Tax Evasion and Economic Crime. Empirical evidence for Italy[1]

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Abstract

This paper examines the impact of tax evasion on criminal activities in Italy. We use annual data for the Italian provinces over the period 2006 to 2010. Empirical findings show that the tax evasion is positively correlated with property crime rates (including robberies, thefts and car thefts) but substitutes frauds and usury. Moreover, the estimates indicate that these crimes show a different persistency over time, reflecting different adjustment costs. Finally, we reports on the relationship between economic crimes and tax evasion in two large macro-regions.

Keywords: criminal economy; tax evasion; income.

JEL classification codes: C33; K34; K42.

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Introduction

In recent years, the studies of crime have shifted the analysis from a Becker's crime economic framework, based on the relationship between crime and punishment, to a more "flexible" approach where many demographic and socioeconomic variables have a role in the explanation of crime.

This literature has proved that crime is often linked to unemployment, age and gender composition of population, education, income, employment activity etc. In this empirical context also several deterrence variables are often significant which approximate the probability and the severity of punishment.[2] In this paper we investigate whether, in a country characterized by high underground activity and tax evasion, there is an increasing presence of criminality. To this end, we exploiting a new data set, provided by Revenue Agency, on tax gap data and many socioeconomic and demographic control variables.

Although an extensive literature in economics has examined the determinants of crime, the analyses on the role of hidden activities and underground economy has not received due attention.

Underground economy and tax evasion are widespread phenomena in Italy, and have attracted a great deal of attention by policy makers as well as researchers. The National Institute of Statistics (ISTAT, 2005) provides a time series of the size of the underground economy from 1992, showing a share of the hidden activity which ranges from the 16% to 18% of total GDP. A different source of data on underground economy in Italy is the Ministry of Finance, that has recently estimated a time series of the not reported Value Added Tax base, and recently, a regional and provincial panel of data for tax gap. The latter panel of data (reconstructed by the Revenue Agency for the years 2006-2010), which is not yet officially available to the public, has allowed us to test this new determinant for the Italian economy.

Precisely, our research question is: considered the quantitative importance of the informal economy and tax evasion in Italy, is tax evasion positively correlated with criminal activity? and what are the reasons for this relationship? We may think that the relationship between tax evasion and crime is characterized by several factors. A first factor is the income-redistribution which tax evasion generates towards any income that is not clearly attributable and which is not subject to withholding tax (ritenuta alla fonte). In recent decades, in a context of continuing increases in the tax burden, a massive tax evasion of small businesses, artisans, shopkeepers, merchants and professionals has generated strong inequalities that may have impacted on criminal activity. A strong redistribution of

[2] See Buonanno (2003) and Buonanno and Montolio (2008) for a survey. For an analysis of crime in Italy see Marselli and Vannini (1997), Buonanno and Leonida (2006), Cracolici and Uberti (2008) and Bianchi et al (2012) amongst others.

income towards the self-employed and small businesses produces an inevitable increase in inequality that impacts on property crimes (see for instance, Fajnzylber at al 2002). A second factor that binds the two phenomena into account is the wealth effect. Tax evasion, though obscure to the Revenue Agency, is well perceived in the territories, and may induce agents to commit more crime. Finally, a third factor concerns the criminogenic environment that a growth of informality produces: if entrepreneurship and legal work are far less lucrative than the hidden one, the growth of the informal activity can generate a culture of illegality where the potential gain from criminal is fully recognized.

These factors seems to predict a positive effect of tax evasion on crime. However, some substitution effects may arise if tax evasion is placed in relation to specific economic crime such as usury and frauds. In these cases, increasing the unreported income to the fiscal authorities may negatively affect crime if both phenomena contribute to the same purpose: to finance legal activities of households and small firms.

We estimate a dynamic panel model following Arellano-Bond (1991) and Arellano-Bover (1995) procedure for the Italian provinces from 2006 to 2010. We consider three types of crime particularly related to economic determinants: i) property crimes which includes robberies, thefts and car thefts; ii) frauds and iii) usury. These are crimes that have a strong impact on the economic and social structure of the affected areas and are, usually linked, by the literature, to socio-economic and demographic determinants, neglecting the role of the hidden economy and, therefore, of tax evasion. Using data for the Italian provinces, tax evasion is found to be an important determinant of these crimes, although with some not predicted effects.

The paper is structured as follows. The next section is a brief report on the stylized facts concerning the crimes involved in the analysis. Section 3 describes the tax gap reconstruction of the Italian Revenue Agency. Section 4 provides a description and data sources used in the regressions. Section 5 shows the methodology used and in the next section the empirical results are presented and interpreted. Finally, Section 7 concludes the analysis.

2. Some stylized facts about the economic crimes and tax evasion

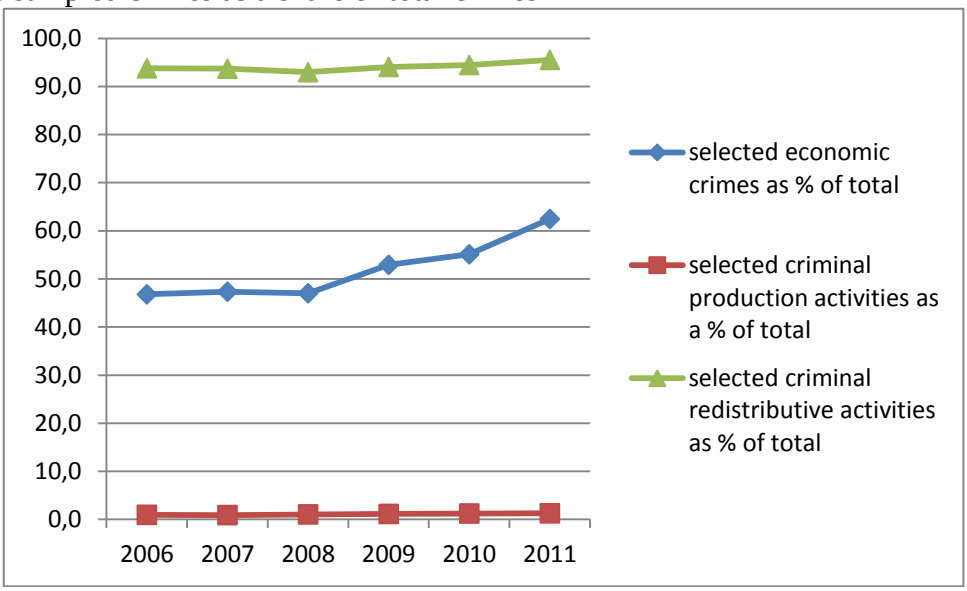
The selected crimes (offences against property, fraud and usury) account for more than 46% of total crimes in Italy in 2006 and rise to 62% in 2010, and, as Figure 1 shows, almost all of these crimes involve redistributive activities.

These crimes may also not imply severe penalties for the offender (for instance, many years in prison), but (as it well known) they have serious negative spillovers effects on the economy.

It is suffice to recall, for example, as usury is intertwined with the credit market, deeply affecting it in some contexts, and how important usurer's debit contracts are in a country of about 5 million small businesses and micro firms.

Similarly, the importance of fraud on the economy, which resides on asymmetric information, is testified by the most common crimes reported by victims: credit card fraud, false Accounting - manipulation of accounts and accounting records, insurance fraud, mortgage fraud, payroll fraud, pyramid schemes, bogus invoices, counterfeiting, forgery, or copyright abuse, to name a few.[3]

Figure 1 The sampled crimes as a share of total crimes



Cheating the government is a thriving practice in most countries, and in particular in Italy where latest official estimates indicate a figure of about 250 billion euro for the value added tax base hidden to the Revenue Agency. The National Institute of Statistics, consistent with international standards and, in particular, with the 1993 System of National Accounts, estimated and regularly updated a time series of the size of the underground economy from 1992, and indicate an hidden production of the total GDP over 15%. Using the tax gap data on provincial base, provided by the Revenue Agency, we firstly explore the importance of tax evasion of three typologies of economic crime.

Table 1 reports the evolution of the tax gap (difference between the potential collection and the tax that is actually paid) over the period 2006-2010 in terms of the main descriptive statistics.[4] On

[3] An agent is said to have committed fraud when he misrepresents the information he has at his disposal so as to persuade another individual (principle) to choose a course of action he would not have chosen had he been properly informed (see Karni, 1989).

[4] Section 3, below, shows the 'analysis of the construction of the tax gap in Italy.

average, in Italian provinces, during the examined period, 2006-2010, about 1400 euro per capita of tax receipts are concealed to tax authorities.

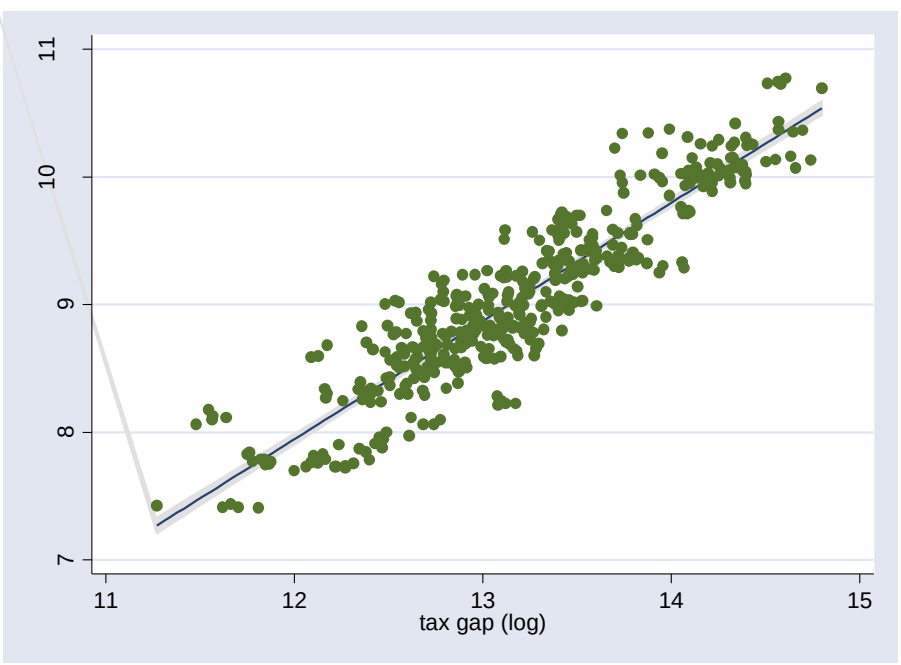
Table 1: per capita (euros) tax gap, Italian Province, years 2006-2010

year	mean	min	max	p50	sd
2006	1465.461	616.5395	3719.664	1386.953	517.2228
2007	1300.698	610.5184	2945.713	1297.265	452.5306
2008	1451.122	523.7056	3611.374	1411.263	523.8343
2009	1448.057	552.597	3048.615	1359.272	517.5876
2010	1387.86	546.7865	2862.576	1326.486	487.5897

The figures in the table show that, although with a significant variability between the minimum and maximum values observed between the various Italian provinces, the phenomenon appears quite relevant and persistent, despite the fact that during the period examined, the Revenue Agency has achieved good results in the fight against tax evasion. In fact, in the years considered 2006-2010, the number of investigations of the activities of tax evasion increased from 420 to 705 thousand. The number of investigations, thanks to the selection of the subjects made on basis of risk analysis for each type of taxpayer and the strong use of databases the Agency, are becoming more targeted, so that, in 2009 and 2010 in the face of a number of investigations basically stable, the additional tax assessed reports a sharp increase. The tax assessed rose from 13 billion euro in 2006 to about 28 billion in 2010. Similarly to that recorded for the additional tax assessed, the total collections from tax evasion shows a dynamic systematically increasing over the period (from 4 to about 11 billion euro). In particular, it should be noted the significant collections of the years 2009 and 2010, where the revenue collected has remarkably increased, despite the economic crisis. (see Revenue Agency 2010).

In the next section, we report briefly the methodology used by the Italian Revenue Agency for the construction of the tax gap. As we shall see, it is essentially based on the value added. In the literature on crime models, usually, the GDP or the value added per capita is considered as a proxy for the general level of prosperity in the provinces. This has led us to use in the estimated models the propensity to evade taxes (the ratio between tax-gap and value added in each province) rather than the tax gap, which would be collinear with the added value and thus obscure the individual effects on crimes. Figure 2 below reports the relationship between tax gap and value added in the Italian provinces, and shows as it is positive and significant.

Figure 2. Scatter plot Tax Gap-Value Added in the Italian provinces (logs)



The propensity to tax evasion is calculated using the ratio of tax gap and added value of the individual provinces. In addition to eliminating the collinear effects, the propensity to evade allows us to consider both the effects of added value and tax evasion.

The following Table 2 show the propensity to evade in the period examined.

Table 2: Propensity to Evade (% of value added), Italian Province, years 2006-2010

year	mean	min	max	p50	sd
2006	6.94602	3.2407	13.38518	6.753039	1.872998
2007	5.969293	3.015444	12.07421	5.736885	1.712342
2008	6.638539	3.209405	12.85391	6.543728	1.855294
2009	6.840249	3.051203	14.16779	6.769772	1.797915
2010	6.5068	2.906763	13.04314	6.3737	1.750486

The propensity to evade looks surprisingly stable over the years of the sample considered, although it is noted a significant reduction between 2006 and 2007. Tax evasion increases, with the exacerbation of the recession (and the reduction of value added) in 2008 and 2009, while, with the recovery in 2010 the ratio lowers again, showing how the dynamic of the propensity to evade, is characterized both by the 'performance of the value added, and from that of tax evasion.

Also worth noting is the remarkable variability of tax evasion among the Italian provinces, with minimum values of about 3% and the maximum reaching 13%.

3. The tax gap

To test the existence of the relationship between criminal activity and tax evasion we use the measure of tax gap calculated by the Revenue Agency on provincial base. The overall tax gap is a complex variable derived by the sum of the tax gaps in IRAP (Regional Tax on Productive Activities), VAT, income and profit tax.[5]

The tax gap estimated for Italy by the Italian Revenue Agency (hereinafter RA), is defined as the difference between the potential collection and the tax that is actually paid. [6] There exists a number a methods to calculate tax gap which rely on the available information, the tax law and the economic structure. [7] The RA adopts a top-down approach, based on the comparison between tax data and National Accounts figures, provided by Italian National Institute of Statistics (ISTAT). The latter incorporate an estimate of the underground economy, and then provide an indicator of the "potential" tax base. From this potential base an estimate of the potential collection is then derived, through which it is possible to calculate the tax gap[8]. The Italian tax gap relies mainly on two key tributes: VAT and IRAP.

The similarity between the IRAP tax base and national account value added is remarkably important in the study of the tax gap. In fact, the National Account is the basic unit that determines the GDP and, therefore, contains all the income that generates the change of the wealth of a country. It follows that the IRAP tax base encompasses much of the tax base resulting from the production of goods and services. In addition, the large number of taxpayers subject to the tax means that the IRAP tax base gap represents a macro indicator of the value added concealed from tax authorities.

[5] The VAT is an internationally standardized tax whereas IRAP is specific of Italian tax system, created in 1997. For a detailed analysis of the construction of the tax gap see Pisani (2014), Braiotta et al (2013) and D'Agostino et al (2012).

[6] The RA has adopted a methodology to estimate potential collection, the amount "which could be collected if no taxpayers would voluntary breach the law and involuntary errors would amount to zero" see Das-Gupta, Mookherjee (2000).

[7] For a summary, refer to OECD (2004a, 2008). See also HMRC, 2012. See also Pisani (2014).

[8] The adopted methodology is based on international best practices (see, among others, European Commission, 2011, 2013, HMRC, 2012).

As mentioned before, the RA uses a "top-down" approach to calculate the gap, comparing (after having proceeded with the harmonization of the two quantities) the base inferred from the IRAP fiscal form with the National Accounts value added at factor cost.

With regard to the VAT , in order to obtain a accurate measure of the potential liability, it is necessary to identify both taxable base and suitable legal VAT rates with respect to the legislation,[9] next, the VAT gap can be derived and includes tax evasion, the deliberate intention to fraud, insolvency, negligent acts and misinterpretation of the law.

The taxpayer voluntary compliance is calculated from the VAT revenue on accrual basis. This represents the VAT revenue that an economic system generates as a result of transactions burdened with VAT in the reference period (a fiscal year). The theoretical VAT base, consistent with the classifications and definitions applied for the declared VAT base, is calculated to estimate base gap. BIT is estimated from detailed expenditure subclasses of National Accounts macro-cluster components Households, General Government and Uses for Market Enterprises.

The RA requires highly detailed National Accounts aggregates in order to capture the complex system of VAT regulation and to calculate accurate theoretical base. For each detailed subclass of National Accounts is deducted the share of exempted base; then to the residual amount is associated its own proper statutory VAT rate. The VAT gap is estimated by deducting from the potential liability the VAT revenue.

From the point of view of economic analysis, the VAT gap captures the phenomenon at the time of consumption, while those of IRAP at the time of production. This differentiation is very important for the spatial analysis, since some areas of the country have a large concentration of production plants, while others are characterized primarily as a place of consumption. It is possible, therefore, that the evasion that is formed in the first ones turns in purchasing power in the second ones

Finally, an estimate of the gap of income and profit tax has been realized from the base gap IRAP. In fact, if the labour cost of black employees is subtracted from the base gap IRAP an estimate of the gap in the gross profit is obtained. Applying appropriate fiscal rate to the gap in gross profit is derived an estimate of the corresponding tax gap. The overall tax gap is equal to the sum of the tax gaps in: IRAP, VAT; income and profit tax.

4. Data and explanatory variables

[9] See D'Agosto et al (2014) for details.

In addition to the tax gap, our panel dataset contains annual observations from 101 Italian provinces over the period 2006 to 2010. The dependent variables concerning the crime data are from the Italian National Statistic Institute. Precisely, our crime variable is the number of crimes reported to the judicial authorities. All the crime variables are normalized by population. We perform three model regressions distinguishing between property crime which includes robberies, thefts and car thefts (Istat, Statistiche Giudiziarie e Penali), fraud, and usury. Following the theoretical framework and empirical analyses (see Buonanno 2003) the explanatory variables are derived by socioeconomic, socio-demographic and deterrence factors. As usual, the expected return from the crime activity is affected by the deterrence variable. In this study we use the unknown offenders as a proxy of the probability of apprehension, measured as the ratio of crimes committed by unknown offenders to all recorded crimes in each category. A further deterrence variable used is the number of convicted by a final judgment on a regional basis, weighting this data with the ratio of the beginning of crimes prosecution in the provinces and the beginning of criminal prosecution in the region of origin. Finally, the number of police enforcement (police and carabinieri) in each province is the additional deterrence variable available from the Ministry of Interior.

We use several demographic variables. The percentage of men aged 15-29 years because they are supposed to be more prone to engage in criminal activities, and the regular component of immigration, both as share of population in the Italian provinces (Bianchi et al. 2012 and the literature quoted therein). In a model with fixed effect, the population of each province may control for population density as a further determinant of criminal activity.

The socioeconomic variables includes the value added per capita, the growth rate of the value added, the activity rate (both total and the female activity rate) , the unemployment rate, for proxing the legitimate and illegitimate income opportunities, and the Gini coefficient for testing inequality.[10] The importance of the availability of credit is "captured" by using a measure of the banks' "problem loans". Specifically, we use the ratio of non-performing loans on performing loans (data from Bank of Italy). A further financial variable included in the estimated models to test wealth effects are bank deposits.

We include in the analysis the education, defined as number of men aged 24-34, who have reached as maximum, the middle school, for 100 men of the same age, and a policy variable such as the

[10] Inequality appears to be significantly associated with crime rates. See, for instance, Kelly (2000), Bourguignon (2001) and Fajnzylber et al (2002) amongst others. The data on the index of Gini for the Italian provinces were kindly provided by Sauro Mocetti (Bank of Italy) and Paolo Acciari (Ministry of Economics).

expenditure for interventions and social services (family and children, the disabled, addictions, the elderly, immigrants and nomads, homeless).

Finally, we test as an explanatory variables the personal consumption of drugs (Article 75, source Istat) and the number of doses of drugs seized to crime from the police. This latter variable is provided by Ministry of Interior may capture an environment of lawlessness that affects criminal activity.

To avoid that the analysis is influenced by the size of the population in the different provinces, the crimes and the various variables used in the models are normalized by the number of people, getting crime rates etc for **10,000** inhabitants. We used a double log model and followed a selection strategy from general to the particular.

The existence of causal link between all these variables and crime has been widely investigated by the literature, here we use them in order to specify a model of crime determinant wherein tax gap has a role. However, the estimation of such models of crime produce relevant statistical problems (heteroskedasticity, multicollinearity etc.) .

5. Empirical framework

The following model studies the impact of tax evasion on crime activity in a panel dataset of 101 provinces for 6 years (2006-2011):

:

$$C_{it} = \beta_1 C_{it-1} + \beta_2 Taxevasion + \beta_3 X_{it} + \eta_t + c_i + u_{it} \qquad t = 1,...,T \tag{1}$$

Equation (1) is the basic function of crime estimated by the literature, where η_t is a separate time period intercept, X_{it} is a *1xK* vector of explanatory variables defined in the previous section, c_i is the time-constant unobserved effect and u_{it} are idiosyncratic errors. In summary, the econometric model follows the empirical model of crime offering initially proposed by Ehrlich (1973) and taken up by many other authors.

With regard the dynamic aspect of the model, the literature assumes that there exist a significant relationship between crime rates in t and t-1, the empirical models includes the lagged dependent variable C_{it-1}. There may be several explanations for this dynamic relationship, not least the one that sees the persistence of the criminal activity as a learning-by-doing process which leads to a

reduction of the costs of the criminal activity itself (see Buonanno and Montolio, 2008, for a survey).

These estimates for the criminal activity involves a number of problems. Firstly, time invariant regional characteristics (fixed effects) may be correlated with the explanatory variables; Secondly, since for several variables included in the vector *K* causality may run in both directions with crime, these regressors may be correlated with the error term and are assumed to be endogenous. Thirdly, the presence of the lagged dependent variable C_{it-1} produces autocorrelation. Finally, a shortcoming of crime data is due to measurement error (under-reporting and so on). These dynamic models of panel data require an instrumental variable procedure such as the GMM estimator suggested by Aurellano and Bond (1991) and Aurellano and Bover (1995). As well known, this instrumental variables estimator, allows the use of multiple instruments. Furthermore, model (1) is characterized by regressors which are correlated with the error terms and by heteroscedastic errors. The Arellano-Bond estimator takes account of this double problem.

6. Empirical results

The following Table 3 shows the GMM- system estimations for crime activities (property crimes, frauds and usury) in Italian provinces. This estimator allows us to control for unobserved provincial-specific effects that are potentially correlated with our determinant of crime rates. In the estimation of property crime, reported in Table 3, all the variables are treated as endogenous, including lagged crime rates.

Table 3 Selected economic crime estimations

Crime (C_t)	Property	Frauds	Usury
C_{t-1}	0.704 (0.074)***	0.384 (0.133)***	0.350 (0.124)***
Prop Evasion	0.127 (0.032)***	-0.267 (0.097)***	-0.781 (0.268)***
Deterrence	-0.065 (0.025) ***	-0.064 (0.045)	
Drug	0.073 (0.037)**		
Unemployment		0.270 (0.084)***	
Non-performing Loans			0.305 (0.114)***

Betting			0.292 (0.090)***
Hansen Test	0.185	0.110	0.161
AR(1)	0.092	0.002	0.000
AR(2)	0.292	0.527	0.342
N. observations	368	368	368
N. instruments	63	31	27
Lags	L(0/3)	L(2/4)	L(2/3)
*Robust standard errors in parenthesis. ***, ** and * indicate coefficient significant at the 1%, 5% and 10% levels, respectively.*			

The basic sample consist of 505 observation (5 years, 101 provinces). Figures on the table refers to 368 observations because we excluded from the sample the provinces of Piedmont and Valle d'Aosta. The exclusion is due to some inconsistency in the definition of the crimes in the original source of data, making data of these provinces not comparable with the figures of the crimes of the other provinces.

The first column provides the best results for crimes against the property, the second column for frauds, and the third one for usury. With L(0/3) we have instructed Stata to use only the first three lags of the endogenous variables as instruments, whereas with L(2/3), the lag used with the instruments goes from the second to the third and, finally, with L(2/4) we have instructed Stata to use lags from the second to the fourth.

Three test are reported, the Hansen test of overidentifying restrictions (we use robust variance matrix estimator, see Roodman 2009), distributed as chi-square under the null hypothesis of validity of instrument, and the first and second order serial correlation test. Estimations performed using GMM-system procedure combining transformed and level instruments. Variables instrumented are crime, population, immigration, total activity rate, propensity to evade, enforcement, drug consumption (all variables are per capita). For usury crime we use also the ratio of non-performing loans on performing loans as further instrument.

The Hansen test does not reject the null hypothesis of validity of the instrument set, and the serial correlation tests indicate that there is evidence for first order serial correlation, while there is no evidence of second-order serial correlation

In the following paragraphs we report a number of features worthy of comment.

6.1 The role of propensity to evade taxes

A first interesting result is that the propensity to evade taxes is statistically significant for the three crimes considered (and robust to different specifications). Tax evasion, acts on the property crimes as a wealth effect, whereas for frauds and for the crime of usury emerges a substitution effect, which is particularly relevant for usury, where the elasticity of substitution is very high. This type of crime is more likely to affect small business owners, shopkeepers, tradesmen and professionals, namely those economic categories that are heavily involved with tax evasion and, at the same time, are themselves subject to usury for the restrictions on credit exercised by the banking system on small firms. Similarly, there is a substitution effect also for frauds: given the information asymmetries that characterize this economic crime, the hypothesis tested concerns agents that have less need for defrauding insurance markets of the automobile, health care, unemployment etc. if they can defraud the state with tax evasion. For instance, literature has highlighted as causes of the rapid growth of insurance fraud factors such as the change in morality, the modification in the behaviour of some intermediaries (medical doctors, mechanics etc), insurers' attitudes (see, Dionne 2012 amongst others), but it seems undeniable that once one finds the gaming system to defraud the tax authority becomes less compelling defraud, for instance, insurance markets.

With regard to the relationship between property crimes and the propensity to evade, the resulting inequalities, may also have impacted on this criminal activity (although, the Gini index has not been found significant). The positive sign of the tax gap coefficient may also concerns with the criminogenic environment that a growth of informality produces. The growth of the informal activity can generate a culture of illegality where the potential gain from criminal is fully recognized.

The following simple model is represented by some static relationships and basically serves to highlight the relationship between illegal financing (B^U), bank credit (B^L) and tax evasion. Exponents (D and ND) to the investment variable I, indicate, respectively, the investments of the firm declared to the tax authorities and those not declared. Finally, A is the firm self-financing due to tax evasion (τ is the tax rate):[11]

$$I = A + B \quad = \quad A + B^L + B^U \quad = \quad \tau \cdot I^{ND} + B^L + B^U$$

[11] Certainly, the interest rates paid on bank loans are much lower than those paid on illegal credit, and there is a probability of being captured by the usurer, making risky loans.

Moreover, the investment I ($I = I^D + I^{ND}$) may be written in terms of shares $\mu I + (1-\mu)I$ where μ is the declared share, and $A = \tau \cdot I^{ND}$.

Thus, the usury may be related to tax evasion in the following way:

$$I = \tau \cdot \mu(1-\mu)I + B^L + B^U \quad \Rightarrow \quad B^U = I - \tau \cdot \mu(1-\mu)I - B^L$$

According to this simple scheme, our estimates carried out with the tax-gap / value added ratio indicate a negative relationship between usury and tax evasion. This result also implies that supply for illegal loans is countercyclical. This is a distinctive character of usury compared with "bank credit", which is pro-cyclical.

The estimates in Table 3 show us how problematic and embarrassing is the relationship between demand for "illegal credit" and tax evasion in a production structure determined by small businesses.

6.2 The socio-demographic variables

From the estimations appear that many demographic and socioeconomic variables are not significantly correlated with crime rates: only unemployment significantly affects frauds. For this crime, unemployment probably involves elements of demand or opportunity costs of participating in this illegal activity (in the absence of work and income more people are available to commit fraud) and supply, as the unemployed are a fragile component of society, and therefore more susceptible to this type of crime. With regard to the property crime, the estimates provide a significant coefficient for the personal consumption of drugs, showing a relationship between petty crime and drug use.

Usury is related to the illegal betting. The share of per capita income used, in the provinces, for consumption of gambling is an indicator highly significant to analyze the exposure to debt and to the risk of the crime of usury. However, not having this information available, we used as his proxy, crimes related to illegal betting. This latter variable is robust to different specification of the equation and along with the funding requested from small businesses, helps to explain the need for illegal financing, certainly not permitted by the banking system.

As described above, we tested several deterrence variables concerning imprisonment and detection, arrest and conviction. However, we find statistical significance and the expected sign for the deterrence variable (per capita number of police enforcement in each province) in property crimes and frauds, whereas usury is not influenced by any deterrence or clearing-up variable. This lack of

significance is likely due to the increased difficulty of intervention and prevention of economic crimes. It follows that in Italy, unlike most of the empirical analysis,[12] for these types of economic crimes deterrence variables (certainty of conviction and/or clear-up rates) have no role (usury) or a very limited role (property and frauds).

Thus, our estimates exclude many of the explanatory variables listed in Section 4, because of their statistical insignificance or because of collinearity problems. Therefore, important variables such as the percentage of men aged 15-29, immigration and education, that the literature on Italy investigated (Buonanno and Leonida 2006; Bianchi et al 2008), have no role in our estimated model. However, we estimate a fixed-effect model and, therefore, the unobserved province effect might include certain demographic feature of the population (age, education). Obviously, people living in different provinces might have different attitudes toward economic crimes, but these are typically slow to change. Finally, we have not even found statistical significance for the time dummies.

6.3 The credit market and usury

In addition, usury does seem correlated with our credit variable (the ratio between non-performing and performing loans). Thus, the condition on credit market are important for this crime and the malfunctioning of the circuit of credit facilitates usury, pushing intermediaries to ration borrowers considered most unreliable: families with low and middle income, small and medium businesses undercapitalized because declaring to the tax authorities only part of their goods and services, companies operating in the most deprived areas and in the areas most at risk. In these situations, lenders limit the supply of additional credit to borrowers who demand funds, even if the latter are willing to pay higher interest rates.

6.4 The costly learning process

The significance of the lagged value of crime rate in the estimated models indicates that the dynamic specification used is appropriate: there exist a persistence of crime in Italian provinces, and in particular, for the property crimes (with a coefficient of the lagged dependent variable of about 0.70). Thus, the past experience in criminal activity such as robberies, thefts and car thefts, affect the decision to commit property crime. In these types of crime there exist a sort of learning-by-doing process which reduce the costs of these illegal activities. The persistence effect is less intense for usury and frauds. Thus, usury and frauds shows a lower degree of inertia compared to property crimes.

[12] See Marselli and Vannini (1997) for Italy and Entorf (2012) for a survey.

In an interpretation of adjustment costs, the dynamic model shows that the level of crimes committed not adjusts instantly to changing determinants of crime. The latter are considered gradually by criminals, as it is costly to adjust quickly to change, requiring a learning process:

$$\Delta C_{it} = C_{it} - C_{it-1} \quad = \quad \lambda\left(C_{it}^{*} - C_{it-1}\right) \quad \Rightarrow \quad C_{it} = \lambda C_{it}^{*} + (1-\lambda)C_{it-1}$$

Where $0 \leq \lambda \leq 1$ is the speed of adjustment and C_{it}^{*} is the goal (or desired) level of crime. Following this interpretation, we can see that the adjustment of usury and fraud is much faster than that for the crimes on the property

7. Propensity to evade and economic crime in two macro-regions

Considered tax evasion at the local level, we proceeded to test the relationship between economic crimes and tax evasion in two large macro-regions, Central North and Southern Italy. Table 4 reports the main results.

Table 4: Economic Crime Estimations. Geographical Distribution						
Crime (C_t)	Property		Frauds		Usury	
	C-North	South	C-North	South	C-North	South
C_{t-1}	0.822(0.078)***	0.668(0.084)***	0.510(0.107)***	0.548(0.130)***	0.571(0.096)***	0.383(0.155)**
Prop Evasion	0.0759(0.036)**	0.122(0.046)***	-0.309(0.096)***	0.171(0.248)	-0.357(0.267)	-0.839(0.323)***
Deterrence	-0.026(0.024)	-0.061(0.032)*	-0.001(0.041)	-0.071(0.054)		
Drug	0.068(0.053)	0.078(0.044)*				
Unempl			0.276(0.100)**	-0.051(0.158)		
Non-perf loans					0.179(0.105)*	0.304(0.156)*
Betting					0.242(0.108)**	0.244(0.106)**
Hansen test	0.324	0.442	0.455	0.483	0.250	0.389
AR(1)	0.183	0.057	0.000	0.021	0.000	0.008
AR(2)	0.348	0.625	0.806	0.176	0.266	0.629
N. observ	224	144	224	144	176	126
N. instrum	51	27	31	31	30	30
Lags	L(1/3)	L(2/2)	L(2/4)		L(2/4)	

*Robust standard errors in parenthesis. ***, ** and * indicate coefficient significant at the 1%, 5% and 10% levels, respectively.*

The estimates shows that the relationship between tax evasion and usury is a South Italy phenomenon, whereas the relationship between evasion and frauds characterizes North Italy (see Cracolici at al 2008 for a territorial analysis of frauds). Illegal betting seems important for usury in both the macro-regions, while for property crimes, in southern provinces deterrence and drug consumption are statistically significant at 10% level. For this crime, a further distinction between the macro-regions, concerns the persistence effect which is much less intense for the South. If we adopt an interpretation of adjustment costs, this means that the speed of adjustment of the criminogenic behavior to change of the various determinants, is faster in the regions of southern Italy, and this is true also for usury.

Standard errors are robust to heteroskedasticity and autocorrelation (Arellano, 1987). ***, ** and * indicate coefficient significant at the 1%, 5% and 10% levels, respectively..

6 Concluding remarks

In this paper we investigate the impact of tax evasion on some crime activities in Italian provincies during the period 2006-2010. A set of hypothesis is tested by using a GMM-system estimator, an instrumental approach that takes advantage of the dynamic properties of data set to control for measurement errors and joint endogeneity of the explanatory variables.

We have seen that the various economic crimes are strongly influenced by tax evasion. In a country like Italy, characterized by a large share of the hidden economy and tax evasion, these phenomena also affect other economic crimes. In particular, for usury and frauds, tax evasion acts as a substitute funding, while for the crimes on the property the effect is just as significant and positive. Thus, our contribution is a first step towards understanding the role of informalities in economy on criminal behavior.

These results, of course, generate many questions about policies to combat the crimes in question, and tax evasion. While not entering on these aspects, in the work we have emphasized how they are related to the size of the Italian production structure: a plethora of small and very small enterprises which make up an "easy ground" on which various economic crimes act and a widespread tax avoidance due to the discretion of the government to manage and control the tax system and the mechanism (*Sector Studies - "Studi di Settore"*) in place to estimate the taxable income of small firms, the self-employed and professionals.

References

Arellano M. and Bond S. (1991), Some tests of specification for panel data: Monte Carlo evidence and application to employment equation, Review of Economic Studies, 58, 277-97.

Arellano M. and Bover O. (1995), Another look at the instrumental-variable estimation of error components models, Journal of Econometrics, 68, 29-52.

Bianchi M., Buonanno P. and Pinotti P. (2012), Do immigrants cause crime?, *Journal of the European Economic Association* , 10, 1318-47.

Bourguignon F. (2001), Crime as social cost of poverty and inequality: A review focusing on developing countries, in Yusuf S, Evenett S. and Wu W. (eds.), Facets of Globalization: International and Local Dimensions of Development. Washington DC, World Bank.

Braiotta A., Pisani S., Pisano E. (2013) (2012) "Evasione fiscale e distribuzione primaria del reddito" in Rivista di diritto finanziario e scienza delle finanze, n.2.

Buonanno P. (2003), The socioeconomic determinant of crime. A review of the literature, Working Paper 62, University of Milan Bicocca.

Buonanno P. and Montolio D. (2008), Identifying the socioeconomic determinants of crime across Spanish provinces, *International Review of law and Economics*, 28, 89-97.

Caracolici M.F. and Uberti T.E. (2009), Geographical distribution of crime in Italian provinces: A spatial econometric analysis, *Jahrbuch fur Regionalwissenschaft*, 29, 1-28..

Das-Gupta A., Mookherjee D. (2000) Incentives and institutional reform in tax enforcement an analysis of developing country experience. Lavoisier.

D'Agosto E., Marigliani M., Pisani S. (2014), Asymmetries in the territorial VAT gap, *Italian Revenue Agency*, Discussion Topics, N.2.

Ehrlich I. (1973), Partecipation in illegitimate activities: an economic analysis, NBER, NY 68-134.

Entorf H. (2012), Certainty and Severity of Sanctions in Classical and Behavioral Models of Deterrence: A Survey, IZA DP No. 6516.

Fajnzylber P., Lederman D. and Loayza N. (2002), Inequality and violent crime, Journal of law and economics, XVL 1-40.

HMRC, (2012), *Measuring tax gaps 2012*, HM Revenue& Customs, October, London.
Internal Revenue Service 2012.

Karni, E., "Fraud" in Eatwell, John et al.(Eds), the New Palgrave: Allocation, Information and Markets, Macmillan Press Limited, 1989.

Kelly M. (2000), Inequality and crime, *Review of Economics and Statistics*, 82, 530-539.
IRS releases new tax gap estimates January, Washington.

Marselli R. and vannini M. (1997), Estimating a crime equation in the presence of organizated crime: Evidence from Italy, International Review of law and Economics, 17, 89-113.

Pisani S. (2014) Tax gap and the performance of Italian Revenue Agency. An ongoing project, Discussion Topics, Italian Revenue Agency, n.1.

Revenue Agency (2010), Dieci Anni dell'Agenzia delle Entrate, Roma.

Roodman D. (2009), How to do xtabond2: An introduction to difference and system GMM, in *Stata Journal 9*, N.1, 86-136.