The SHIW as a tool to measure unobserved economic activities

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November 2015

PRELIMINARY, DO NOT QUOTE

JEL classification: H26, O17.
Keywords: irregular employment, underground economy, tax evasion, SHIW.

1. Introduction

Scholars know very well the Bank of Italy's Survey of *Household* Income and Wealth as a powerful tool to investigate issues such as income distribution, inequality, consumption, labour market, etc. (see Bank of Italy, 2015).

It is much less known its role as Survey of *Hidden* Income and Wealth. Literature exploiting this information is quite scant. Research has in fact mostly exploited other sources such as currency data (Bovi, 1999; Schneider and Enste, 2000; Zizza, 2002; Ardizzi *et al.*, 2014), consumption of electricity (Kaufmann and Kaliberda, 1996; Lackò, 1996) and audit data (Bordignon and Zanardi, 1997; Di Porto, 2009).

While estimates of underground labour and tax evasion based on either macroeconomic models or survey questionnaires are not suitable for national account compilation, and are usually hardly comparable with them, they represent an improvement respectively in terms of timeliness and heterogeneity, providing useful insights to policy makers. Sources of data on income alternative to

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household surveys, such as social security or tax records, obviously do not serve for the scope of measuring these phenomena, as by definition they only cover regular jobs and declared income.

Conversely, self-reported real and financial wealth from household surveys is usually found to be affected by underreporting with respect to administrative records; increasing complexity of households financial portfolios and the presence of dwellings not used as principal residence make the respondents' task more difficult, especially among the older segment of the population. Papers dealing with this issue in the SHIW are Cannari and D'Alessio (1990), D'Aurizio et al. (2006), Neri and Zizza (2010).

The quality of the survey is crucial in evaluating the quality of the estimates. It is indeed well known that there are many risks associated with the use of sample surveys, some of which exceed those of a sampling nature, such as under reporting, non-random non-response, under-representation of some segments of the population, reticence, and so on (Neri and Zizza, 2010). The SHIW has been designed, and is systematically conducted, with the aim of mitigating the impact of such factors.

This paper deals with hidden economic activities, with a separate consideration of underground labour and under-declaration of income for the purposes of evading tax and social contributions. The extent of undeclared real and financial wealth is instead analysed in Pellegrini and Tosti (2011), which exploits international investment positions and balance of payment statistics, and in Pellegrini, Sanelli and Tosti (2015).

We compare the way in which the SHIW can be exploited to assess the extent of hidden economic activities with other available methodologies, and in particular with those adopted by Istat in the Italian System of National Accounts. Preliminarily, Section 2 briefly reviews the characteristics of the SHIW. Section 3 then deals with irregular employment; we update the exercise in Cappariello and Zizza (2010) to obtain estimates up to 2014, allowing an assessment of the consequences of the double recession on the extent of underground labour. Section 4 copes with tax evasion, relying heavily on Marino and Zizza (2012) and Ufficio Parlamentare di Bilancio (2015). Section 5 surveys the body of literature analysing the opinions on tax evasion (tax morale). Section 6 finally concludes.

2. **Quality issues in the SHIW**

The SHIW is carried out every two years and the sample is composed of about 8,000 households, representative of the whole Italian population (Bank of Italy, 2015). The data collection process has been accurately designed to in order to avoid the potential sources of bias typical of sample surveys. In particular, for about 80 per cent of the interviews, the Computer-Assisted Personal Interviewing program (CAPI) was used. Thanks to the use of an electronic questionnaire, a number of checks is performed in real time, making it possible to correct any inconsistency in the data during the interview and hence greatly reducing the need for post-survey consistency checks for data quality. The remaining interviews rely on paper-based questionnaires (PAPI, Paper-And-pencil Personal Interviewing), later transferred by the survey company to a computer using the CAPI program.

As it is customary in household surveys, to reach an adequate level of participation – which is not compulsory in for this survey - and to receive reasonably truthful income reports, respondents to SHIW

are granted anonymity. Interviews are long (almost one hour), and a specialised company, providing around 180 professional interviewers, is in charge of data collection. 90 per cent of the interviewers have at least an upper secondary school diploma, the majority have at least ten years' experience in the field and have taken part in at least two editions of the SHIW. They receive training from officials of the Bank of Italy and representatives of the company. Despite the fact that participation is voluntary and respondents are informed at the outset about the content of the survey, they may be reluctant to reply to "sensitive" questions. Interviewers are asked at the end of the interview to assess how reliable the responses provided are, especially with reference to income and wealth; this could help to quantify the impact of this distortion.

3. Irregular employment

Istat has recently developed a complete and in-depth revision of all the methodologies used to measure the non-observed economy - a statistical concept used to define the components commonly described as the hidden economy - with the aim to support national account benchmark estimates. This methodological overhaul was supported by a committee of experts - including academics and institutional representatives - who were responsible for verifying and discussing the new measurement techniques (Istat, 2014).

In order to estimate employment figures Istat has developed a new model. It is based on the complete integration at the micro level of all the available administrative sources, containing information on paid work (and the relative income) and their exact match with the information collected from individuals through the ongoing Labour force survey (LFS) with reference to years 2010 and 2011. This method allows to differentiate between the various types of employment, firstly by identifying the line between regular and irregular employment, on the basis of the range of information from administrative sources (ADMIN). In particular, not registered (undeclared) employment is identified in the segments where the presence of a working activity (measured at the individual level) does not correspond to any form of social contribution or taxation payment. On the other hand, the association of the information on regular workers and the enterprises that employ them allows us to draw up a particularly precise picture of the labour input.

The statistical integration of survey data with administrative records is a promising data source for a deeper understanding of the multifaceted determinants behind irregular employment. Heterogeneity can derive from the interaction of individual characteristics with the working of local economies. Heterogeneity may also derive from fading borders between regular and irregular jobs. Micro-data are thus a powerful tool to study these features of irregularity and to enrich the analysis addressing policy issues.

By exploiting these micro-data, De Gregorio and Giordano (2014) use logistic regression to model the probability of being irregular worker as a function of individual characteristics and variables accounting for the local market context. The measurement of the effects of characteristics confirms the relevance of factors connected with weaker individual position in the labour market. Their results turn out to be consistent with those emerging in this paper obtained by using the microeconomic data from SHIW. However, because of the limited time span of the data (2010-2011), in De Gregorio and

Giordano (2014) the potential role of the economic crisis in shaping the trends in underground labour cannot be taken into account.

3.1 Identification of the underground workers from SHIW

The data from SHIW have constituted a pioneering source for a deeper understanding of the complexity of the underground employment phenomenon.[1] By exploiting the information on self-reported individuals' social security status available in the survey, it is possible to identify the underground workers and derive measures of irregularity. By running standard wage regressions for the legal and the shadow sector, the latter including those individuals stating that they are working but they have never been paid social security contributions, Boeri and Garibaldi (2007) estimate a widening shadow wage gap in the period 1995-2002. Brandolini and D'Alessio (2002) and Cappariello and Zizza (2010) also identify as underground workers those who have never been paid social security contributions (or who have never paid, if self-employed), as well a broader measure based on pension coverage. Both papers then provide a thorough statistical description of the pool of irregular workers; the latter also assesses the role of education achievement in shaping the opportunity/necessity to be informal, showing that a low level of education sizeably and significantly increases the probability of working underground. Di Porto and Elia (2014) broadly adopted the same strategy used in Cappariello and Zizza (2010) to identify the underground workers, with the aim of investigating empirically how underground labour affects the wages of undeclared and declared workers and in particular the declared wage inequality. Their results, based on instrumental variable regressions, indicate that undeclared work adversely affects undeclared wages, increases declared wages and reduces wage inequality in the declared sector. Finally, Capasso and Jappelli (2013) constructs an index of irregular activity at the individual level by dividing the number of years not covered by social security contributions by the length of the working life, as well as proxies the extent of the underground activity by calculating the fraction of income received in cash.[2] Then these indices are studied in relation to the degree of local financial development.

In this Section we update to 2014 the measures of irregularity presented in Cappariello and Zizza (2010), giving the opportunity to analyse the phenomenon of irregular labour before and in the course of the global financial and economic crisis of 2008. To our knowledge, no existing empirical research deals with the potential impact of the crisis on the determinants behind irregular employment at an individual level.

Cappariello and Zizza (2010) propose two different definitions of "irregular workers". According to a first one, "underground workers" are those who reported to have never paid (or their employers have never paid) social security contributions throughout their entire career. Individuals who are currently irregular but have cumulated pension contributions in the past, or those whose main occupation is regular but hold an irregular second job are not labelled as underground workers. This measure is

[1] In the past, estimates of irregular labour inputs have been obtained in Italy using indirect tools. Among others, Calzaroni (2000) founded his analysis on a comparison between Census data and Labour Force Survey data.

[2] According to the authors, this fraction was equal to 31 per cen on average in the period 1995-2004; for 2006, the last year in which this information was collected, we obtain a fraction equal to 27 per cent (49 in the South).

conceivably on the conservative side, and not strictly comparable to that in the national accounts which includes workers who are *currently* underground, and we refer to it as a *narrow estimate* of irregular labour.

A further information drawn from the questionnaire dealing with the number of years (or months) the individuals (or their employers) have been paying social security contributions up to the time of interview is exploited to retrieve a precise indication of social contribution evasion. More specifically, this information is compared with a proxy of the number of years actually worked in order to obtain a second measure of "irregular workers" that includes those who spent a significant fraction of their working life underground i.e. those who paid too few contributions in comparison with their working experience.

To assess how little the payment of contributions is we look at the pension coverage, given by the ratio between contributions paid and years of experience and label as "underground workers" those for whom the pension coverage is below the first quartile of the distribution of the coverage across individuals of the same gender reporting the same number of jobs held[3]. The measure is further improved by *excluding* those for which informality has been a stepping stone towards a regular position. For this reason, an absolute criterion (whereas the previous one has a relative nature) has been applied to this estimate, namely the difference between the number of years actually worked and the years of contributions have to exceed 10 years. Adding these partially underground workers to those included in the narrow measure, we get a *broad measure of underground labour*.

It is worthy noticing that even this broad measure is not fully comparable with that provided by Istat, as it includes workers who were "chronically" underground in the past but are regular today and excludes those irregular today but possibly regular for most of their life. Still, this measure tracks reasonably well the dynamics of the three Istat measures, in turn based on different definitions of labour input (persons employed, full time equivalent units, job positions; Table 1 and figure 1).

3.2 The link between underground employment and socio-economic characteristics

The identification of irregular workers is exploited to test empirically for Italy the relationship between underground labour and a wide range of socio-demographic characteristics at the individual level. The results in this paper span on a longer time period than that covered in Cappariello and Zizza (2010). Here we pool the observations in the nine surveys conducted from 1998 to 2014. The sample is split into two different periods: the first one includes observations from the six surveys between 1998 and 2008, that is, surveys run before the onset of the financial and economic crisis; the second period

[3] More formally, underground workers are defined those satisfying the following relative criterion:

$$[1] \qquad YCONTR / POTEXPER < p25$$

where YCONTR is the number of years the individuals (or their employers) have been paying social security contributions up to the time of interview) and POTEXPER is a variable proxying the number of years actually worked. Since SHIW does not ask the number of years worked but records both the age at the time of the interview (AGE) and the age when the interviewed started working (AGESTART), the potential experience (POTEXPER) is calculated as the difference between AGE and AGESTART and corresponds exactly to EXPER only if the worker has had a very regular work history.

includes observations from the most recent surveys available (up to 2014). This split aims at evaluating if and possibly how the crisis has modified the determinants of underground labour at the individual level. Table 2 reports the incidence of irregular labour in selected groups, according to both narrow and broad measures and for the two sub-periods kept separately.

The percentage of underground workers differs considerably according to geographical location and personal characteristics. Confirming a huge body of literature, as well as the breakdown available in the official national account estimates, irregularity is much more diffuse in the South and in the Isles, irrespective of the measure considered. The proportion of workers in the informal sector is higher among women in both periods of analysis.

Descriptive statistics suggest that before the crisis the age class characterised by a higher incidence of irregular workers was the class of the youngest (14-30 years) if one looks at the narrow measure, while this is not the case for the broader measure, suggesting that informality might play a role as a stepping stone towards regular employment for those entering the labour market. According to the broad measure the core age class (41-50 years) is that characterised by a higher incidence of workers with low pension coverage. In general, the proportion of irregular workers is higher among those who have been always or ever self-employed, also in this case confirming the official trends.

The irregularity status is more frequent among individuals with a compulsory or lower level of education, and broadly decreases with the level of education: the gain when comparing those with at maximum a compulsory level of education with those having a diploma is larger than that emerging from the comparison of those having a diploma with graduates. Finally, again in line with the official statistics, underground labour is more diffuse in agriculture and in the building sector, while services (here including the public sector) and manufacturing are less affected.

3.3 Modelling the probability of working underground

The probability of working underground is estimated through pooled probit regressions, where the dependent variable takes a value of one if the individual is underground, and zero if not. Being underground is set to depend on a wide range of socio-demographic variables at the individual level provided by the SHIW.

Given that we are looking at workers who have been underground for all or most of their working life, the explanatory variables have been selected among those reflecting invariant or at least highly permanent conditions (gender and educational attainment) or accounting for the past working history (number of working experiences and kind of occupation). Only one variable reflects instead a more recent piece of information on individuals (sector of economic activity of the latest job held).

In Table 3 we report some results obtained on the entire sample (1998-2014) and on the pre-crisis (1998-2008) and post crisis (2010-2014) observations separately. In this set of regressions the probability of working underground is measured by the broad definition of underground workers presented in the paragraph 3.1. The model A considers all the socio-demographic variables listed above but the sector, which is instead included in model B.

The estimates suggest that individuals' social and economic characteristics (education, kind of job, sector) rather than demographic ones (gender and age) have a greater role in explaining the probability of working underground. In general, the magnitude and the significance of the (marginal) effects on the first set of variables are larger and consistent over the two sample periods. The building sector, which ranked second after agriculture before the crisis according to both measures, during the crisis turned out to be the most irregular sector, as well as emerging as one of the sectors hit hardest by the crisis, with a sizeable reduction in terms of employment and turnover.

Both models show that women have a higher probability of being in irregular employment, although the divide lessens with the crisis. Once we control for sector of activity, the gain for men loses significance for the post crisis years (column 6). This result, coupled with that on the building sector, where men are traditionally overrepresented, confirm a crucial role for underlying economic conditions in the narrative of the phenomenon.

Age appears to play a different role before and during the crisis. Up to 2008 the probability of being irregular reduces as we depart from the youngest (14-30 years). With the crisis the proportion of irregular workers among the different age categories changes substantially. As labour market weakens, the probability of being in an irregular position becomes higher for central age classes (31-40 and 41-50 years). This result is in line with that in De Gregorio and Giordano (2014) for years 2010 and 2011.

The effect of education attainment on the probability of working underground is, as expected, negative and strongly significant. The gain from achieving further education comes however crucially from taking a diploma, while graduates and those with a diploma have, ceteris paribus, broadly the same risk of being underground.

The condition of having been "always independent" is crucially a risky one: the coefficient on this variable is positive and significant in the two models. Employment in the informal sector – at least in our "broad" definition – is more likely among those who have had more than one working experience.

We have also checked the robustness of our results along different dimensions. We have first restricted ourselves to the narrow measure of underground, i.e., to those who have been involved in the shadow sector throughout their whole career (Table 4). We still find a sizeable effect of education on the probability of being underground. Women face a probability of being stuck in an informality trap higher than men both before and after the crisis, no matter of the model used. The positive effect of having been "always independent" remains strongly confirmed. On the contrary, the coefficient on the variable "having had more than one working experience" becomes negative; this result suggests that an individual working for more than just one employer is less likely be stuck - either deliberately or not - in an irregular job position throughout his entire career. The probability of being underground in the narrow sense is lower for every age category different from the youngest (14-30 years) both before and after the crisis, again confirming the "stepping stone" argument discussed before. Results on sectors are confirmed except for the building sector whose coefficient remains negative and significant even after 2008. Then we included sample weights in the regressions (Tables 5 and 6). As a whole we derive fairly consistent results.

4. Tax evasion[4]

In addition to redefining the method of estimating the labour input of undeclared employment, the major improvements in the new methodology developed by Istat for evaluating the unobserved economy were made to the adjustment procedures for under-declaration of activities (i.e. false statements which tend to hide part of the income produced by the production unit). In this field, in-depth checks were conducted, developing specific procedures for identifying and correcting the under-declaration of activity. The method previously adopted, based on the assumption that income of the self-employed should be coherent with average compensation of employees involved in the same activity (Franz, 1985), was in fact in its standard application not able to account for the business cycle, for the economic context in which the firm was operating and not suitable to account for production units characterised by a higher level of complexity. It was then decided to apply specific methodologies to different segments of small and medium sized production units: for some groups of firms it was chosen to keep using the comparison with a reference income to identify the under-declaring units and adjust their data accordingly, while for more "complex" production units (e.g. in terms of size) statistical and econometric methods were introduced (e.g. factorial analysis, models for the firm's mark-up). Another step forward in measuring hidden components of the economy was made in estimating the labour income of undeclared employment. A new methodology was developed allowing to estimate the difference in compensation between registered and not registered employment, by integrating information from EU-Silc and labour force surveys with the information from administrative sources at a microlevel. The new methodology thus exploits both direct and indirect methods to estimate tax evasion. In general the literature classifies as direct methods those making use of tax records or sample survey data or also audit data; indirect methods are based instead on economic models or econometric estimates of indicators that approximate the informal economy (for example, the discrepancy between income and spending, the use of employees behavior to analyze and explain that of self-employed). Each method has pros and cons. An indirect method can be in some cases easier to use because it does not require to have access to tax records and, in general, to massive micro data, but tends to be less accurate and based often on simplifying assumptions. In contrast, the direct method suffers of an additional element of uncertainty, given that results, based on national accounts data, are affected by the accuracy of the estimate of the underground economy.

In turn direct methods can follow two different approaches. The first is a macroeconomic approach in which evasion is estimated by comparing National Account aggregate data with tax administration data such as in Visco (1984), Bernardi (1996), Bernardi and Bernasconi (1997) and SOGEI (1999). The tax gap, namely the discrepancy between the theoretical tax and the tax actually paid, is seldom estimated (for further details see Bernardi and Franzoni, 2004, and Isae, 2006). This methodology can be applied to several kinds of taxes: VAT, corporation tax, tax on production activities and personal income tax.

This is the method chosen in the draft legislative decree implementing the enabling law for the reorganization of the tax system. The decree provides that a Commission of experts prepares an Annual Report on the unobserved economy and tax and social contribution evasion, indicates the information content and the method that has to be adopted. In the draft legislative decree it is explicitly opted for a

[4] Largely based on Marino and Zizza (2012) and Ufficio Parlamentare di Bilancio (2015).

direct method with a macroeconomic approach: tax evasion will be calculated as the difference between revenue due on the theoretical tax base calculated from National Accounts data and the actual base deduced from the statements.

The second approach, which is microeconomic in nature, compares data on incomes declared by taxpayers in complying with their tax obligations i) with data on incomes collected through sample surveys on households (Marenzi, 1996; Cannari *et al.*, 1997; Bernasconi and Marenzi, 1997; Fiorio and D'Amuri, 2005; Marino e Zizza, 2012) or ii) resulting from tax investigations (Bordignon and Zanardi, 1997). In the first case, the approach is based on the hypothesis that, as the survey questionnaires are multipurpose, anonymity is granted and replies are not compulsory, respondents will not feel threatened or suspicious and would hence reply truthfully. In the second case, the so-called tax auditing, the percentage of tax evaders is measured by looking at the proportion of inspections with positive results, meaning those cases in which tax declarations were found counterfeit. It is important to highlight that this method suffers from a sample selection problem, since persons who are inspected are not randomly drawn from the taxpayers' population but selected among those having the highest probability of being evaders. In order to mitigate the possible bias descending from this selection, the literature usually proposes a post-stratification of the sample in order to align the sample structure to that of the whole population (Bordignon and Zanardi, 1997; Isae, 2006). The main difference between the two cases is to consider the population of taxpayers as a whole or each taxpayer as an individual.

SHIW is a perfect tool to be used to estimate tax evasion with a microeconomic approach of the first type. Marenzi (1996), Bernasconi and Marenzi (1997), Cannari *et al.* (1997), Fiorio and D'Amuri (2005) and Marino e Zizza (2012) use the Bank of Italy Survey; if the survey disposable income is higher than that from tax data the difference is considered hidden income. Marenzi (1996) and Cannari *et al.* (1997) estimated tax evasion for different groups of tax payers, identified by their main income (employees, self-employed, pensioners, etc.). Marenzi (1996) and Bernasconi and Marenzi (1997) provide also an estimate of redistributive effects using a tax-benefit microsimulation model.

Marino and Zizza (2012) estimate the propensity to evade personal income tax by comparing per capita income with reference to 2004 with that derived from tax records provided by SOGEI (the society managing the tax information system on behalf of the Italian Tax Administration) for the same year. It differs from the previous papers for two main reasons: 1) it compares adjusted data as obtained in Neri and Zizza (2010), which allows to better replicate National Account aggregates for all income sources, overcoming the usual critique that the discrepancy between disposable incomes resulting from the Survey and from tax data may reflect measurement errors rather than account for tax evasion; 2) the estimation of tax evasion is performed for highly detailed categories of tax payers, overriding the usual dichotomy of self-employed versus dependent workers common in this stream of literature (secondary jobs and inactive positions are taken into account).

As for the results, Marino and Zizza (2012) find that in Italy in 2004, on average, 13.5 per cent of net income was hidden to the Tax Authorities (Table 7). In particular, youngsters evade more than the aged and self-employed more than dependent workers. Highest evasion rates were found for the self-employed and the entrepreneurs, for the rentiers and for self-employed with a secondary income source (either from dependent work or from pension). Even if at a first sight, women show a lower propensity to evade than men and people living in the South seem to evade less with respect to other areas of the country, these differences vanish when evasion rates are regressed against all available characteristics

(Table 8). In this case, only age and income type are found relevant in explaining differences in the compliance behavior.

5. Tax morale

According to a consolidated view, taxpayers decide whether and how much to evade taxes depending on the risk of being caught and the size of sanctions. However, as stressed by a large stream of recent research, this is not enough to explain the tax evasion evidence. Several economists emphasize the role of tax morale, i.e. the individual intrinsic motivation to comply with fiscal obligations, in explaining tax evasion. Many studies have shown that tax cheating has to be attributed to a large extent to the tax morale of taxpayers.[5]

On this basis, in the 2004 wave the SHIW featured a monographic section on personal attitudes towards tax evasion. A sub-sample of 3,796 heads of households were asked questions such as:

> *"Generally speaking, among the problems facing the Government, how serious is tax evasion (very serious, serious, the same as any other, marginal, non-existent)?"; "Do you think it would be a good thing if tax inspections were made more often?"; "Among the solutions listed, which would be the most effective to counter tax evasion?". In addition, respondents were asked to declare which of several statements was closest to their own opinion. Among them there were remarks such as: "Paying taxes is one of the basic duties of citizenship"; "Not paying taxes is one of the worst crimes a person can commit because it harms the whole community"; "It is right not to pay taxes if you think they are unfair"; "In Italy, it's always the same groups of people that pay taxes"; "Even if someone thinks a tax is unfair, he/she should pay it first and then complain if necessary"; "Some people are obliged to evade tax in order for their business to survive"; "It is right to pay taxes because it helps the weak"; "People are happy to pay taxes if the country functions properly"; "People will be more willing to pay taxes if they know everyone else does"*

According to the answers, tax evasion is held a serious or very serious problem by about three out of four respondents; the size of tax evasion is correctly perceived by the majority of respondents, who posit the loss of tax revenues as a result of tax evasion in a range between 10 and 20 per cent, in line with official estimates by Istat. Households have been also asked to declare their degree of agreement on a series of statements on the Italian tax system. A subset of these statements has been used by number of papers (Cannari and D'Alessio, 2007; Barone and Mocetti, 2011; Filippin, Fiorio and Viviano, 2013) to build an individual index of tax morale using principal component analysis. Another paper (Fiorio and Zanardi, 2008) looks at selected statements.

Cannari and D'Alessio (2007) shed light on the relationship between the taxpayer and the public administration. Combining data from Italian municipalities' balance sheets with individual data from the 2004 wave of the SHIW, they found that the attitude towards paying taxes is stronger when resources are spent more efficiently. This evidence seemed not to be driven by some confounding factors at the municipality level or by spatial sorting of citizens and proved robust to accounting for alternative measures of both inefficiency and tax morale.

[5] Schneider and Torgler (2007) show how governance or institutional quality and tax moral affect shadow economy using an international country panel and within country data.

Barone and Mocetti (2011) continue in the same direction, studying further the determinants of tax morale by investigating the role of public sector and, in particular, of its inefficiency in providing public goods, exploiting the heterogeneity of public spending inefficiency across Italian municipalities. They examine whether taxpayers living in municipalities where public spending is highly inefficient show lower tax morale, with a measure of public spending inefficiency based on a stochastic frontier model using information on expenditures and various output indicators for a panel of Italian municipalities. Individual tax morale is calculated as in Cannari and D'Alessio (2007).

Filippin *et al.* (2013) find that tax enforcement not only has a direct effect on tax compliance by affecting the expected value of tax evasion but exerts an additional indirect effect as it impacts positively on tax morale. The causal interpretation benefits from the use of an instrumental variable approach exploiting the change in the tax gap at the provincial level as an instrument for tax enforcement.

Fiorio and Zanardi (2008) investigate the determinants of citizens' perceptions of the seriousness and of the size of tax evasion, showing that age, education, income, occupation type and geographical location are all relevant variables in explaining how people judge how serious and widespread tax evasion is. The area of residence is the unique variable influencing the two perceptions with a different sign: people living in the South gauge tax evasion as a widespread phenomenon but do not consider it as a primary concern.

6. Conclusions

Microeconomic data on households from the Bank of Italy's SHIW are a perfect tool to be used for a deeper understanding of the complexity of the underground employment and tax evasion phenomena.

In the first part, the paper focuses on the issue of irregular labour. We have used data from the SHIW, which allows identifying irregular workers by relying on individuals' self-reported social security positions, to identify underground workers and assess their characteristics before and in course of the global financial and economic crisis.

We have shown that individuals' social and economic characteristics (education, kind of job, sector) rather than demographic ones (gender and age) play a greater role in explaining the probability of working underground. Moreover, we show that the financial and economic crisis partially changed the potential impact of some determinants behind irregular employment. In particular, before 2008 women showed a higher probability of being in irregular employment than men; this divide lessens after 2008. Even age appears to change its impact before and during the crisis: as labour market weakens, the probability of being in an irregular position increases for core-age workers.

Our analysis confirms that low education levels sizeably and significantly increase the probability of working permanently underground. This result holds, on an empirical standpoint, for the entire period analysed and suggest active policies in terms of training (throughout the whole working life) as a policy prescription to combat the phenomenon.

In the last part, the paper contains a brief description of the methods for estimating tax evasion and surveys how SHIW has been used for this purpose. The main results of several papers based on SHIW

data are briefly reviewed. In particular, there is a focus on the Marino and Zizza (2012) estimates of the propensity to evade the personal income tax in 2004. The paper also highlight how SHIW has been used to study the determinants of tax morale and how this relates to tax evasion.

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Tables

Table 1. Percentage incidence of irregularity: estimates from SHIW and Istat

	SHIW		Istat		
year	Narrow	Broad	Rate of irregular workers	Rate of irregular full time equivalent units	Rate of irregular jobs
1998	8.6	21.0	14.2	16.5	17.4
2000	7.7	19.8	13.9	16.4	17.3
2002	6.4	17.0	13.3	15.5	16.9
2004	6.9	18.2	12.4	14.4	16.1
2006	8.0	19.1	12.5	14.7	16.0
2008	7.4	20.6	12.2	14.5	15.3
2010	5.7	19.4	12.3	14.5	14.9
2012	5.1	20.2	12.6	14.9	14.8
2014 (*)	5.6	19.0	12.8	15.0	15.1
Average	**6.8**	**19.4**	**12.9**	**15.1**	**16.0**

Notes: our calculations on 1998-2014 SHIW. Averages are computed using sample weights and using the entire sample of individuals between 14 and 67 years old. (*) Year 2013 for Istat.

Table 2. Percentage incidence of irregularity in selected groups. Narrow and broad measures

Groups	Narrow 1998-2008	Narrow 2010-2014	Broad 1998-2008	Broad 2010-2014
Men	6.5	4.6	16.9	18.4
Women	8.7	6.6	22.4	20.9
14-30 years old	16.6	12.1	17.5	12.9
31-40 years old	7.8	7.2	17.6	19.5
41-50 years old	5.3	4.7	20.9	23.3
51-67 years old	4.2	2.9	20.2	18.7
North	3.9	2.4	13.9	13.7
Centre	7.8	4.7	18.7	17.9
South and Isles	13.8	11.4	29.6	30.7
Compulsory school or below	8.4	7.7	25.9	28.7
High school	6.3	4.2	13.1	14.6
College degree or beyond	7.4	3.4	11.7	9.8
Always dependent worker	7.0	5.4	18.3	19.3
Always independent worker	14.2	9.0	24.6	18.6
Either independent or dependent	4.5	3.0	20.2	21.9
Only one job in working history	9.7	6.6	19.9	17.4
More than one job in working history	4.9	4.4	18.5	21.7
Agriculture	7.2	7.6	22.0	24.6
Manufacturing	3.6	1.9	11.2	12.5
Construction	10.6	7.7	29.8	33.4
Services	6.2	4.6	13.7	14.4
Total	7.5	5.5	19.3	19.5

Notes: our estimations on 1998-2014 SHIW.

Table 3. Probability of working underground (broad measure)

Explanatory variables	Model A			Model B		
	Entire sample (1)	<=2008 (2)	>2008 (3)	Entire sample (4)	<=2008 (5)	>2008 (6)
Male	-0.0844***	-0.0909***	-0.0691***	-0.0181***	-0.0225***	-0.00661
	(0.00269)	(0.00325)	(0.00480)	(0.00262)	(0.00316)	(0.00469)
Age 31-40	-0.000783	-0.0166***	0.0549***	-0.0142***	-0.0288***	0.0353***
	(0.00444)	(0.00491)	(0.0103)	(0.00386)	(0.00424)	(0.00902)
Age 41-50	0.0152***	-0.00285	0.0712***	-0.00643*	-0.0232***	0.0437***
	(0.00437)	(0.00491)	(0.00955)	(0.00380)	(0.00423)	(0.00836)
Age 51-67	-0.0206***	-0.0248***	0.0044	-0.0501***	-0.0511***	-0.0341***
	(0.00400)	(0.00457)	(0.00827)	(0.00349)	(0.00398)	(0.00725)
More than 1 working experience	0.0231***	0.0127***	0.0434***	0.0420***	0.0324***	0.0640***
	(0.00294)	(0.00354)	(0.00526)	(0.00282)	(0.00340)	(0.00504)
High school	-0.120***	-0.117***	-0.126***	-0.0846***	-0.0792***	-0.0950***
	(0.00256)	(0.00306)	(0.00467)	(0.00251)	(0.00301)	(0.00453)
Degree or beyond	-0.134***	-0.124***	-0.151***	-0.0881***	-0.0770***	-0.106***
	(0.00251)	(0.00318)	(0.00418)	(0.00266)	(0.00343)	(0.00430)
Always independent	0.0712***	0.0802***	0.0461***	0.0728***	0.0813***	0.0526***
	(0.00471)	(0.00557)	(0.00877)	(0.00454)	(0.00539)	(0.00841)
Either depend. or indep.	0.0370***	0.0427***	0.0290***	0.0361***	0.0491***	0.0127*
	(0.00449)	(0.00549)	(0.00787)	(0.00422)	(0.00522)	(0.00714)
Manufacturing				-0.118***	-0.127***	-0.0843***
				(0.00302)	(0.00349)	(0.00667)
Building sector				-0.0237***	-0.0349***	0.0238**
				(0.00467)	(0.00511)	(0.0112)
Services				-0.131***	-0.139***	-0.0852***
				(0.00438)	(0.00488)	(0.00920)
Observations	92.878	64.296	28.582	87.196	60.270	26.926

Notes: variables are all dummies. See Table 2 for omitted categories. Marginal effects evaluated at the sample mean. 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.

Table 4. Probability of working underground (narrow measure)

Explanatory variables	Model A			Model B		
	Entire sample (1)	<=2008 (2)	>2008 (3)	Entire sample (4)	<=2008 (5)	>2008 (6)
Male	-0.0333***	-0.0342***	-0.0299***	-0.0132***	-0.0134***	-0.0116***
	(0.00143)	(0.00181)	(0.00222)	(0.00127)	(0.00160)	(0.00190)
Age 31-40	-0.0359***	-0.0414***	-0.0222***	-0.0294***	-0.0341***	-0.0179***
	(0.00117)	(0.00146)	(0.00195)	(0.000967)	(0.00123)	(0.00150)
Age 41-50	-0.0535***	-0.0607***	-0.0357***	-0.0434***	-0.0490***	-0.0291***
	(0.00120)	(0.00147)	(0.00200)	(0.00106)	(0.00131)	(0.00169)
Age 51-67	-0.0810***	-0.0826***	-0.0718***	-0.0734***	-0.0748***	-0.0645***
	(0.00166)	(0.00193)	(0.00317)	(0.00153)	(0.00179)	(0.00291)
More than 1 working experience	-0.00686***	-0.00934***	-0.00226	-0.00384***	-0.00536***	-0.000278
	(0.00147)	(0.00188)	(0.00220)	(0.00129)	(0.00166)	(0.00186)
High school	-0.0286***	-0.0282***	-0.0277***	-0.0173***	-0.0158***	-0.0187***
	(0.00132)	(0.00166)	(0.00206)	(0.00118)	(0.00151)	(0.00180)
Degree or beyond	-0.0250***	-0.0208***	-0.0280***	-0.0138***	-0.00883***	-0.0186***
	(0.00137)	(0.00195)	(0.00172)	(0.00133)	(0.00196)	(0.00154)
Always independent	0.0530***	0.0612***	0.0335***	0.0424***	0.0486***	0.0282***
	(0.00298)	(0.00373)	(0.00467)	(0.00263)	(0.00332)	(0.00406)
Either depend. or indep.	-0.00173	0.000647	-0.00528	0.000628	0.00416	-0.00520*
	(0.00240)	(0.00314)	(0.00338)	(0.00211)	(0.00281)	(0.00275)
Manufacturing				-0.0358***	-0.0412***	-0.0224***
				(0.00124)	(0.00159)	(0.00193)
Building sector				-0.0145***	-0.0163***	-0.00883***
				(0.00150)	(0.00185)	(0.00254)
Services				-0.0377***	-0.0431***	-0.0200***
				(0.00207)	(0.00245)	(0.00350)
Observations	92.878	64.296	28.582	87.196	60.270	26.926

Notes: variables are all dummies. See Table 2 for omitted categories. Marginal effects evaluated at the sample mean. 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.

Table 5. Probability of working underground (broad measure)

Explanatory variables	Model A			Model B		
	Entire sample (1)	<=2008 (2)	>2008 (3)	Entire sample (4)	<=2008 (5)	>2008 (6)
Male	-0.0784***	-0.0881***	-0.0583***	-0.0150***	-0.0226***	0.00166
	(0.00370)	(0.00447)	(0.00651)	(0.00367)	(0.00444)	(0.00636)
Age 31-40	0.00717	-0.0124*	0.0720***	-0.00866	-0.0264***	0.0498***
	(0.00611)	(0.00679)	(0.0137)	(0.00536)	(0.00592)	(0.0121)
Age 41-50	0.0314***	0.0105	0.0930***	0.00803	-0.0104*	0.0621***
	(0.00609)	(0.00689)	(0.0128)	(0.00534)	(0.00599)	(0.0113)
Age 51-67	-0.0051	-0.0129**	0.0293***	-0.0388***	-0.0433***	-0.0136
	(0.00548)	(0.00630)	(0.0112)	(0.00474)	(0.00544)	(0.00966)
More than 1 working experience	0.0220***	0.00611	0.0497***	0.0410***	0.0272***	0.0670***
	(0.00411)	(0.00500)	(0.00719)	(0.00394)	(0.00483)	(0.00672)
High school	-0.117***	-0.116***	-0.119***	-0.0817***	-0.0768***	-0.0923***
	(0.00358)	(0.00428)	(0.00644)	(0.00355)	(0.00425)	(0.00631)
Degree or beyond	-0.128***	-0.118***	-0.144***	-0.0841***	-0.0707***	-0.105***
	(0.00363)	(0.00462)	(0.00592)	(0.00387)	(0.00505)	(0.00598)
Always independent	0.0501***	0.0635***	0.0153	0.0574***	0.0713***	0.0250**
	(0.00642)	(0.00776)	(0.0111)	(0.00625)	(0.00761)	(0.0107)
Either depend. or indep.	0.0346***	0.0456***	0.0199*	0.0349***	0.0539***	0.00417
	(0.00624)	(0.00766)	(0.0108)	(0.00594)	(0.00745)	(0.00971)
Manufacturing				-0.109***	-0.115***	-0.0848***
				(0.00455)	(0.00522)	(0.00959)
Building sector				-0.00893	-0.0227***	0.0330**
				(0.00709)	(0.00774)	(0.0162)
Services				-0.117***	-0.129***	-0.0696***
				(0.00626)	(0.00691)	(0.0132)
Observations	92.150	63.568	28.582	86.496	59.570	26.926

Notes: variables are all dummies. See Table 2 for omitted categories. Marginal effects evaluated at the sample mean. Sample weights included. 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.

Table 6. Probability of working underground (narrow measure)

Explanatory variables	Model A			Model B		
	Entire sample (1)	<=2008 (2)	>2008 (3)	Entire sample (4)	<=2008 (5)	>2008 (6)
Male	-0.0303***	-0.0323***	-0.0258***	-0.0110***	-0.0122***	-0.00789***
	(0.00203)	(0.00265)	(0.00294)	(0.00185)	(0.00247)	(0.00242)
Age 31-40	-0.0365***	-0.0437***	-0.0209***	-0.0312***	-0.0379***	-0.0170***
	(0.00177)	(0.00226)	(0.00286)	(0.00147)	(0.00190)	(0.00224)
Age 41-50	-0.0525***	-0.0599***	-0.0356***	-0.0442***	-0.0499***	-0.0301***
	(0.00173)	(0.00214)	(0.00288)	(0.00151)	(0.00187)	(0.00252)
Age 51-67	-0.0708***	-0.0758***	-0.0571***	-0.0645***	-0.0700***	-0.0493***
	(0.00197)	(0.00239)	(0.00342)	(0.00177)	(0.00218)	(0.00296)
More than 1 working experience	-0.00974***	-0.0147***	-0.00118	-0.00649***	-0.00935***	-0.00119
	(0.00220)	(0.00292)	(0.00303)	(0.00198)	(0.00268)	(0.00249)
High school	-0.0285***	-0.0283***	-0.0281***	-0.0178***	-0.0158***	-0.0201***
	(0.00191)	(0.00245)	(0.00289)	(0.00179)	(0.00234)	(0.00262)
Degree or beyond	-0.0244***	-0.0192***	-0.0286***	-0.0145***	-0.00804***	-0.0200***
	(0.00204)	(0.00303)	(0.00236)	(0.00200)	(0.00312)	(0.00207)
Always independent	0.0467***	0.0543***	0.0301***	0.0386***	0.0463***	0.0219***
	(0.00414)	(0.00522)	(0.00648)	(0.00375)	(0.00487)	(0.00524)
Either depend. or indep.	-0.000069	0.00427	-0.00623	0.00177	0.00688	-0.00608*
	(0.00365)	(0.00505)	(0.00458)	(0.00331)	(0.00470)	(0.00361)
Manufacturing				-0.0365***	-0.0419***	-0.0257***
				(0.00192)	(0.00252)	(0.00261)
Building sector				-0.0136***	-0.0166***	-0.00815**
				(0.00242)	(0.00301)	(0.00371)
Services				-0.0346***	-0.0415***	-0.0184***
				(0.00307)	(0.00370)	(0.00498)
Observations	92.150	63.568	28.582	86.496	59.570	26.926

Notes: variables are all dummies. See Table 2 for omitted categories. Marginal effects evaluated at the sample mean. Sample weights included. 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.

Table 7. Evasion rates by gender, age, geographical area and taxpayer's type

Characteristics	SHIW		SOGEI		Difference between per capita income (1)	Evasion rate
	Taxpayers	per capita net income (1)	Taxpayers	per capita net income (1)		
Gender						
Man	20,699,048	18,932	21,612,453	15,653	3,278	17.3
Woman	20,335,554	11,904	18,879,643	10,725	1,178	9.9
	41,034,602		40,492,096			
Age						
age ≤ 44	17,432,387	15,428	17,192,526	12,363	3,065	19.9
44 < age ≤ 64	13,096,415	18,386	12,186,526	16,441	1,945	10.6
age > 64	10,505,801	11,822	11,113,044	11,508	314	2.7
	41,034,603		40,492,096			
Geographical area						
North	19,763,271	17,063	20,033,653	14,530	2,532	14.8
Centre	8,469,568	16,850	8,120,830	13,914	2,936	17.4
South	12,801,763	12,030	12,337,613	11,080	950	7.9
	41,034,602		40,492,096			
Taxpayer's type						
dependent worker	16,513,566	14,690	17,675,343	14,931	-240	-1.6
pensioner	12,223,823	10,940	13,582,001	11,023	-83	-0.8
independent worker/entrepreneur	4,645,534	27,020	4,318,697	11,798	15,222	56.3
rentier	1,122,165	21,286	1,122,929	3,462	17,824	83.7
dependent worker and pensioner	1,063,240	21,065	675,158	22,694	-1,629	-7.7
indep. worker + pension or dep. worker	910,369	36,745	1,222,658	20,372	16,373	44.6
Other	4,555,905	11,494	1,895,310	16,942	-5,447	-47.4
	41,034,602		40,492,096			
Whole population	41,034,602	15,449	40,492,096	13,356	2,093	13.5

Source: Marino and Zizza (2012).

Table 8. Regression of evasion rates on relevant characteristics

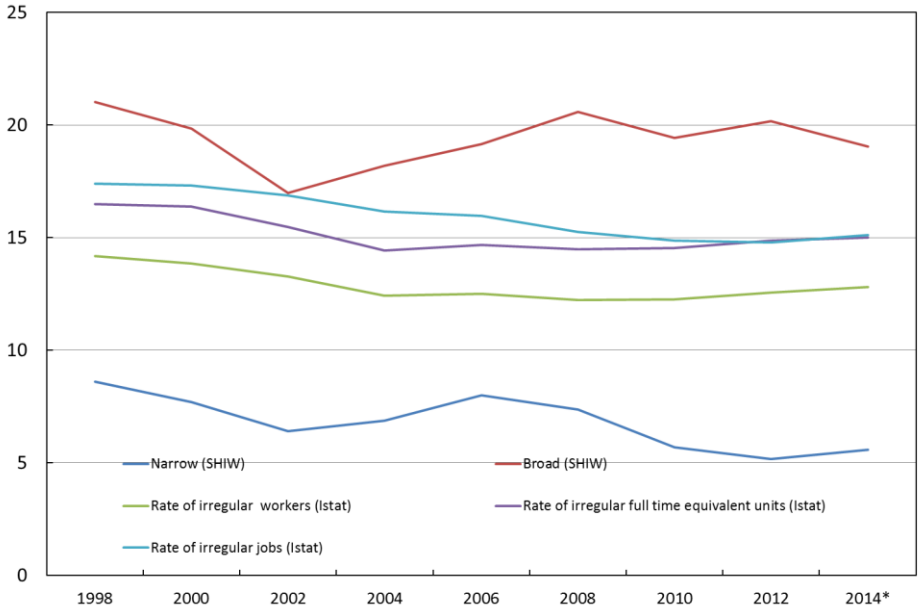
Evasion rate	Baseline regression		Regression with tax morale indicator	
	Coefficient	T statistic	Coefficient	T statistic
Man		Omitted variable		
Woman	-0.37	-0.28	-0.56	-0.39
Age ≤ 44	9.18	3.51**	8.24	2.92**
44 < age ≤ 64	1.67	-0.75	1.25	-0.53
Age > 64		Omitted variable		
North	0.15	-0.10	0.58	-0.31
Centre	3.02	-1.64	3.23	-1.65
South		Omitted variable		
Dependent worker		Omitted variable		
Pensioner	5.82	2.38*	5.08	-1.96
Independent worker/entrepreneur	53.94	24.72**	53.70	22.69**
rentier	78.63	18.41**	78.45	17.29**
Dependent worker with pension	5.25	-1.22	5.29	-1.16
Indep. worker with either pension or income from dep. Work	26.83	5.92**	26.52	5.61**
Other	9.97	4.39**	9.75	4.09**
Tax morale			20.38	-0.31
Constant	-4.82	-1.71	-4.24	-1.42
Number of observations	124		113	
Adjusted R-square	0.89		0.89	
F-test (p-value in parenthesis)	89.86 (0.00)		75.76 (0.00)	

Notes: * significant at 5 per cent, ** at 1 per cent. Regressions weighted with the number of taxpayers in SHIW.

Source: Marino and Zizza (2012).

Figures

Figure 1. Percentage incidence of irregularity: estimates from SHIW and Istat



* Year 2013 for Istat.