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**Does the Underground Economy Hold Back Financial  
Deepening? Evidence from the Italian Credit Market**

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## **Abstract**

The paper investigates the relationship between underground activities and financial deepening. The access to external finance requires entrepreneurs to disclose credible information through formal documentation. This requirement may be impossible to oblige to for many informal producers who lack a proper book-keeping of their operations. For the same reason irregular workers may find difficult to borrow for financing both consumption and housing purchase. Using panel data on Italian regional credit markets we find a strong negative impact of the share of irregular employment on outstanding credit to the private sector. According to our estimates a shift of 1 per cent of the employees from regular activities to irregular ones corresponds to a decline of about 2 percentage points in the volume of business lending and of 0.3 percentage points in outstanding credit to households, both expressed as ratios to GDP. Conversely, the feedback effects from financial deepening to the size of the informal sector are weak and statistically not significant. Through a difference-in-difference approach exploiting the regularisation program for immigrant workers launched in 2002 we also identify a negative effect of the irregular labour on banks' entry decisions in the local credit markets, now defined in terms of provinces.

JEL classifications: G21, O17, R23.

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

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## 1. Introduction

Shadow or underground<sup>1</sup> economic activity accounts for a sizeable proportion of employment and output in emerging market economies and in developing countries. Rates of participation in the unofficial economy are quite high also in several developed countries. An extensive literature has explored measurement issues and causes of this phenomenon (Schneider and Enste, 2000; Schneider, 2006). A recent strand of research has moved to assess the relationships between the 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 (OFI) to business firms and households. A negative correlation emerges when one looks at cross-country data referred to high-income OECD members<sup>2</sup> (chart 1). If such an impact is significant, the size of the informal sector may be well regarded as a factor affecting the different development of credit markets across time and across countries. This would provide new insights with respect even to the most recent literature, which so far has pointed to the role played by institutions in explaining cross-country heterogeneities (see, for example, Djankov *et al.*, 2005).

The relationship between the underground economy and the credit market has been rarely investigated in the economic literature, both from a theoretical and an empirical perspective. Usually the exclusion from the official financial markets is mentioned among the costs that firms bear from being informal. The access to finance requires entrepreneurs to disclose credible information about their activities through formal documentation; this requirement may be impossible to oblige to for many informal producers who lack a proper book-keeping of their operations.

The constraints faced by irregular firms in raising funds are also often referred to as a rationale for the anti-cyclical behaviour of the underground economy. The scarcity of capital at disposal of the informal entrepreneur makes it more difficult to invest, sometimes forcing

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<sup>1</sup> By underground economy we mean those activities (production, labour) which are deliberately concealed to the public authorities in order to escape the payment of taxes and social contributions or to avoid having to meet legal standards (minimum wages, number of hours worked, safety and health standards, and so on; OECD (2002)). The terms ‘underground’, ‘shadow’, ‘informal’, ‘irregular’, ‘hidden’ will be here considered as synonyms and used thereafter interchangeably.

<sup>2</sup> The comparison has been restricted to the subset of OECD members classified as ‘high income’, arguably representing a more homogeneous panel of countries.

him to operate a low productivity technology, thus depressing the economic growth also during the expansionary phases. If irregularity is regarded as a transitory state for “infant” activities (so-called “development shadow sector” view, as opposite to “marginal shadow sector”), an irregular firm which is credit constrained could be locked-in in an irregularity trap and never unfold its productive potential.

Household access to credit can also be affected by the size of the underground activities. Irregular workers may be unable to provide to banks and other financial institutions the documentation that supports their ability to service the debt. Furthermore, in areas characterised by high rates of irregularity it is likely that an above average number of dwellings are not fully complying with the relevant laws and are not eligible assets as collateral.

Both supply and demand effects presumably play a significant role, unambiguously pointing to a negative relationship between credit granted and the size of the shadow sector. On one side enterprises and households involved in irregular activities do not demand credit because they are not able to provide assets fully eligible as collateral or cannot meet the minimal informational requirements to be risk-assessed in the official credit markets. On the other hand 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.

We investigate the relationship between the underground activities and the development of the credit market relying upon data for the Italian economy since the mid-Nineties. There are several reasons for choosing Italy. First of all, that country presents a high rate of irregular labour when compared to other industrialised countries. Also there is a substantial geographical heterogeneity to be exploited and to be explained, as standard arguments for heterogeneity delivered in cross-country analyses (e.g. differences in fiscal and regulatory burden, in institutions and in legal settings) should not apply to a within-country context.

We perform two different exercises.

First, using panel data techniques applied to regional data we relate the bank credit to GDP ratio to the share of irregular workers over total employment in the private sector. The

opposite direction of causality, running from the availability of credit to the extent of the shadow sector, is taken into account as well. We take care of relevant endogeneity problems. As expected we find that there is a strong negative link between these two variables and that a non negligible proportion of the regional variation in the bank credit to GDP ratio both for firms and households can be traced back the size of the irregular activities. The same pattern also emerges whenever we enrich the analysis with the loans extended by other financial institutions. On the contrary we do not detect any significant feedback effects from the credit-GDP ratio to the rate of irregular work.

Second, we evaluate if entry decisions by banks into local markets are affected by the extent of the irregular employment; this allows us to identify if there are supply effects at work. Through a difference-in-difference approach, exploiting the exogenous variation induced by a regularisation program for immigrant workers launched in 2002, we estimate a negative effect of the size of the underground sector on the number of new 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 can restrain the supply of banking and financial services to small business enterprises (SMEs) and to households.

The paper is organised as follows. In section 2 we briefly review the existing literature. In section 3 we illustrate the development and the structural characteristics of the underground economy in Italy. In sections 4 and 5 we discuss the data, describe the empirical strategy and present estimates with regard respectively to the credit and to the entry equations. In the last section we conclude pointing to the future extension of the research.

## **2. The underground economy and the credit market**

Business firms' accounts, balance sheets, salary pay slips and other records provide basic information to financial intermediaries for gauging the credit worthiness of the would-be borrowers. Firms who hide part of their activity and accordingly counterfeit the accounts in order to escape from tax obligations can therefore be unable to raise external finance in the official credit markets. The very same constraints could also be binding for other sources of financing, such as the resort to the capital market, although this is an option not very common for small and medium sized firms, among which those operating informally are mainly

concentrated. This very simple idea is the starting point of virtually all of the relative small number of papers, which have addressed the issue of the relationship between irregular economic activities and the financial sector.

In Johnson *et al.* (2000) the variable ‘financing’ is put on the right-hand side of a regression for the underground economy in a panel of transition countries. ‘Financing’, measured as the percentage of firms who received credit in a given time range, is found to have no impact on the decision to operate underground. However, all enterprises included in the sample are known to the authorities, hence their activity is in the worst case only partially hidden, allowing them somehow to access 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 at a first stage move partially into the underground economy; then, they gradually move back into the legal economy due to the fact that since they are not paying taxes, their credit is restricted and hence the availability of capital. On the other side, a low tax regime eliminates 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 a better access to outside finance; since projects and assets in the irregular sector are not adequately documented, they cannot be turned into capital or cannot be used as collateral for a loan. Each individual has three occupational options – being either 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 allows to evaluate how much of the difference between United States and Southern Europe in the extent of the informal sector is attributable to entry barriers (regulation costs) and credit market imperfections (enforcement of financial contracts). They find that the former accounts for most of this 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 costs of registering formally; some extensions also allow to test whether this decision could be

affected by the quality of the enforcement system, the volatility of the economy and the degree of rigidity of the labour market. The empirical evidence, based on cross-country enterprise-based data, gives credit to the idea that becoming at least partially formal and accessing the formal credit market is a joint decision.

Being informal could imply not only limits in the size of the credit granted, but possibly a higher cost of borrowing, whereas the features usually characterising irregular firms - small size, opaqueness, scarce capital endowment, simple internal organisation - induce financial intermediaries to classify them among the riskier activities. This higher cost can consist in either a higher interest rate or more assets pledged as collateral for the credit granted. Some authors have assumed the existence of a specialisation among lenders in the private credit market, whereas non-bank intermediaries seem more prone to lend at a higher interest rate to those rationed by banks (Carey *et al.*, 1998). Under this view, irregular firms should frequently recur to the first kind of intermediaries.

Albeit the extant literature provides useful insights and valuable pieces of evidence, to our knowledge there are no papers which provide systematic empirical support of the links between the credit and the underground sectors. This could also be due to the scarcity of reliable data on the shadow economy. In what follows we try to establish some basic quantitative relationships on which to foot further research.

### **3. Size and structure of the underground economy in Italy**

The underground economy flourishes in many advanced and developing countries. Several causes have been listed in the literature to justify the level and the growth of this phenomenon: high level of taxation and complexity of the fiscal system; inefficiencies of the institutional environment (auditing, law enforcement, judicial system); cultural acceptance and lack of tax morality; excess of regulation and bureaucracy; high fragmentation of the industrial structure; specialisation in labour intensive productions and growing demand especially for labour-intensive services; increased volatility in the economy<sup>3</sup>.

Among the industrialised countries the shadow economy is of great magnitude in Italy, where - according to the estimates published by the National Statistical Institute (Istat) - the value added produced by the irregular sector in 2003 was equal to about 15-17 as a

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<sup>3</sup> See Roma (2001), Zizza (2002) and Lucifora (2003) for an extensive discussion of these issues.

percentage of total GDP. The underground sector also accounted for about 13 per cent of the total employment, measured in terms of standard labour units; it was equal to 11 per cent in 1980.

These estimates are the official ones, delivered by Istat 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, administrative data, and so on) and, after allowing for pertinent conceptual differences, giving economic meaning to relevant discrepancies detected (see Istat, various years).

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. So, henceforth we will refer to a narrower concept of shadow economy, given by the ratio between the irregular number of standard labour units and the total (regular plus irregular) number of standard labour units; besides, in Italy it represents the most important component. We have re-elaborated the data published by Istat in order to derive a rate of shadow employment in the private sector excluding from the denominator the labour force employed by the Public Administration, which we believe it is a more meaningful indicator of the actual weight of the irregular work in the economy.

The distribution of the underground labour in Italy is heterogeneous both at a sectoral and at a regional level. There are some economic activities which are more prone to employ irregular workers: the agriculture and the tertiary sectors (net of the Public Administration) display a high concentration (33 and 16 per cent, respectively). The intangibility of the activity performed, the reduced physical capital endowment and the small size of most firms operating in the services sector are all factors that make it easier for the underground economy to proliferate. Within the industrial sector, characterised as a whole by a low incidence (about 5 per cent), labour intensive sectors - such as textiles and clothes, leather and shoes - are those where the phenomenon is more relevant. Regions in the South of Italy are more affected, with rates of employment in the irregular sector in some cases higher than 25 per cent. In 2002, albeit the size of the irregular employment declined at a national level,

the divide between the Centre-North and the South widened: this divide can only by a small extent being explained by the different sectoral composition, as the regions where the size for the whole economy is higher also exhibit systematically higher rates in each sector (Cappariello and Zizza, 2004).

## 4. Modelling the amount of credit granted in regional markets. Is there a role for underground labour?

### 4.1 Data and empirical specification

Our empirical test is based on the specification of a set of regressions where the credit to GDP ratio ( $y$ ) is a function of the measure of the irregular employment in the private sector ( $IRR$ ), of  $J$  variables describing the local economy ( $LE_j$ ,  $j = 1, \dots, J$ ) and of  $K$  structural indicators related to the banking industry ( $BI_k$ ,  $k = 1, \dots, K$ ). We include region-specific fixed effects ( $\mathbf{x}_i$ ) to take into account 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 regions are accounted for by year dummies ( $\mathbf{z}_t$ ). Thus the basic equation to be estimated is:

$$[1] \quad y_{it} = \alpha + \beta IRR_{it} + \sum_j \chi_j LE_{jit} + \sum_k \delta_k BI_{kit} + \mathbf{x}_i + \mathbf{z}_t + e_{it}$$

The dataset constructed for this paper refers to the 20 Italian regions over the period 1995-2003. We assume the region as our definition of local banking markets; regions are, besides, the boundaries considered by Italian antitrust regulation on credit markets.

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; ii) outstanding credit to the small firms with less than 20 employees registered as individual firms or partnerships; iii) outstanding credit to the consumer households.

We alternatively consider bank lending or bank lending compounded to the loans granted by non-bank financial institutions. The extension to non-bank financial intermediaries is meant 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.

A proper measure of the impact of *IRR* on the amount of credit granted to small firms would require a suitable scale factor like their share in terms of total output. Unfortunately we do not have such a measure, so we use total GDP and this makes less clear-cut the interpretation of the estimated coefficient of *IRR* in [1], due to two different factors. The first one is the negative effect of the shadow economy on credit markets discussed so far. The second one stems from the fact that a large share of irregular workers are employed in small firms, and hence the magnitude of the irregular activities is likely to be negatively correlated with average firm-size but positively with the weight of small firms.

In charts 2 and 3 we present scatters of outstanding bank lending to firms and households, respectively, in relation the size of the irregular workforce in 2003. The correlation is negative and quite strong, although a number of factors are likely to influence both the extent of credit and of the irregular employment.

The set of variables accounting for the local economic conditions includes the log of per capita GDP (*LNGDPPC*), the lagged average size of enterprises (*SIZE*), the lagged shares of the agriculture, the construction and the service sectors 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 quite standard in cross-country regressions where the credit-to-GDP ratio stands on the left-hand side (see Cottarelli *et al.*, 2005, for a recent example). The idea is that outstanding credit is a measure of financial deepening and that financial deepening is correlated with overall economic development approximated by per capita GDP; faster growing regions should have a higher demand for credit. Moreover, is meant to serve also as a proxy for labour productivity.

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 the demand of credit by firms. The variable *ENFORCE* is computed as the average number of days that it takes a bankruptcy procedure to be worked out in courts. The importance of the efficiency of the legal system in determining the development and the functioning of credit markets has been extensively explored in the literature (see Djankov *et*

*al.*, 2005, for a recent investigation of this issue based on cross-country data); specifically to our point, 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 one 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 one is a measure of branch density (*BRANCHPC*) given by the number of bank branches by a thousand of inhabitants. Several studies have shown that physical proximity between lenders and borrowers can help to alleviate problems arising from asymmetric information<sup>4</sup>. 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.

#### **4.2 Concerns and 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 of a firm which can choose between two technologies. The first one is a capital intensive production plan which requires external finance and though has to be run employing workers regularly registered. The second one is a labour intensive activity for which credit is not required and irregular work can be employed. The decision of demanding credit and of employing 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 convenience to go 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 reduce the number of potential truly exogenous variables

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<sup>4</sup> See Bofondi and Gobbi (2006) for a detailed discussion of the issue.

which can be used as instruments. In fact, 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 characterised by the same institutional and legal settings.

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 be 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 in our view this should not introduce a preference for an irregular work position.

In the set of regressions referred 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 the secondary school (*DROPOUT*) seems a good candidate<sup>5</sup>, on the grounds of a strict connection between the educational attainment and the employment opportunities. On the supply side, low-skilled workers are plausibly less choosy and could often find themselves in need to accept also an irregular position; on the demand side, areas characterised 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.

A preliminary look at the data confirms that the rate of school drop-out is positively correlated with the size of the underground labour across regions (see chart 4, referred to year 2003). 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

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<sup>5</sup> The rate of dropout 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 - labour is forbidden to those aged less than 15, we preferred to deal with a more consistent measure, accounting for the education choices of those already eligible for employment.

lower end of the skill distribution. This is also supported by the sectoral breakdown reported in section 3, as the underground labour is particularly diffuse in the agriculture, in the construction sector, in the services to households and in labour intensive manufacturing branches. Later the same authors have been able to confirm 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 relevant we need its partial correlation with the endogenous regressor to be different from zero.<sup>6</sup> Moreover, it is plausible that the schooling achievement of the entrepreneur (in case of an individual firm) or of the workforce of a firm asking for a loan is a parameter which is not used by banks to gauge the credit worthiness of the would-be borrowers; after conditioning on some covariates, it is arguably uncorrelated with other determinants of the extent of credit.

We formally tested for endogeneity by using the regression-based form of the Hausman test (Wooldridge, 2002). Results broadly confirmed our a priori beliefs: the null hypothesis of exogeneity was strongly accepted for credit granted to households, while we detected endogeneity at the 10 per cent significance level for credit granted to firms.

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

$$[2] \quad IRR_{it} = \alpha + \beta y_{it} + \sum_j \chi_j LE_{jit} + \delta DROPOUT_{it} + x_i + z_t + e_{it}.$$

The expected sign of the coefficient for *DROPOUT* is positive, that for outstanding credit - if a feedback effect should emerge - negative.

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<sup>6</sup> It could be argued that it is not the drop-out causing the underground economy, but that the reverse causality direction occurs. Drop-out variable hence features with a lag in the first stage equation; moreover, we have tested this line of reasoning against the data provided by the Survey of Household on Income and Wealth carried out by the Bank of Italy (results are available from the authors upon request). Using data from surveys run from 1998 to 2004, the probability of dropping out of secondary school has been found not to depend on the size of irregularity in the region, after controlling for parents' education, parents' occupation and time and region fixed effects.

### 4.3 Empirical results

The results of the bank credit to GDP ratio regressions for non-financial firms are reported in Table 1. The first four columns (A-D) refer to all the enterprises and the other (E-H) to the smaller ones, i.e. partnerships and family-owned businesses employing less than 20 employees. For each definition of firms we have estimated a simple two-way fixed effects model, an instrumental variable (IV) version of it and a simultaneous equation model using three-stage least squares (3SLS). Because of the endogeneity problems discussed above we restrict our comments to the last two models.

The first robust result is that our measure of the importance of the shadow economy (*IRR*) has a large impact on bank lending to the overall business sector. From the IV regression it emerges that a one percentage point shift in the regional employment from the regular to the irregular sector leads to a reduction of the bank credit to GDP ratio of 2.1 percentage points (Table 1, 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 of 15 percentage points which compares with an interquartile range of the bank credit to GDP ratio of 19 percentage points (Table A1).

As expected when we restrict to the small enterprises we find that the impact of the irregular activities on credit is not statistically different from zero in the IV regression (Table 1, column F). We interpret this outcome as a balance between the depressing effect of the shadow economy on the size of the credit market and the larger weight of semi-irregular small firms in the regions where the resort to irregular employment is more intense.

The signs of the estimated coefficients for the variables controlling for the structural characteristics of regional credit markets 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 and, on the contrary, loans are more abundant where the density of bank branches is higher. The pattern of coefficients of the variables intended to control for other regional economic variables is less crystal clear. The log of per capita GDP (*LNGDPPC*) has the expected sign, albeit not statistically different from zero, in the IV regression for lending to all of the non-financial firms (Table 1, column B), but it is negative (and statistically different from zero) in the IV regression for lending to small firms. This may be interpreted as the effect of a negative correlation between the importance of small firms and the level of per capita output. The coefficients of the variables *SIZE* and *ENFORCE*

are never statistically different from zero in the IV regressions. This may reflect their limited longitudinal 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<sup>7</sup> (Table 1, columns B and F).

In Table 1, columns C and D we report the results of the 3SLS estimation aiming at uncovering 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 coherent with the one obtained from the IV regression. The effect of *IRR* on credit is again quite significant both economically and statistically: a shift of 1 per cent of the employees from regular activities to irregular ones corresponds to a decline of 2.2 percentage points in bank credit to GDP ratio. In the equation for irregular employment (column D) the identification variable *DROPOUT* enters with the expected sign and is strongly statistically different from zero. The feedback effect from credit to the size of the irregular sector is not statistically significant. The outcomes of 3SLS estimation of the model restricted to the small firms (columns G and H) provide indications that are broadly in line with those from the IV regression, as for specifications referred to the overall business sector. Our results then suggest that the link between the underground economy and the size of the credit market is essentially one-way.

Table 2 reports the results of the regressions for the outstanding loans to all of the non-financial firms granted by both banks and other financial institutions. Although the analysis is very preliminary, the magnitude of the negative impact of the irregular economy on the size of total lending is the same as that for bank lending. Loans from non-bank financial intermediaries do not substitute loans from bank in the local economy where the size of the irregular workforce is large. One explanation is that the kind of financial intermediaries for which we dispose of data are by and large specialized in lending activities such as leasing and factoring, which as in the case of banks require the borrowers to keep records hardly available to irregular firms. Preliminary investigations, not reported here, seem to suggest that the loans by non-bank financial intermediaries that are not related to factoring or leasing activities tend to be positively correlated with the ratio of irregular workers.

Last, Table 3 contains the results of the tentative estimates of credit to GDP ratio for the household sector from a simple two-way fixed effects model. Considering only bank loans, the dependent variable in our sample ranges from 11 per cent to 17 per cent and the average

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<sup>7</sup> 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.

is 14 per cent (Table A1). Consumer credit and other loans granted by non-bank financial institutions add some 3 percentage points to these figures. The size of the irregular sector has a negative impact also on the total amount of borrowing of households, but we have some clue that the effect is higher for bank loans. A shift of one percentage point of workforce from regular to irregular employment reduces by 0.39 percentage points the bank credit to GDP ratio for households. Including the loans by other financial institutions the fall of the ratio is of 0.28 percentage 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.

## **5. Entry decisions by banks in local credit markets and underground labour**

In this section we investigate whether bank entry into local credit markets, here defined in terms of provinces, depends on the extent of the underground economy. We address the problem of endogeneity by using a regularisation program for immigrant workers launched in 2002 as an instrument for the irregular labour.

There are two forces that can induce a negative correlation between the size of the irregular employment and the number of branches within a local market. The first one works on the demand side: a high rate of irregular labour implies a low demand of loans and other financial services both from the irregular employers and employees. The second one is that irregular activities add to the informational opaqueness of local credit markets and by this way they raise the costs of entry for outside banks (Gobbi and Lotti, 2004).

A negative impact of the irregular economy on the size of bank branch networks can have negative welfare effects also 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 technologies have enlarged the transaction facilities available to the 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 reduce the attritions due to asymmetric information in lending to opaque borrowers such as small business firms. Degryse and Ongena (2005) shows 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 made. Bofondi and Gobbi (2006) find that banks lending from outside the local markets in which firms are based experience default rates twice as large as the insider lenders. Borrowers are not the only recipients of the benefits from bank branch density. Bofondi and Paiella (2004) using Italian micro data show that the probability of a household holding a bank account is positively correlated with the number of branches. Finally 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.

### **5.1 The regularisation program 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-Nineties (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 the Realignment Contracts (implemented in 1996), the establishment of the Committee for the emergence of the underground economy (1998) and the Regularisation Campaign (2001-2003).<sup>8</sup>

There is some evidence that firms could have instead preferred indirect, more "hidden", methods of regularisation. Among them, in particular, the subsidies introduced in 1998 (in the form of a tax credit) provided to firms that either hired a new worker with permanent contracts or transformed a fixed-term contract into an open-end one.<sup>9</sup> Many firms claiming the tax credit in fact experienced a sharp, sudden, and quite suspicious, increase of the number of workers.

A policy intervention that has been effective in bringing underground workers out of the shadows is the regularisation program for unauthorised migrants launched in 2002 (No. 189, 30<sup>th</sup> July 2002, so called Bossi-Fini Law). The program ran from September 2002 to

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<sup>8</sup> 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.

<sup>9</sup> See Cipollone and Guelfi (2003) for a description and an evaluation of this policy measure. The tax credit was introduced first by the Finance Law for the year 1998, then prolonged first until the end of 2003, and later until the end of 2006. The bonus was first targeted to small firms in the South of Italy, and since the second regime extended to all firms and to all regions, though remaining much more generous for Southern regions.

November 2002) and involved about 700,000 workers; about half of them were domestic workers, the others were distributed among the agriculture, the construction, the tourism and the manufacturing (mainly metallurgy, textiles and footwear industries) sectors. To apply a migrant had to provide a proof of employment.

The effect on the size of the irregular labour 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 percentage point with respect to the previous year (from 15.1 to 14.2 per cent); it declined further to 13.4 in 2003, reaching the lowest level in the last ten years.

## 5.2 Data and empirical strategy

The outcome variable describing the entry decision by banks is given by the number of new branches (both *de novo* banks and branching by existing banks<sup>10</sup>; *ENTRY*) opened at the level of the 103 Italian provinces for each year over the period 1996-2003.

We want to test here whether the size of the underground economy has an effect on the branching decision and if this effect is, as we have discussed so far, negative. Also in this case the problem of endogeneity must be addressed and again we resort to an instrumental variable strategy. This time we take advantage of the implementation of the regularisation program 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” and a “control” group, observed pre and post treatment.<sup>11</sup>

The regularization program involved all the Italian provinces; however, its impact has been very heterogenous across them<sup>12</sup>, giving thus the chance to define “high program” and “low program” areas. 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 program was in each

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<sup>10</sup> We excluded banks that enter by acquiring an existing bank as the acquired bank was already in the market though under a different ownership.

<sup>11</sup> The tax credit policy would be a more questionable instrument, as the regions benefiting from it were those where the underground economy is more diffuse, representing *de facto* an endogenous intervention. Moreover, its period of application was very long, and hence its effects presumably too diluted to be appreciated in the data.

province. Specifically we regressed the number of regularised workers on the number of persons employed and on the province surface (see Appendix B).

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

Descriptive statistics of the treatment and control groups are in table 4. A preliminary look at the data seems not to corroborate our prediction. On one side, 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 (*post treatment period*) was equal to 9.5, which compares to an average of 11.6 in the three preceding years (*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 take into account the cyclical position of the Italian economy in the period under exam (see chart 5). Post-treatment period was characterised by stagnation (0.3 per cent growth on average), that contrasts with sustained 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 charter new branches, it is likely that the actual post-treatment period started later (i.e. in 2003).

We then need a more formal analysis that keeps into account conditioning variables. Moreover, we will also consider only year 2003 as post-treatment period. We perform both reduced and structural form estimates of the relation between bank branching and the regularisation program. 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:

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

where  $I_{it} = post_t * treat_i$ ;  $post$  is a dummy equal to one from year 2002 onwards (or in year 2003 only in our alternative exercise) and  $treat$  is a dummy equal to one for treated ("high program") provinces. Since the number of entries is a non-negative count data, we resort to

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<sup>12</sup> See in chart B1 in the Appendix B the distribution across provinces of the ratio between the number of regularised workers and the stock of employment.

the traditional Poisson regression model; to deal with overdispersion<sup>13</sup> 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 instead set to depend on the irregularity rate (*IRRP*), on a bunch of covariates and on market and year fixed effects:

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

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

$$IRRP_{it} = \alpha + \beta I_{it} + \sum_j \psi_j CONTROLS_{jit} + \mathbf{x}_i + \mathbf{z}_t + \zeta_{it} .$$

As further determinants of the 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 ( $\Delta POP$ ); the market per capita income (*GDPPC*) and its growth ( $\Delta GDPPC$ ); 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 active and passive operations (*SPREAD*); an indicator of market concentration, measured by the Herfindahl index computed using the share of branches (*HERF*).<sup>14</sup> Table B1 presents definitions and descriptive statistics of the variables used in this section.

### 5.3 Empirical results

Table 5 summarises the results of the different estimates performed. If both 2002 and 2003 are kept as post-treatment period and if we take the period 1999-2001 as the pre-treatment period we obtain that, as expected, in the structural form the irregularity rate affects negatively the number of new branches (-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 reflect in almost 3

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<sup>13</sup> As it often happens with count data, also 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.

<sup>14</sup> As the index is calculated on the basis of branches, it is introduced with a lag of one year to avoid endogeneity problems.

additional new branches per province.<sup>15</sup> 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 post-treatment period in the placebo exercise, with 1996-1998 as pre-treatment period (in the bottom part of the table). No effect emerges from this falsification exercise. As anticipated we have also restricted the post-treatment period to year 2003. Basically we get the same results, except for the fact that the deterrent effect of the irregularity rate on bank branching is now a bit stronger (-0.364; column (E)), though not statistically distinguishable from the coefficient retrieved 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, 2005).

## 6. 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 regions over the period 1995-2003 we have attempted at a quantitative assessment of the constraints that the shadow economy imposes on the amount of funds borrowed. Our results suggest that these constraints are economically and statistically significant both for firms and households. The heterogeneity in the size of the irregular employment across the Italian regions can explain a large proportion of the variance in the credit to GDP ratio. On the contrary we haven't found sizeable feedback effect from credit to the shadow economy.

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

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<sup>15</sup> 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).

Further research is required on several dimensions. Though we have been able to identify a significant effect on the supply side of the credit market, the disentanglement of supply and demand effects still deserves in our view a deeper analysis. Information on market interest rates, credit supply stance and credit risk should be also brought into the picture.

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

Explanatory variables	<i>Dependent variable: bank loans to non-financial firms as a ratio to GDP (CREDIT)</i>				<i>Dependent variable: bank loans to small non-financial firms as a ratio to GDP (CREDIT)</i>			
	Two-way fixed effects	IV	3SLS		Two-way fixed effects	IV	3SLS	
	(A)	(B)	Credit equation (C)	Irregular equation (D)	(E)	(F)	Credit equation (G)	Irregular equation (H)
IRR	-0.922*** (0.225)	-2.106*** (0.861)	-2.245*** (0.787)	--	-0.081 (0.059)	0.022 (0.198)	0.034 (0.183)	--
CREDIT	--	--	--	-0.000 (0.067)	--	--	--	0.130 (0.226)
LNGDPPC	0.114 (0.265)	0.381 (0.284)	0.385 (0.252)	0.220*** (0.062)	-0.099** (0.052)	-0.122* (0.065)	-0.118** (0.058)	0.242*** (0.070)
HERF	-0.576*** (0.176)	-0.589*** (0.163)	-0.504*** (0.137)	--	-0.193*** (0.031)	-0.192*** (0.038)	-0.199*** (0.033)	--
BRANCHPC	0.501*** (0.137)	0.478*** (0.126)	0.500*** (0.111)	--	0.116*** (0.034)	0.118*** (0.029)	0.118*** (0.026)	--
SHAREAGR	1.243* (0.625)	0.341 (1.023)	0.140 (0.924)	-0.725*** (0.268)	-0.264 (0.173)	-0.185 (0.235)	-0.172 (0.215)	-0.702*** (0.233)
SHARECON	0.404 (0.714)	-0.292 (0.687)	-0.374 (0.624)	-0.536*** (0.147)	0.821*** (0.161)	0.882*** (0.158)	0.886*** (0.145)	-0.645*** (0.235)
SHARESER	1.436*** (0.416)	1.331*** (0.385)	1.233*** (0.344)	-0.048 (0.148)	0.278*** (0.081)	0.288*** (0.088)	0.295*** (0.080)	-0.085 (0.125)
SIZE	0.002 (0.007)	-0.002 (0.009)	-0.002 (0.009)	-0.005* (0.003)	-0.001 (0.002)	-0.000 (0.002)	-0.000 (0.002)	-0.005* (0.003)
ENFORCE	-0.009 (0.031)	0.005 (0.026)	0.008 (0.024)	0.008 (0.007)	-0.000 (0.004)	-0.001 (0.006)	-0.002 (0.005)	0.009 (0.007)
DROPOUT	--	0.002*** (12.6) §	--	0.002*** (0.001)	--	0.002*** (12.6) §	--	0.002*** (0.001)
CONSTANT	-0.935 (0.810)	-1.440* (0.782)	-0.087* (0.048)	-0.044*** (0.011)	0.147 (0.148)	0.193 (0.180)	0.015 (0.011)	-0.048*** (0.012)
R <sup>2</sup>	0.72	0.66	0.64	0.42	0.64	0.63	0.62	0.40
Overall significance: p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sample: annual data 1995-2003, 20 regions. Explanatory variables: IRR (irregular employment as a ratio to total employment, in the private sector); LNGDPPC (log of per capita GDP, in the private sector); HERF (Herfindahl concentration index computed on branches); BRANCHPC (number of branches, per capita); SHAREAGR (share of the agricultural sector, in terms of value added; with lag 1); SHARECON (share of the construction sector, in terms of value added; with lag 1); SHARESER (share of the services sector, in terms of value added; with lag 1); SIZE (mean firm size; with lag 1); ENFORCE (average number of days needed to complete bankruptcy proceedings; in logs, with lag 1); DROPOUT (rate of drop-out in the secondary school, with lag 1). 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.**

Explanatory variables	<i>Dependent variable: bank and OFI loans to non-financial firms as a ratio to GDP (CREDIT)</i>			
	Two-way fixed effects (A)	IV (B)	3SLS	
			Credit equation (C)	Irregular equation (D)
IRR	-0.968*** (0.243)	-2.189** (1.011)	-2.427*** (0.907)	--
CREDIT	--	--	--	-0.002 (0.115)
LNGDPPC	0.249 (0.306)	0.537 (0.342)	0.608** (0.292)	0.226*** (0.066)
HERF	-0.514*** (0.191)	-0.611*** (0.229)	-0.282* (0.161)	--
BRANCHPC	0.547*** (0.140)	0.550*** (0.156)	0.361*** (0.129)	--
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)
CONSTANT	-1.076 (0.891)	-1.658* (0.936)	-0.107* (0.057)	-0.045*** (0.012)
R <sup>2</sup>	0.77	0.72	0.66	0.38
Overall significance: p-value	0.00	0.00	0.00	0.00

Sample: annual data 1997-2003, 20 regions. Explanatory variables: IRR (irregular employment as a ratio to total employment, in the private sector); LNGDPPC (log of per capita GDP in the private sector); HERF (Herfindahl concentration index computed on branches); BRANCHPC (number of branches, per capita); SHAREAGR (share of the agricultural sector, in terms of value added; with lag 1); SHARECON (share of the construction sector, in terms of value added; with lag 1); SHARESER (share of the services sector, in terms of value added; with lag 1); SIZE (mean firm size; with lag 1); ENFORCE (average number of days needed to complete bankruptcy proceedings; in logs, with lag 1); DROPOUT (rate of drop-out in the secondary school, with lag 1). 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.**

Explanatory variables	<i>Dependent variable</i>	
	Bank loans as a ratio to GDP (A)	Bank and OFI loans as a ratio to GDP (B)
IRR	-0.385*** (0.061)	-0.276*** (0.055)
LNGDPPC	0.073* (0.051)	-0.009 (0.051)
HERF	-0.067* (0.037)	-0.063 (0.062)
BRANCHPC	0.201*** (0.023)	0.155*** (0.029)
CONSTANT	-0.103 (0.157)	0.132 (0.147)
R <sup>2</sup>	0.95	0.96
Overall significance: p-value	0.00	0.00

Sample: annual data 1995-2003 for the first regression, 1997-2003 for the second, 20 regions. Explanatory variables: IRR (irregular employment as a ratio to total employment, in the private sector); LNGDPPC (log of per capita GDP in the private sector); HERF (Herfindahl concentration index computed on branches); BRANCHPC (number of branches, per capita). 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.**

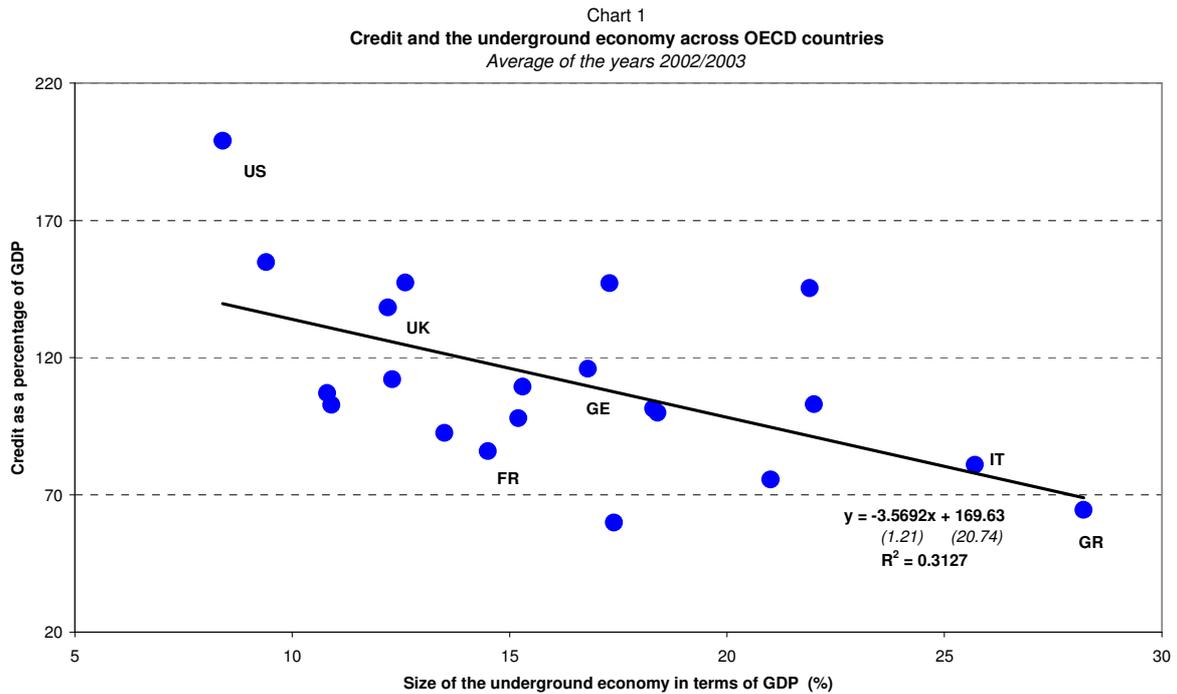
	Low program provinces (control group)	High program provinces (treatment group)
<b>PRE - TREATMENT</b>		
ENTRY	9.9	13.1
IRRP	17.3	14.6
POP	6.03	6.01
$\Delta POP$	-0.005	-0.002
GDPPC	14.6	16.6
$\Delta GDPPC$	2.6	2.3
BRANCHES	5.2	5.3
SPREAD	5.4	5.0
HERF	0.15	0.13
<b>POST - TREATMENT</b>		
ENTRY	7.8	11.0
IRRP	17.0	13.1
POP	6.02	6.02
$\Delta POP$	0.004	0.01
GDPPC	15.1	17.0
$\Delta GDPPC$	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. The effect of the irregular labour on the banks' entry decisions. Instrumental variable estimates.**

Explanatory variables	<i>POST-TREATMENT: 2002-2003</i>						<i>POST-TREATMENT: 2003</i>					
	<b>Reduced form</b> (A)		<b>Structural form</b>				<b>Reduced form</b> (D)		<b>Structural form</b>			
			Entry equation (B)		Irregular equation (1 <sup>st</sup> stage) (C)				Entry equation (E)		Irregular equation (1 <sup>st</sup> stage) (F)	
IRRP	--	--	<b>-0.264*** (0.086)</b>		--	--	--	<b>-0.364*** (0.101)</b>		--	--	
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)
$\Delta$ POP	-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)
$\Delta$ GDPPC	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	<b>0.221*** (0.072)</b>	--	--	--	<b>-0.837*** (0.158)</b>	--	<b>0.312*** (0.087)</b>	--	--	--	<b>-0.857*** (0.210)</b>	--
<b>PLACEBO EXERCISE §</b>												
IRRP	--	--	<b>-0.608 (0.086)</b>		--	--	--	--	<b>-0.236 (0.252)</b>		--	--
TREATED PROVINCE	<b>0.058 (0.084)</b>	--	--	--	<b>-0.095 (0.117)</b>	--	<b>0.065 (0.070)</b>	--	--	--	<b>-0.277** (0.126)</b>	--
Market and year fixed effects + constant	yes	yes	yes	yes	yes	yes	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: *IRRP*; 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.



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, 2005 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 note 2.

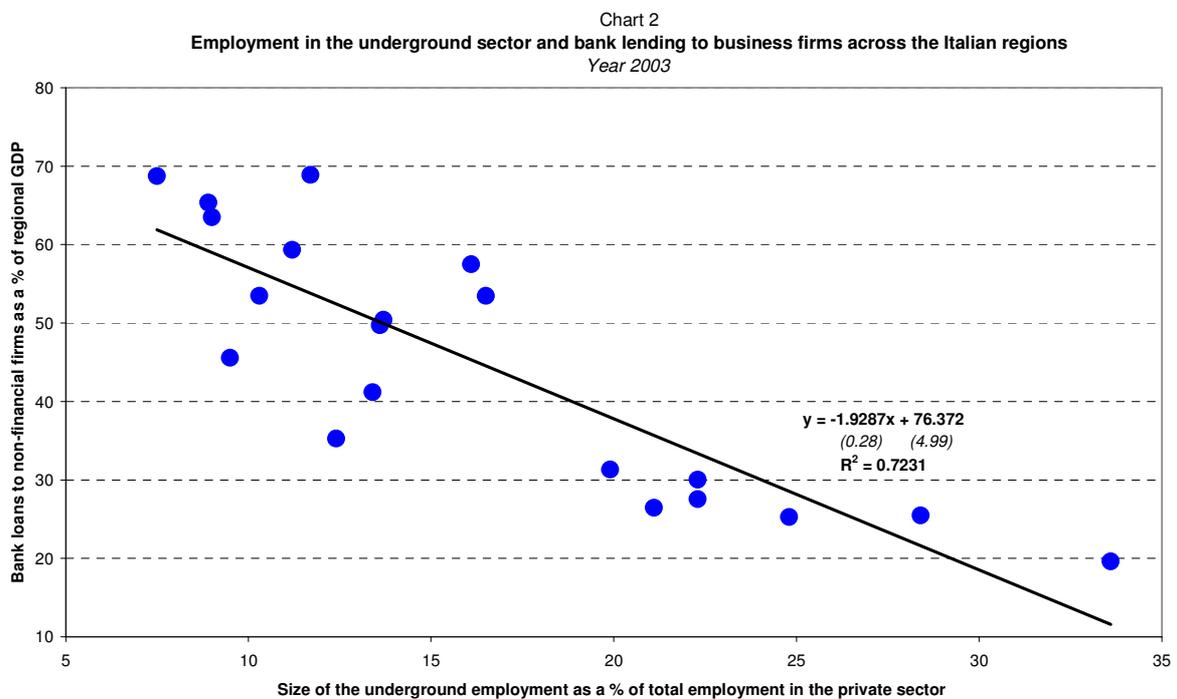


Chart 3  
**Employment in the underground sector and bank lending to households across the Italian regions**  
 Year 2003

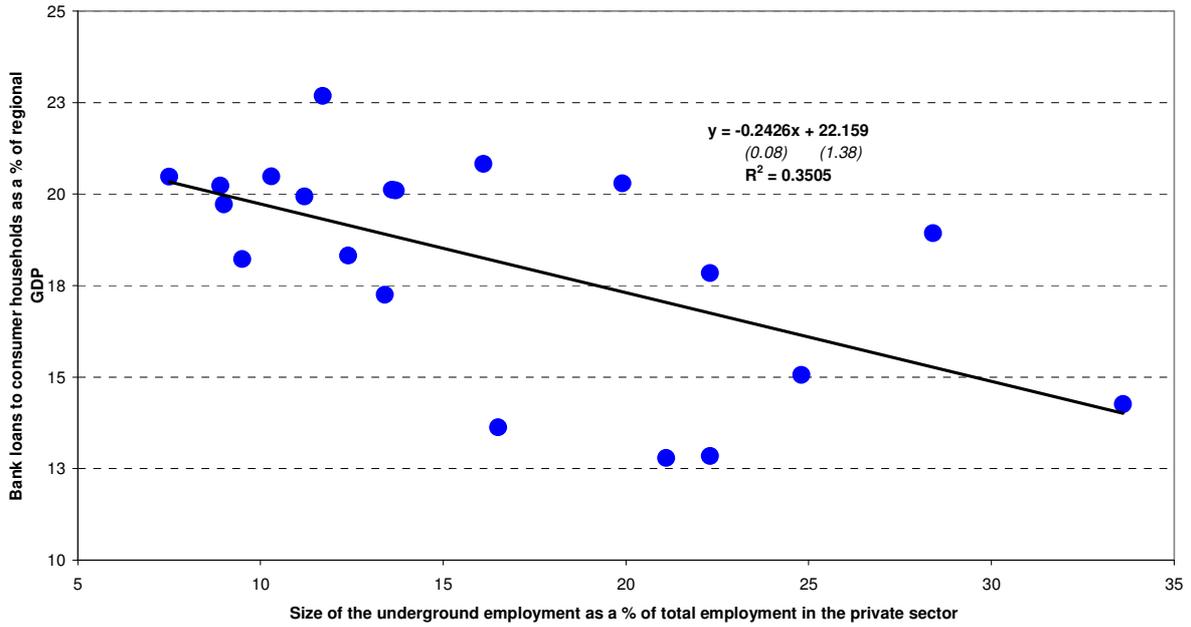


Chart 4  
**Employment in the underground sector and school dropout across Italian regions**  
 Year 2003

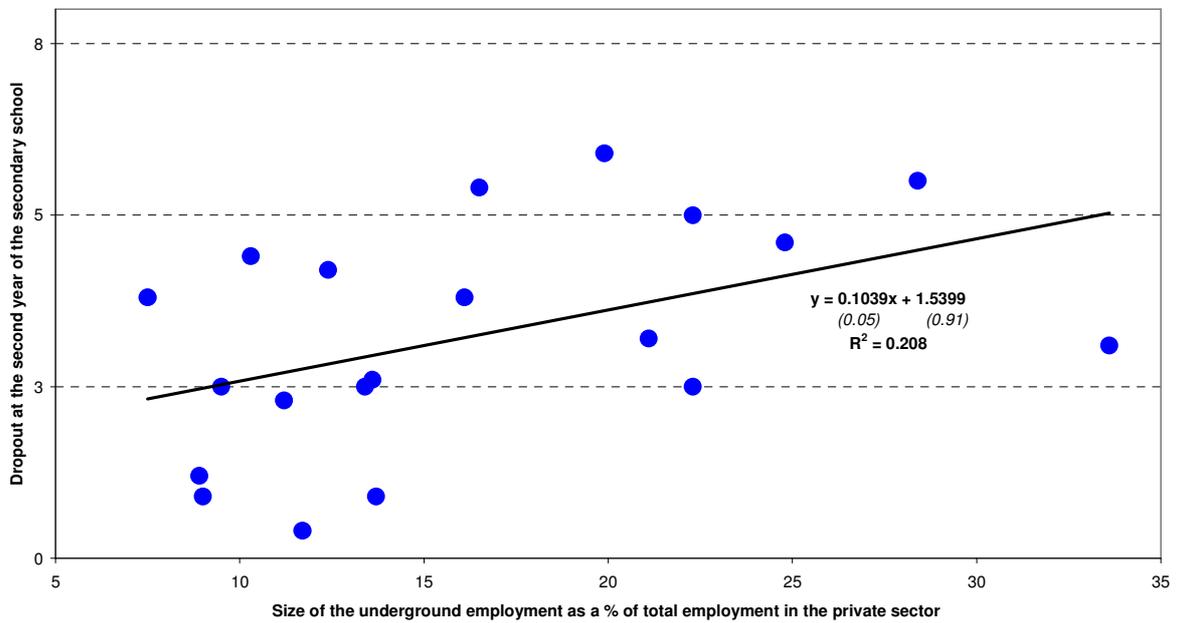
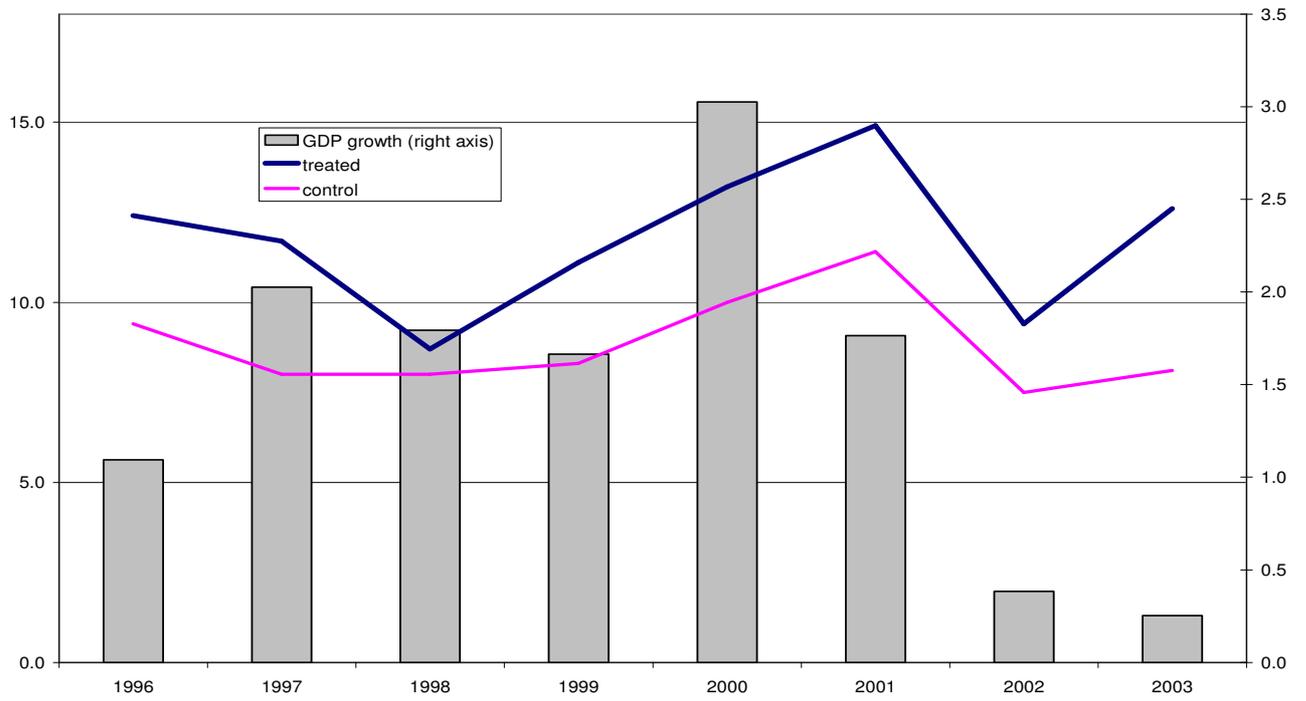


Chart 5  
Average number of new branches by treatment and control groups and GDP growth



## Appendix A: Variable definitions and sources; descriptive statistics

### Regional data

CREDIT: bank loans to non-financial firms, to small non-financial firms, 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; source: ISTAT.

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 loans to small non-financial firms as a ratio to GDP	0.11	0.04	0.09	0.14	0.05	0.25
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.

IRRP: 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.

$\Delta$ POP: growth rate of POP.

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

$\Delta$ GDPPC: growth rate of GDPPC.

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

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.

REGWORK: log of number of regularised immigrant workers; source: Ministry of the Interior.

SURFACE: log of the province surface area, in square metres; source: Istat.

EMPLOYMENT: log of employment; source: Istat.

**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
IRRP	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
$\Delta$ POP	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
$\Delta$ GDPPC	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.

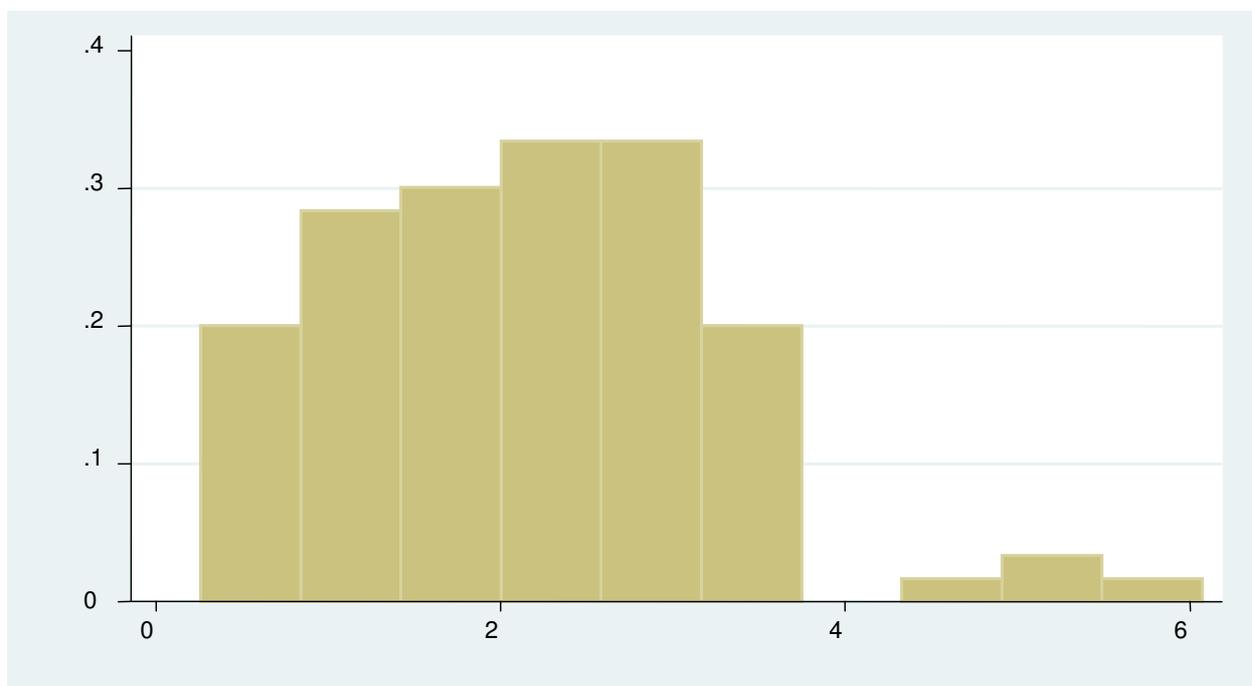
## Appendix B

**Table B1. Regression for selecting high and low program provinces**

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

Notes: OLS regression for year 2002 (103 observations). All variables in logarithms. Robust standard errors are reported in parentheses. The symbol \*\*\* indicates a significance level of 1 per cent.

**Chart B1**  
Distribution across provinces of the number of regularised workers as a percentage of total employment  
*Year 2002*



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