the effects of the regularisation since 2002 (see Istat, 2005b).

4. Conclusions

In this paper we have explored the link between the shadow economy and the credit market. Notwithstanding a widespread belief that irregular activities prevent firms from borrowing from the official market, systematic empirical evidence on the issue is scanty because of the scarcity of data. Relying on a panel dataset of the Italian local credit markets since the mid-1990s we provide a quantitative assessment of the constraints that the shadow economy imposes on the amount of funds borrowed. Our results show that these constraints are economically and statistically significant both for firms and households. The heterogeneity in the size of irregular employment across Italian local markets can explain a large proportion of the variance in the credit to GDP ratio. On the contrary we did not find a sizable feedback effect from credit to the shadow economy.

The impact of underground labour on the development of the credit market has also been evaluated in terms of branching by banks in Italian provinces. We used a difference-in-difference approach which exploits the exogenous variation induced by the regularisation programme for immigrant workers launched in 2002. This exercise shows that irregular labour works as a barrier to entry into local banking markets. We argue that this effect is

[19] The average response to a one unit change in the j-th regressor is in Poisson regression models with intercept equal to $\hat{\beta}_j \bar{y}$ (see Cameron and Trivedi, 2005).

likely to have negative consequences on the supply of banking and financial services to the regular sector of the economy as well.

Table 1. Credit and the irregular sector. Estimated coefficients from two-way fixed effects, IV and 3SLS regressions.

Dependent variable: bank loans to non-financial firms as a ratio to GDP (CREDIT)						
	REGIONAL DATA				*PROVINCIAL DATA*	
	Two-way fixed effects (A)	IV (B)	3SLS Credit equation (C)	3SLS Irregular equation (D)	Two-way fixed effects (E)	IV (F)
IRR	-0. 922*** (0.225)	-2.106*** (0.861)	-2.245*** (0.787)	--	-1.227*** (0.195)	-2.284*** (0.715)
CREDIT	--	--	--	-0.000 (0.067)	--	--
LNGDPPC	0.114 (0.265)	0.381 (0.284)	0.385 (0.252)	0.220*** (0.062)	-0.461*** (0.073)	-0.299*** (0.101)
HERF	-0.576*** (0.176)	-0.589*** (0.163)	-0.504*** (0.137)	--	-0.129 (0.089)	-0.078 (0.065)
BRANCHPC	0.501*** (0.137)	0.478*** (0.126)	0.500*** (0.111)	--	0.366*** (0.093)	0.323*** (0.075)
SHAREAGR	1.243* (0.625)	0.341 (1.023)	0.140 (0.924)	-0.725*** (0.268)	--	--
SHARECON	0.404 (0.714)	-0.292 (0.687)	-0.374 (0.624)	-0.536*** (0.147)	--	--
SHARESER	1.436*** (0.416)	1.331*** (0.385)	1.233*** (0.344)	-0.048 (0.148)	--	--
SIZE	0.002 (0.007)	-0.002 (0.009)	-0.002 (0.009)	-0.005* (0.003)	--	--
ENFORCE	-0.009 (0.031)	0.005 (0.026)	0.008 (0.024)	0.008 (0.007)	--	--
DROPOUT	--	0.002*** (12.6) §	--	0.002*** (0.001)	--	0.002*** (44.7) §
CONSTANT	-0.935 (0.810)	-1.440* (0.782)	-0.087* (0.048)	-0.044*** (0.011)	1.780*** (0.210)	1.507*** (0.210)
R^2	0.72	0.66	0.64	0.42	0.69	0.66
Overall significance: p-value	0.00	0.00	0.00	0.00	0.00	0.00

Regional sample: annual data 1995-2003, 20 regions. Provincial sample: annual data 1996-2003, 103 provinces. See Appendix A for variable definitions and sources. SHAREAGR, SHARECON, SHARESER, SIZE, ENFORCE and DROPOUT are lagged by one period. As instrument for the rate of irregular employment, DROPOUT was used. Robust standard errors are reported in parentheses. The symbols ***, **, * indicate a significance level of 1 per cent, 5 per cent and 10 per cent respectively. Coefficients for time dummies are omitted for sake of brevity. § Coefficient of the instrument in the first-stage regression; corresponding F-statistic in parenthesis.

Table 2. Credit and the irregular sector. Estimated coefficients from two-way fixed effects, IV and 3SLS regressions.

Dependent variable: bank and OFI loans to non-financial firms as a ratio to GDP (CREDIT)						
	REGIONAL DATA				*PROVINCIAL DATA*	
	Two-way fixed effects (A)	IV (B)	3SLS Credit equation (C)	3SLS Irregular equation (D)	Two-way fixed effects (E)	IV (F)
IRR	-0.968*** (0.243)	-2.189** (1.011)	-2.427*** (0.907)	--	-1.172*** (0.205)	-2.450*** (0.768)
CREDIT	--	--	--	-0.002 (0.115)	--	--
LNGDPPC	0.249 (0.306)	0.537 (0.342)	0.608** (0.292)	0.226*** (0.066)	-0.466*** (0.081)	-0.325*** (0.109)
HERF	-0.514*** (0.191)	-0.611*** (0.229)	-0.282* (0.161)	--	-0.035 (0.121)	-0.082 (0.070)
BRANCHPC	0.547*** (0.140)	0.550*** (0.156)	0.361*** (0.129)	--	0.369*** (0.136)	0.345*** (0.080)
SHAREAGR	1.249* (0.670)	0.302 (1.153)	0.095 (1.038)	-0.701** (0.345)	--	--
SHARECON	0.029 (0.812)	-0.481 (0.690)	-0.900 (0.664)	-0.496*** (0.161)	--	--
SHARESER	1.044** (0.458)	0.962** (0.421)	0.862** (0.387)	-0.041 (0.176)	--	--
SIZE	-0.004 (0.009)	-0.007 (0.012)	-0.010 (0.011)	-0.005 (0.003)	--	--
ENFORCE	-0.001 (0.031)	0.014 (0.028)	0.011 (0.026)	0.009 (0.008)	--	--
DROPOUT	--	0.002*** (12.6) §	--	0.002** (0.001)	--	0.002*** (44.7) §
CONSTANT	-1.076 (0.891)	-1.658* (0.936)	-0.107* (0.057)	-0.045*** (0.012)	1.837*** (0.257)	1.656*** (0.226)
R^2	0.77	0.72	0.66	0.38	0.73	0.71
Overall significance: p-value	0.00	0.00	0.00	0.00	0.00	0.00

Regional sample: annual data 1997-2003, 20 regions. Provincial sample: annual data 1997-2003, 103 provinces. See Appendix A for variable definitions and sources. SHAREAGR, SHARECON, SHARESER, SIZE, ENFORCE and DROPOUT are lagged by one period. As instrument for the rate of irregular employment, DROPOUT was used. Robust standard errors are reported in parentheses. The symbols ***, **, * indicate a significance level of 1 per cent, 5 per cent and 10 per cent respectively. Coefficients for time dummies are omitted for sake of brevity. § Coefficient of the instrument in the first-stage regression; corresponding F-statistic in parenthesis.

Table 3. Credit to households and the irregular sector. Two-way fixed effects estimation.

	REGIONAL DATA				*PROVINCIAL DATA*			
	Dependent variable				*Dependent variable*			
Explanatory variables	Bank loans as a ratio to GDP (A)		Bank and OFI loans as a ratio to GDP (B)		Bank loans as a ratio to GDP (C)		Bank and OFI loans as a ratio to GDP (D)	
IRR	-0.385***	(0.061)	-0.276***	(0.055)	-0.389***	(0.050)	-0.293***	(0.051)
LNGDPPC	0.073*	(0.051)	-0.009	(0.051)	-0.218***	(0.018)	-0.219***	(0.017)
HERF	-0.067*	(0.037)	-0.063	(0.062)	-0.001	(0.024)	0.028	(0.028)
BRANCHPC	0.201***	(0.023)	0.155***	(0.029)	0.102***	(0.024)	0.075**	(0.032)
CONSTANT	-0.103	(0.157)	0.132	(0.147)	0.816***	(0.051)	0.839***	(0.056)
R^2	0.95		0.96		0.94		0.95	
Overall significance: p-value	0.00		0.00		0.00		0.00	

Regional sample: annual data 1995-2003 for regression (A), 1997-2003 for regression (B), 20 regions. Provincial sample: annual data 1996-2003 for regression (C), 1997-2003 for regression (D), 103 provinces. See Appendix A for variable definitions and sources. Robust standard errors are reported in parentheses. The symbols ***, **, * indicate a significance level of 1 per cent, 5 per cent and 10 per cent respectively. Coefficients for time dummies are omitted for sake of brevity.

Table 4. Characteristics of control and treatment group, pre and post-treatment.

	Low programme provinces (control group)	High programme provinces (treatment group)
PRE - TREATMENT		
ENTRY	9.9	13.1
IRR	17.3	14.6
POP	6.03	6.01
ΔPOP	-0.005	-0.002
GDPPC	14.6	16.6
ΔGDPPC	2.6	2.3
BRANCHES	5.2	5.3
SPREAD	5.4	5.0
HERF	0.15	0.13
POST - TREATMENT		
ENTRY	7.8	11.0
IRR	17.0	13.1
POP	6.02	6.02
ΔPOP	0.004	0.01
GDPPC	15.1	17.0
ΔGDPPC	0.12	-0.20
BRANCHES	5.3	5.4
SPREAD	5.7	5.3
HERF	0.15	0.12

Notes: POP and BRANCHES are in logs.

Table 5. Effects of the irregular labour on the banks' entry decisions. Instrumental variable estimates.

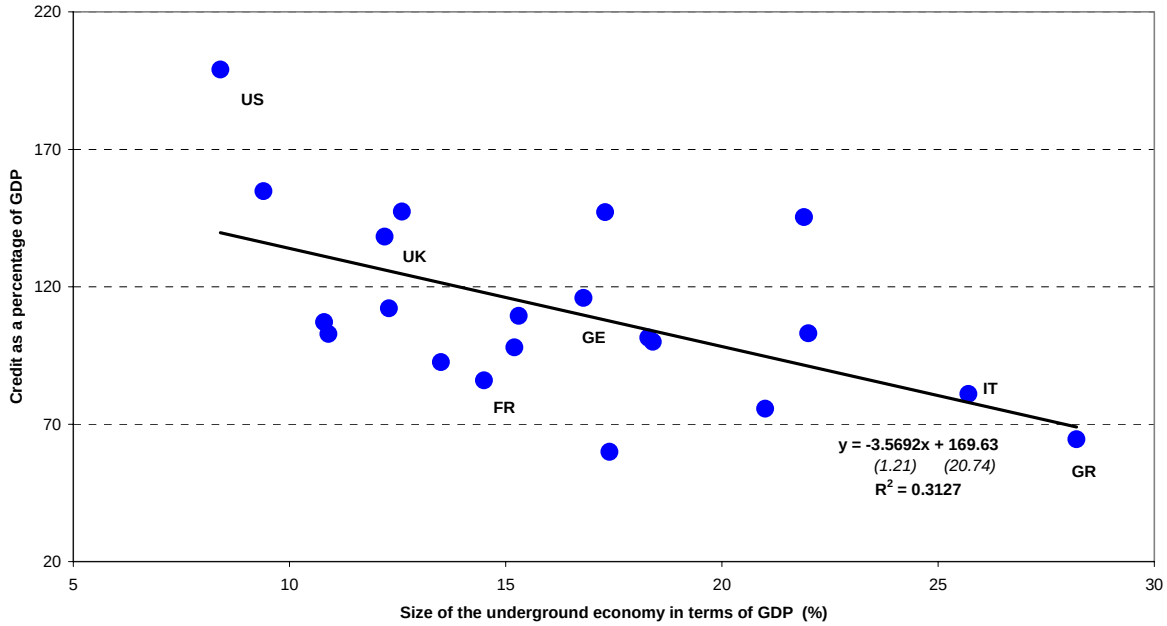
	POST-TREATMENT: 2002-2003			***POST-TREATMENT: 2003***		
Explanatory variables	**Reduced form** (A)	**Structural form** Entry equation (B)	**Structural form** Irregular equation (1^{st} stage) (C)	**Reduced form** (D)	**Structural form** Entry equation (E)	**Structural form** Irregular equation (1^{st} stage) (F)
IRR	--	**-0. 264*** (0.086)**	--	--	**-0. 364*** (0.101)**	--
POP	0.304 (1.950)	-8.130** (3.698)	-31.994*** (4.527)	1.478 (2.407)	-8.825** (4.132)	-28.302*** (6.215)
ΔPOP	-1.165 (2.932)	4.578 (3.520)	21.782*** (7.120)	-2.902 (3.040)	5.424 (3.759)	22.872*** (7.792)
GDPPC	-0.030 (0.063)	-0.052 (0.065)	-0.083 (0.128)	0.002 (0.076)	0.046 (0.075)	0.120 (0.162)
ΔGDPPC	0.003 (0.010)	0.007 (0.104)	0.014 (0.019)	-0.006 (0.012)	-0.002 (0.012)	0.011 (0.022)
BRANCHES	-5.981*** (0.915)	-5.786*** (0.905)	0.741 (2.263)	-6.472*** (1.170)	-7.791*** (1.287)	-3.622 (2.899)
SPREAD	-0.098 (0.061)	-0.184*** (0.064)	-0.325*** (0.118)	-0.050 (0.068)	-0.216*** (0.077)	-0.457*** (0.121)
HERF	4.571** (2.098)	-0.280 (2.507)	-18.403*** (4.557)	8.837*** (2.493)	1.804 (3.102)	-19.322*** (4.456)
TREATED PROVINCE	**0. 221*** (0.072)**	--	**-0. 837*** (0.158)**	**0. 312*** (0.087)**	--	**-0. 857*** (0.210)**
			PLACEBO EXERCISE §			
IRR	--	**-0. 608 (0.086)**	--	--	**-0. 236 (0.252)**	--
TREATED PROVINCE	**0. 058 (0.084)**	--	**-0. 095 (0.117)**	**0. 065 (0.070)**	--	**-0. 277** (0.126)**
Market and year fixed effects + constant	yes	yes	yes	yes	yes	yes

Sample period: 1999-2003, annual data, for the main exercise; 1996-2001 for the placebo exercise. Columns (A)-(B) and (D)-(E): dependent variable: *ENTRY*; Poisson regression; standard errors in parentheses are scaled using the square root of the Pearson Chi-square distribution to correct for overdispersion. Columns (C) and (F): dependent variable: *IRR*; two-way fixed effects regression; robust standard errors in parentheses. The symbols ***, **, * indicate a significance level of 1 per cent, 5 per cent and 10 per cent respectively. § For the sake of brevity we report only the coefficients for the irregularity rate and for the treatment dummy.

Chart 1

Credit and the underground economy across OECD countries

Average of the years 2002/2003



Source: underground economy estimates have been borrowed by Schneider (2006). These estimates may differ from official statistics for some country (Italy, for example); underlying methodologies have been criticized on different grounds (see Istat, 2005a and OECD, 2002). Here we use them only for the sake of comparison. Data on the ratio between credit and GDP are drawn from the 2006 revised version of the Financial Structure Dataset (see Beck *et al*. (2000)). See also footnote 3.

Chart 2

Employment in the underground sector and bank lending to business firms across the Italian regions

Year 2003

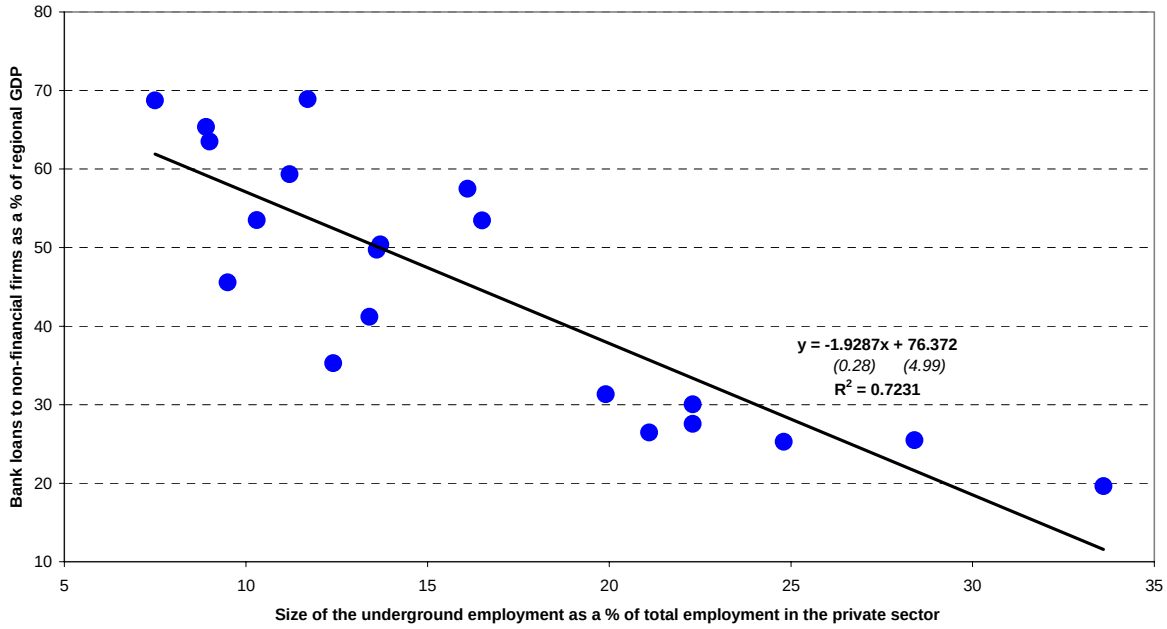


Chart 3

Employment in the underground sector and bank lending to households across the Italian regions

Year 2003

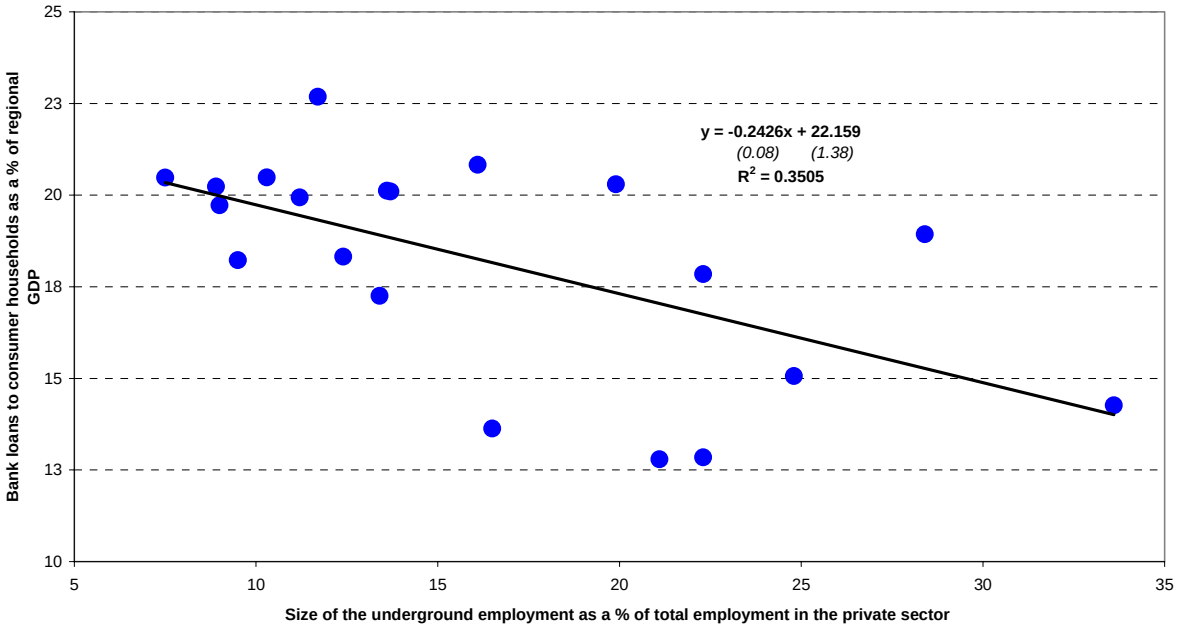


Chart 4

Employment in the underground sector and school dropout across Italian regions

Year 2003

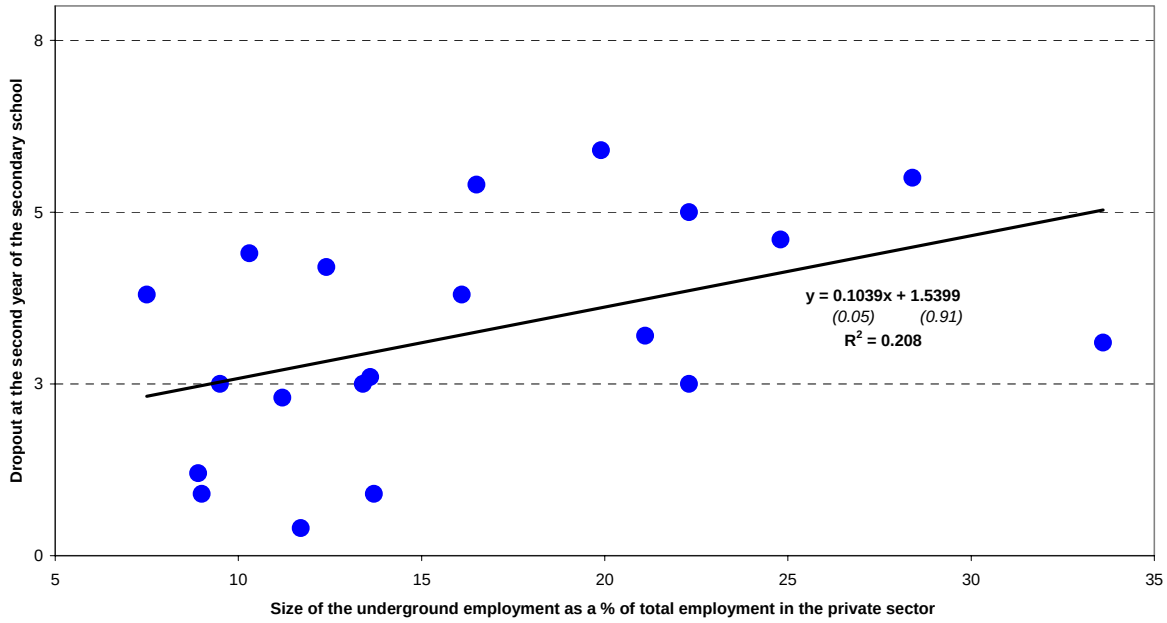
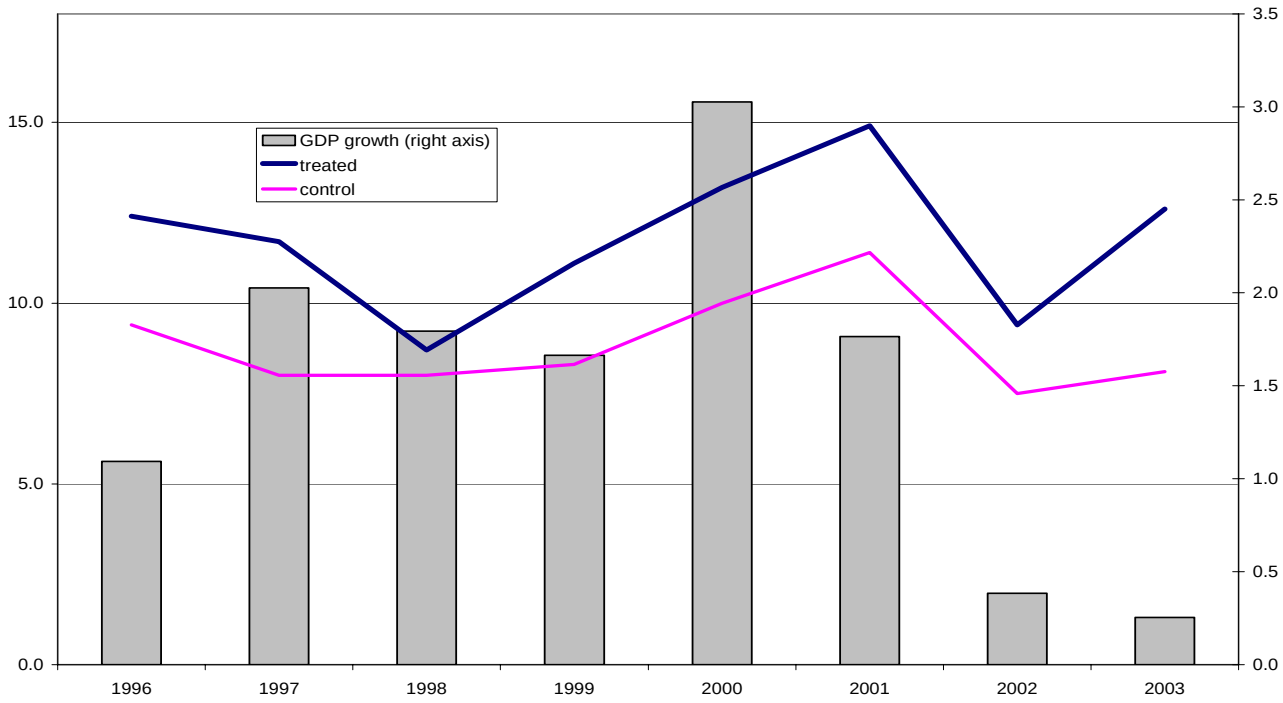


Chart 5
Average number of new branches by treatment and control groups and GDP growth



Appendix A: Variable definitions and sources; descriptive statistics

Regional data

CREDIT: bank loans to non-financial firms and to households; bank and OFI loans to non-financial firms and to households. As a percentage of GDP. Source: Bank of Italy, Bank and Other Financial Intermediary Supervisory Reports.

IRR: irregular employment as a ratio to total employment in the private sector, measured in terms of standard labour units; our calculations on Istat data. Official estimates are delivered within the framework of national accounts in order to ensure the exhaustiveness of GDP estimates. They are obtained by comparing several sources of information (such as surveys of firms and households, census and administrative data) and, after allowing for pertinent conceptual differences, giving economic meaning to relevant discrepancies detected (see Istat, 2004, 2005a). Data on the underground economy available at a national level basically account for hidden labour, income understatement (either by overstating costs or understating revenues) and missing activities due to statistical reasons: illegal or criminal activities are not included, as it is not yet current practice to make explicit adjustments for them in the national accounts, due to the uncertainty and the poor quality of the estimates (OECD, 2002). At a regional level, moreover, only measures of the hidden labour are released. Along the paper we refer to this narrower concept of shadow economy.

LNGDPPC: log of per capita GDP, in the private sector. Population aged 15 and over; source: Istat, National Accounts for GDP and Labour Force Survey for population.

HERF: Herfindahl concentration index computed on branches; source: our calculations on Bank of Italy, Bank Supervisory Reports.

BRANCHPC: number of branches, per capita. Population aged 15 and over; source: our calculations on Bank of Italy, Bank Supervisory Reports, and Istat, Labour Force Survey.

SHAREAGR, SHARECON, SHARESER: share of the agricultural, construction and services sectors respectively, in terms of value added; source: Istat.

SIZE: mean firm size, measured as the average number of employees in the private sector; source: our calculations on Istat and Unioncamere.

ENFORCE: log of the average number of days needed to complete bankruptcy proceedings; source: Istat.

DROPOUT: rate of drop-out at the second year of the secondary school; source: Istat.

Table A1. Descriptive statistics for regional data

Variable	Mean	Standard deviation	First quartile	Third quartile	Minimum	Maximum
Bank loans to non-financial firms as a ratio to GDP	0.40	0.13	0.30	0.49	0.19	0.59
Bank and OFI loans to non-financial firms as a ratio to GDP	0.46	0.15	0.34	0.59	0.21	0.70
Bank loans to households as a ratio to GDP	0.14	0.02	0.12	0.16	0.11	0.17
Bank and OFI loans to households as a ratio to GDP	0.17	0.02	0.15	0.18	0.13	0.21
IRR	0.17	0.06	0.13	0.20	0.11	0.31
LNGDPPC	2.92	0.26	2.67	3.14	2.50	3.29
HERF	0.13	0.06	0.10	0.14	0.06	0.33
BRANCHPC	0.58	0.21	0.43	0.71	0.28	1.12
SHAREAGR	0.04	0.02	0.02	0.05	0.01	0.07
SHARECON	0.06	0.01	0.05	0.07	0.04	0.08
SHARESER	0.66	0.04	0.62	0.69	0.60	0.75
SIZE	4.78	0.70	4.36	4.95	3.79	6.98
ENFORCE	7.77	0.15	7.70	7.88	7.48	8.06
DROPOUT	4.52	1.27	3.51	5.49	1.98	7.28

Statistics calculated on the average over the sample period.

Provincial data

ENTRY: number of new branches. Source: Bank of Italy, Bank Supervisory Reports.

BANK AND OFI LOANS: see regional data.

IRR: irregular employment as a ratio to total employment. Data for provinces have been retrieved from official data at regional level (source: Istat). For each province the irregularity rate is calculated as the weighted average across sectors of economic activity of the irregularity rate of the corresponding region, with weights given by the size of the sector in the province. For years 1999 and 2000 our data are broadly comparable with those made available in Censis (2004).

POP: log of population aged 15 and over; source: Istat, Labour Force Survey.

ΔPOP: growth rate of POP.

GDPPC: per capita GDP; source: our calculations on Istat, National Accounts (see above for population).

ΔGDPPC: growth rate of GDPPC.

LNGDPPC: log of GDPPC.

BRANCHES: log of number of branches; source: Bank of Italy, Bank Supervisory Reports.

BRANCHPC: see regional data.

DROPOUT: see regional data. Each province is assigned the value of the corresponding region.

HERF: Herfindahl concentration index computed on branches; source: our calculations on Bank of Italy, Bank Supervisory Reports.

SPREAD: difference between interest rates on active and passive operations; source: Bank of Italy.

Table A2. Descriptive statistics for provincial data

Variable	Mean	Standard deviation	First quartile	Third quartile	Minimum	Maximum
ENTRY	10.4	13.1	3	12	0	107
Bank loans to non-financial firms as a ratio to GDP	0.43	0.19	0.27	0.55	0.10	1.07
Bank and OFI loans to non-financial firms as a ratio to GDP	0.49	0.21	0.31	0.64	0.12	1.19
Bank loans to households as a ratio to GDP	0.16	0.05	0.12	0.19	0.06	0.34
Bank and OFI loans to households as a ratio to GDP	0.18	0.05	0.14	0.22	0.07	0.36
IRR	15.4	6.0	11.1	19.5	6.1	33.4
POP	6.0	0.7	5.5	6.4	4.5	8.3
ΔPOP	0.001	0.010	-0.01	0.01	-0.05	0.03
GDPPC	15.5	3.9	11.9	18.6	7.4	26.7
ΔGDPPC	1.4	2.5	-0.2	2.7	-6.4	10.6
BRANCHES	5.3	0.7	4.8	5.7	3.0	7.7
HERF	0.14	0.08	0.10	0.16	0.04	0.65
SPREAD	5.6	1.4	4.5	6.6	1.9	10.9

Statistics calculated on the average over the sample period. POP and BRANCHES are in logs.

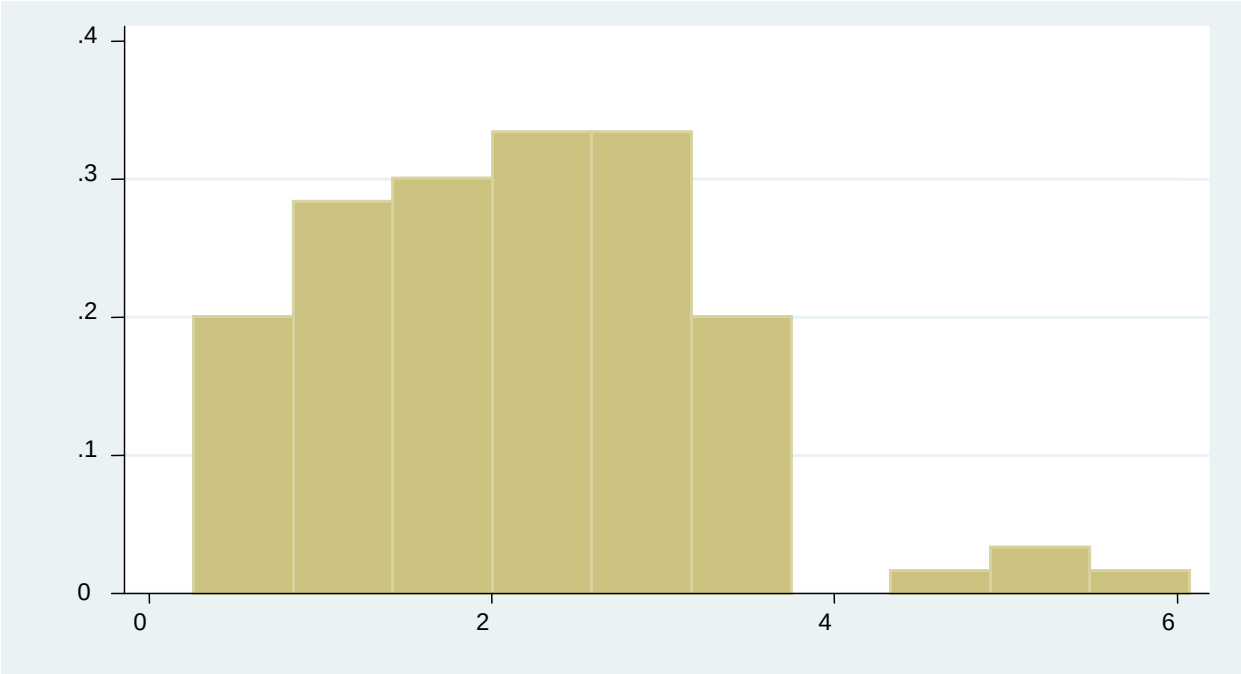
Appendix B. Identification of high and low programme provinces

Table B1. Regression for selecting high and low programme provinces

Dependent variable: REGWORK	
SURFACE	-0.30*** (0.11)
EMPLOYMENT	1.37*** (0.08)
CONSTANT	3.39*** (0.77)
R^2	0.74
Overall significance: p-value	0.00

Notes: REGWORK is the number of regularised immigrant workers (in logs; source: Ministry of the Interior); SURFACE is the province surface area (in square metres, in logs; source: Istat; EMPLOYMENT (in logs; source: Istat, Provincial economic accounts). OLS regression for year 2002 (103 observations). Robust standard errors are reported in parentheses. The symbol *** indicates a significance level of 1 per cent.

Chart B1
Number of regularised workers as a percentage of total employment. Distribution across Italian provinces
Year 2002



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