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Matsaganis, Manos and Benedek, Dóra and Flevotomou, Maria and Lelkes, Orsolya and Mantovani, Daniela and Nienadowska, Sylwia

Athens University of Economics and Business, Central European University, Budapest, Bank of Greece, European Centre for Social Welfare Policy and Research, University of Modena and Reggio Emilia

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Distributional implications of income tax evasion in Greece, Hungary and Italy*

Manos Matsaganis†
Athens University of Economics and Business

Dóra Benedek
Fiscal Council, Republic of Hungary & Central European University, Budapest

Maria Flevotomou
Bank of Greece

Orsolya Lelkes
European Centre for Social Welfare Policy and Research, Vienna

Daniela Mantovani
University of Modena and Reggio Emilia

Sylwia Nienadowska
University of Modena and Reggio Emilia

Abstract

Even though tax evasion has been the focus of a growing volume of research in recent years, the issue of its distributional impact is still relatively neglected. This paper is an attempt to analyse empirically the implications of tax evasion in terms of inequality, poverty, redistribution and progressivity of the income tax system in Greece, Hungary and Italy (three countries featuring an extensive informal economy). The paper applies the discrepancy method, i.e. compares two sets of data, household budget surveys and income tax returns, to derive ratios of under-reporting by income source and geographical area. The tax-benefit model EUROMOD is used to estimate the distributional impact of tax evasion comparing household disposable incomes to a full compliance counterfactual.

Keywords: tax evasion, inequality, microsimulation
JEL subject codes: H26, H23

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† Corresponding author. Address: Athens University of Economics and Business, Department of European and International Economic Studies, Patission 76, Athens 10434, Greece (tel. no.: +30-210-8203380; fax no.: +30-210-8214122; e-mail: matsaganis@aueb.gr).

1. **Introduction**

Even though interest in tax evasion has been growing in recent years, the large volume of research generated includes few attempts to study its distributional impact. Yet, tax evasion has profound implications for distributional analysis.

In terms of horizontal equity, individuals with similar income differ in terms of inclination and opportunity to under-report it. As a result, tax evasion violates notions of fairness and equal treatment, and undermines the idea of reciprocity which lies at the heart of the social contract between taxpayers and the state.

In terms of vertical equity, "if the poor had more opportunity of evading taxes than the rich, or were better at it, then the egalitarian policy maker might have good reason to smile indulgently on evasion: up to a point anyway" (Cowell, 1987: 195). However, tax evasion may soften rather than strengthen the redistributive impact intended by the tax schedule. Either way, ignoring tax evasion is likely to cause decision makers and policy analysts seriously to misjudge the distributive and fiscal effect of changes in social benefits and the tax system.

On the other hand, tax evasion raises significant issues for efficiency as well. Lower tax revenues may ultimately lead to higher tax burdens on those who do pay. Moreover, to the extent that opportunities to evade differ by occupation and/or sector of the economy (Frederiksen et al., 2005), tax evasion will also distort labour supply decisions – although it is not always easy to confirm this assumption empirically (Parker, 2003).

The aim of this paper is to provide preliminary estimates of the size and distribution of income tax evasion in Greece, Hungary and Italy. As discussed in the next section, in all three countries the informal economy is widely held to be very extensive, accounting for between one-quarter and one-third of official GDP.

The structure of the paper is as follows. Section two offers a brief literature review. Section three presents data and explains the methodology. Section four reports the results. Section five discusses our findings. Section six raises issues for further research.

2. **Literature review**

Scholarly interest in tax evasion is growing fast, both in terms of theoretical treatment and empirical research. Comprehensive reviews of that literature are offered in Andreoni et al. (1998) and Slemrod and Yitzhaki (2002), while Slemrod (2007) provides a recent overview of what is known about the extent and the determinants of tax evasion.

This paper draws selectively on that literature. In particular, the deterrence model of tax evasion, formulated by Allingham and Sandmo (1972) and Yitzhaki (1974), assumes that rational taxpayers decide how much to evade given their income, the marginal tax rate, as well as (crucially) the subjective probability of detection and the penalty rate. While the relation between the last two factors has been the focus of research on the optimal design of auditing policies, the starting point of our own research is the theoretical insight that the level of tax evasion is a negative function of the subjective probability of detection.

Indeed, evidence on cross-sectional variation in non-compliance rates across income sources provides some empirical support for the deterrence model. Specifically, there seems to be a clear positive correlation between the rate of compliance and the probability of detection in the presence of enforcement mechanisms. As Sandmo (2005) noted, since wages and salaries are typically reported to tax authorities by employers, under-reporting by employees would lead to certain detection.

In fact, the analysis of US tax audit data collected under the Taxpayer Compliance Measurement Program (TCMP) in 1988 demonstrated that the rate of under-reporting of

income from dependent employment (0.5%) was much lower than for self-employment income (58.6%) (Slemrod and Yitzhaki, 2002). Similar data from the successor to TCMP, the National Research Program (NCP), showed that an estimated 57% of self-employment income was under-reported, compared to 1% of wages and salaries (Slemrod, 2007).

These findings are supported by evidence on patterns of non-compliance by income source from other countries, or using different research designs (or both). For example, Pissarides and Weber (1989) found that the self-employed in Britain spent a higher share of their reported income on food (other things such as household characteristics being equal), and attributed this to income under-reporting rather than a higher propensity to consume food – a finding later replicated by Lyssiotou et al. (2004). Feldman and Slemrod (2007) used this insight to analyse the relationship between charitable contributions and reported income, and argued that the higher contributions of the self-employed at similar levels of reported incomes could only be explained by higher income under-reporting. In Italy, Fiorio and D'Amuri (2005) estimated the rate of under-reporting of self-employment income around the median of the distribution at 27.7%, compared to 1.9% for income from wages and salaries. In Hungary, Krekó and Kiss (2007) highlighted the opportunities for (legal) tax avoidance and (illegal) tax evasion available to the self-employed. In Greece, Tatsos (2001) found that the self-employed were more likely to participate in unregistered activities that remain invisible to the tax authorities.

Note that what the theory predicts is that the propensity to evade taxes will vary by income source, not by employment status. The distinction is clear in the case of employees "moonlighting" (Slemrod and Yitzhaki, 2002). Since the probability of detection is lower for self-employment income earned in their spare time than it is for wages or salaries from their main job, the expected rate of under-reporting will be higher for the former than for the latter.

While the evidence on patterns of non-compliance by income source seems robust, and is supported by unambiguous theoretical predictions, the same cannot be said with respect to non-compliance by income class. Even though theoretical models generate no clear prediction on the relative strength of income and substitution effects of tax rates on compliance, they all indicate that tax evasion should generally rise with income (Andreoni et al., 1998). Nevertheless, the empirical evidence is mixed.

For example, Christian (1994) used data from the 1988 TCMP study to show that, relative to the size of their true income, higher-income taxpayers evaded *less* than those on lower incomes. However, his study was seen as inconclusive on methodological grounds: it classified as low incomes taxpayers with high permanent income reporting business losses, while it failed to account for illegal tax shelters and for non-compliance in partnership and corporate tax returns (Slemrod, 2007). Fiorio and D'Amuri (2005) also found that the share of unreported income in Italy fell with income. In contrast, Pashardes and Polycarpou (2008) showed that, once corrected for tax evasion, the income distribution in Cyprus was less equal than the distribution of reported incomes, while Tatsos (2001) argued that high earners in Greece were more inclined to non-compliance.

On the whole, little is known about the level of non-compliance by income class, and the available evidence does not always support the hypothesis of a regressive bias of tax evasion.

The trouble with the deterrence model is that it seems to predict more tax evasion than is actually observed. While several studies within this intellectual tradition (Sandmo, 1981; Andreoni et al., 1998; Pestieau et al., 2004; Sandmo, 2005; Slemrod, 2007) attempted to resolve this puzzle, others have looked for explanations elsewhere. Behavioural theories reject the assumption that tax payers are isolated and amoral individuals, and suggest that the decision to evade is greatly influenced by social norms and interactions. Frey (1997),

for instance, argued that there is more to tax compliance than simple fear of punishment: excessive reliance on extrinsic motivations (such as increased penalties) may ultimately crowd out intrinsic ones (e.g. civic virtue). Also, Fortin et al. (2007) tested the assumption that individual compliance is influenced by the reporting behaviour of others, and found evidence of a fairness effect in terms of horizontal equity: perceived unfairness in taxation may lead to increased tax evasion.

One implication of the theory, the proposition that the propensity to evade taxes will inversely correlate with trust in institutions, appears to have intuitive appeal and has in fact found support in the literature. Some have attempted to test behavioural models drawing on the results of the World Values Survey (WVS), the European Values Survey (EVS) or similar surveys. For example, Torgler (2003) and Slemrod (2003) established that professed trust in government correlates quite closely with survey-based attitudes towards tax evasion, both across countries and across individuals within countries. Furthermore, Hanousek and Palda (2004) analysed opinion poll evidence from the Czech Republic relating attitudes towards tax evasion to perceived quality of public services, and found that a 20% increase in the former could lead to a 13% reduction in the latter. Still, as Slemrod (2007) has pointed out, "survey responses may also reflect after-the-fact rationalization of noncompliant behaviour".

Empirical approaches to estimating the size of informal activities and/or tax evasion often rely on relationships between macroeconomic indicators. The most common are the demand-for-currency method (Cagan, 1958; Tanzi, 1983; Bhattacharyya, 1990), the transactions method (Feige, 1979), the electricity consumption method (Lackó, 2000), and the Multiple Indicators Multiple Causes (MIMIC) method (Frey and Weck-Hannemann, 1984; Schneider, 1997; Giles 1997; Dell'Anno et al., 2007). These methods, reviewed by Schneider and Ernste (2000) and Schneider and Klinglmair (2004), have been extensively

criticized on the grounds that their estimates are sensitive to changes in key parameters and are not firmly based on theory (Thomas, 1999; Caridi and Passerini, 2001; Breusch, 2006; Hanousek and Palda, 2006).

Another strand of research using *microeconomic* data relies on the expenditure-based method (Pissarides and Weber, 1989; Lyssiotou et al., 2004; Feldman and Slemrod, 2007). The method assumes that family expenditure surveys are more reliable on the expenditure side rather than on the income side, and use information on the former to estimate under-reporting of the latter.

Direct methods include voluntary questionnaire-based sample surveys, trying to elicit information on respondents' non-compliance (Mogensen et al., 1995; Pedersen, 2003), and the discrepancy method. The latter focuses on the difference between two alternative and independent measurements of the same variable, e.g. comparing income declared for tax purposes to that measured by selective checks such as audits. Most of the TCMP/NCP studies in the US belong to that category. The analysis of tax returns alongside a general-purpose income survey may be thought of as an extension of the discrepancy method. (Note that the term "discrepancy method" is also used to describe macro studies looking at the difference between expenditure and income statistics in national accounts, between the official and the actual labour force etc.)

Our paper builds on previous attempts to estimate the size of the informal economy in Greece (Vavouras et al., 1991; Kanellopoulos et al., 1995; Tatsos, 2001), Hungary (Krekó and Kiss, 2007; World Bank, 2008; Elek et al., 2009) and Italy (Bordignon and Zanardi, 1997; Bernasconi and Marenzi, 1997; Fiorio and D'Amuri, 2005), sometimes in a comparative context (Schneider and Enste, 2000; Lackó, 2000; Schneider and Klinglmair, 2004; Christie et al., 2005; Dell'Anno et al., 2007). According to the resulting estimates, the share of the informal economy in the three countries ranges from approximately one-

quarter to approximately one-third of official GDP.

Beyond that, our main contribution to the literature is that we link an estimation of non-compliance patterns to an analysis of how gains from tax evasion are distributed in the general population. Our estimation of the size and incidence of tax evasion in Greece, Italy and Hungary relies on the assumption that respondents to an income survey have no incentive to conceal their income and are therefore more likely to reveal it truthfully; the opposite is the case when individuals fill in their tax return, as tax payers who decide to hide part of their income have a good chance of ending up with a higher post-tax income than would have been the case under full compliance.

3. **Methodology and data**

Our paper applies a variation of the discrepancy method developed by Fiorio and D'Amuri (2005), in the sense that we also estimate tax evasion by comparing the tax returns and income survey responses of similar individuals. Our approach significantly departs from theirs in one significant respect, namely that our estimates of under-reporting by level of income are due to a pure composition effect, i.e. result from our application of adjustment rates by income source and geographical area to the entire income distribution. In other words, we specifically assume that all income from source *j* earned by residents of area *i* is under-reported at the same rate, regardless of its level. On the contrary, Fiorio and D'Amuri estimate under-reporting by income centile (2005: 252). As Mantovani and Nienadowska (2007) have shown, adopting the latter approach amounts to implicitly assuming away re-ranking effects, which in turn under-estimates the regressive impact of tax evasion.

More specifically, we draw on two sets of data: (a) incomes observed in a household budget survey, and (b) incomes reported in tax returns.

In the case of Greece, we compare data from the 2004/05 Household Budget Survey on 17,400 individuals in 6,600 households, with a sample of unaudited tax returns filed in 2005 by 41,300 tax payers in 27,400 tax units. Both sources report incomes earned in 2004.

In the case of Hungary, we compare information on 24,500 individuals in 9,000 households from the Household Budget Survey, with a random sample of the tax records of 228,000 individuals. Both datasets contain information on incomes earned in 2005.

In the case of Italy, we compare data on 21,100 individuals in 8,000 households from the Bank of Italy Survey of Household Income and Wealth, with aggregate statistics on the number of tax payers, taxable income and tax paid as published by the Italian Ministry of Finance. Both sources refer to incomes earned in 2002.

We compare the distribution of income as observed in the survey with a synthetic distribution of reported income as revealed to tax authorities, which we have corrected for income under-reporting in the light of information derived from tax returns.

A crucial assumption is that respondents reveal their income to survey interviewers more truthfully than they do when filling their tax return. While this assumption has intuitive appeal, and is consistent with incentives, all income is known to be measured with error. Atkinson et al. (1995) conceptually defined five levels of measuring income ("true income", administrative record income, tax reported income, edited survey income, reported survey income), with involuntary measurement error potentially increasing as we move from one level to the next. Dhami and Al-Nowaihi (2006) discussed measurement error in the context of tax evasion. Rendtel et al. (2004) carefully analysed factors leading to misreporting of incomes in surveys. Respondents tend to forget small or irregular incomes such as tips and bonuses, and to estimate uncertain incomes (e.g. from self employment) conservatively – to which one might add recall error, possibly rising with

age. Over-reporting of incomes in surveys relative to tax registers can also happen: respondents may confuse net and gross earnings, or ignore tax deductions, while self-employed workers will report positive incomes in the survey (or negative incomes will be edited out of the survey) even when for tax purposes they report negative incomes. Moreover, taxable incomes may be under-reported relative to survey incomes for the purpose of tax evasion, i.e. voluntarily. Jäntti (2004) found that interview incomes tend on average to be lower than register incomes, while non-respondents tend to have lower incomes than respondents. On the whole, Rendtel et al. (2004) concluded that "all trends will be present to some extent and it is not clear how these trends balance at the end".

In this paper, we accept that involuntary measurement error can go either way, but rely on the working hypothesis that the various causal factors offset each other, and that residual discrepancies between survey incomes and tax reported incomes can be attributed to tax evasion alone. Furthermore, we attempt to minimise measurement (and simulation) error by defining the reference population narrowly. This is explained below.

We begin by adjusting income components in the survey in such a way as to mirror income as reported to the tax authorities. Here, the main objectives are: (i) ensuring that variables are consistently defined across datasets, (ii) identifying the reference population, and (iii) obtaining adjustment factors to correct reported incomes for under-reporting with a view to evading tax.

With respect to defining variables consistently, in the survey most or all incomes are reported net of taxes and social contributions, while in tax returns most or all are recorded in gross terms. In the case of Greece, making income concepts consistent required careful treatment of farming and self-employed incomes (reported gross of social contributions in the survey), and of wages or salaries and pensions (reported net of social contributions in the tax records). Also, in view of the fact that renting out rooms or apartments is often

associated with informal activity in tourism, property incomes were merged with incomes from self employment. Similar adjustments were made in the other two countries, where only incomes from dependent employment and self employment were considered. In the case of Hungary, pensioners not reporting labour income were excluded from the sample since pensions (as most social benefits) are tax-exempt. In the case of Italy, most property income is imputed rent from owner-occupied housing, which is estimated subjectively in the survey but is taxed "objectively" according to a standard formula. Moreover, the possibility of under-reporting pension incomes with a view to tax evasion was ruled out, and differences between the two sources were mostly attributed to respondents misclassifying contributory minimum pensions (taxed as income) and non-contributory social pensions (not subject to income tax).

With respect to identifying the reference population, in Greece and Hungary the sample of tax returns was made representative of the population of tax payers and was also reconciled with the sample of the income survey. Specifically, we reweighted the sample of tax returns by occupation and geographical area in terms of population and of average household (tax unit) income. Then we reconciled the reweighted sample of tax returns with the survey to ensure that the population of tax payers was similar in the two datasets. In Italy no adjustments to the tax records could be made, as only aggregate income tax statistics were accessible.

A further adjustment concerned the distinction between income under-reporting and tax evasion. In all three countries, the existence of personal allowances (Greece) or tax credits (Italy and Hungary) implied that below a certain income level €1 under-reported made no difference in terms of tax. In view of that, comparisons between survey incomes and incomes reported in tax returns were restricted to the population of tax payers, defined as those liable to pay an amount of tax that is greater than zero. Note that – in

implicit recognition of, and in an attempt to compensate for, tax evasion – personal allowances and tax credits were less generous for the self-employed (Greece and Italy), or were only available to employees (Hungary).

Furthermore, with respect to obtaining adjustment factors needed to correct incomes for tax evasion, we allocated the total incomes of the reference population into a number of mutually exclusive categories defined as combinations of geographical area and income source. Adjustment factors are defined as $\alpha_{ij} = \bar{y}_{ij}^{IR} / \bar{y}_{ij}^{HBS}$, where $\bar{y}_{ij}^{IR}$ and $\bar{y}_{ij}^{HBS}$ denote the average income from source *j* earned by residents of geographical area *i* as reported in tax returns and in the survey respectively.

In all three countries, small rates of over-reporting were actually observed in some geographical areas for income from wages and salaries (and, in the case of Greece, for pension incomes as well). The corresponding adjustment factors were set equal to one, on the grounds that no-one knowingly reports higher incomes in a tax return than in an income survey. ($\bar{y}_{ij}^{IR} / \bar{y}_{ij}^{HBS} \leq 1, \forall ij$). Finally, the adjustment factor for farming income in Athens was set equal to 1 minus the average under-reporting rate across geographical areas (53.2%) for that income source, as the relevant category was too small in the survey (n=8).

The resulting adjustment factors by income source and geographical area are shown in Table 1.

[TABLE 1]

The implications of income under-reporting in terms of tax evaded and the resulting distribution of post-tax household disposable incomes were derived through a comparison of our approximation of the real world on the basis of our estimate of income under-reporting by category, with the counterfactual of full tax compliance using the European tax-benefit model EUROMOD (http://www.iser.essex.ac.uk/msu/emod/).

4. **Results**

Our results are summarized in Tables 2-4.

Table 2 shows our estimated rates of under-reporting by income quantile, defined by reference to non-equivalised personal pre-tax incomes.

[TABLE 2]

The overall rate of under-reporting is very similar in the three countries (10-12%).

In Greece, the extent of income under-reporting seems to be largest at the two ends of the distribution. Income is mostly concealed from the tax authorities by people in the top income decile (about 15%), followed by those in the bottom three income deciles (10-11%. The rate of under-reporting in the top centile is 24%, and falls somewhat to 19% in the top 1‰ of the distribution.

In Hungary, the estimated rate of under-reporting peaks locally to 10% around decile 2, then rises again in the upper half of the distribution to 19% in the top income decile. In Italy, income under-reporting appears to increase from 2% to 2.5% in the bottom two deciles to almost 7% in decile 5, and then again from around 4% to almost 21% in the top decile. In both countries, the rate of under-reporting continues to rise further up the distribution: to 27% and 30% in the top 1%, and to 39% and 51% in the top 1‰, in Italy and Hungary respectively.

Table 3 presents the fiscal implications of tax evasion, as a comparison of taxable income and the resulting tax liability under income under-reporting with the counterfactual of full tax compliance. It is worth highlighting our finding that tax evasion reduces the income tax yield rather considerably: by 19% in Hungary, by 21% in Italy, and by as much as 26% in Greece.

[TABLE 3]

Our estimates of the distributional implications of tax evasion vs. full compliance in terms of poverty, inequality, tax progressivity and redistribution (analysed on the basis of the distribution of equivalised household disposable income) can be seen in Table 4.

[TABLE 4]

Since tax evasion increases post-tax incomes, it is quite likely that median equivalised household disposable incomes will rise as well. By implication, the poverty line at 60% of median will also go up. In this case, it rises by 1% in Greece and by around 3.5% in Italy and Hungary. In response to that, our two poverty indices, headcount rate and poverty gap, increase in the case of Greece and Italy (significantly at the 5% level), and decrease in the case of Hungary (not significantly at the 5% level).

In contrast, our five inequality indices (S80/S20, Gini, Atkinson for e=0.5 and e=2, and Theil) increase considerably in all three countries, implying that tax evasion results in a more unequal income distribution. This effect is especially pronounced with respect to the Theil index and the Atkinson index for e=0.5. Finally, our results for the three indices of tax progressivity and redistribution estimated here (Kakwani, Reynolds-Smolensky, Suits) show that the effects of tax evasion are strongly negative. Specifically, the decline in the Kakwani index ranges from 10% to 16%, the reduction in the Suits index from 13.5% to 22%, while the estimated decrease in the Reynolds-Smolensky index was more dramatic: from 23.5% in Greece and 27% in Hungary to 40% in Italy.

5. **Discussion**

As shown earlier, the ratio of income from dependent employment that is reported in tax records to income from the same source as observed in household budget surveys is close to one in all three countries. In contrast, the estimated rate of under-reporting with respect to income from self employment ranges from 24% in Greece to 51% in Italy to as

much as 71% in Hungary. This is strictly consistent with the literature, as well as with prior notions on the different opportunities for tax evasion presented to different occupations.

Nevertheless, it seems unlikely that under-reporting of wages and salaries is close to zero. The standard assumption that it must be negligible because of withholding and information provided by employers cannot hold in the case of collusion – i.e. when employers and employees agree to conceal all or part of wages paid in order to reduce both employers' labour costs and workers' take-home pay.

In fact, empirical evidence suggests the existence in all three countries of a large shadow economy centred on precarious, unregistered, informal jobs (*petits boulots*). In Greece, the Inspectorate Service of the Social Insurance Foundation IKA estimated that employers in 10% of all firms inspected in 2008 failed to pay social contributions, while 27% of all workers remained unregistered (press release, 25 January 2009). In Hungary, a recent study estimated the share of unregistered employment at 17% of the labour force, while more than half of employees reporting earning at the minimum wage in 2003 in fact received about one-third of their actual pay in a "brown envelope" (Elek et al. 2009). In Italy, an inspection of 145,000 firms by the National Institute of Social Protection INPS showed that in 2003 approximately 63% of firms used irregular payment methods such as "pay on the side", while the National Statistical Service ISTAT estimated the size of irregular labour force at 14% (cited in Fiorio and D'Amuri 2005: 255). In all three countries, such "informal" practices were particularly widespread in construction, retail trade, tourism, contracted-out services such as cleaning and catering and so on.

We think there are three reasons we failed to detect much under-reporting of wages and salaries earned by the informally employed. To start with, a large proportion of those concerned belong to ethnic minorities and other disadvantaged groups (illegal immigrants, the Roma) who tend to be under-represented in household budget surveys. On the other

hand, tax records are truncated, either in the sense that unregistered workers by definition are invisible to tax authorities, or because those earning below a very low level (€3,000 a year in Greece) are legally exempt from the obligation to fill in a tax return, or because in order to compute adjustment rates we deliberately restricted our analysis to those liable to pay an amount of tax that is greater than zero. Thirdly, following up on the last point, given that our original samples of tax records and of household budget survey data were drawn from different populations, as a consequence of which a considerable amount of reweighting had to be done, it is possible that some variability was smoothed out in the process.

As explained before, our results are driven by estimates of under-reporting and the resulting adjustment rates by income source and geographical area. All other results are due to a pure composition effect. This is clearly true for our finding of non-compliance by income class, which suggests something between a U- and a J-shape pattern. Specifically, it appears that the rate of under-reporting is higher at low incomes than at middle income levels (except in Italy), and is highest at top incomes. Since, by design, under-reporting was not allowed to vary by income class, this result is entirely due to the concentration of wage and salary earners in the middle of the income distribution, combined with the strong presence of self-employed professionals at the top.

As discussed earlier, the available evidence on the relation between tax evasion and income class is mixed. In particular, beyond the literature reviewed in the relevant section, our finding that tax evasion is more prevalent at high incomes finds some extra support in the results of the 1999 values survey jointly conducted by WVS and EVS – at least insofar as survey-based attitudes towards tax evasion reflect actual behaviour. In that survey, the share of respondents agreeing with the statement "cheating on tax if you have the chance is never justified" was greater at low- than at high-income levels in all three countries.

Incidentally, the same was true elsewhere (e.g. in Germany and the US). The survey also shows that variation in attitudes towards tax evasion across countries is very wide indeed (http://www.worldvaluessurvey.org).

Clearly, the implications of a given rate of under-reporting at low levels of income are very different from those of the same rate further up the income distribution, and not just because of the difference between relative and absolute terms. Because of progressive income taxation and significant tax-free allowances or tax credits for low earners with dependants, the effects of income under-reporting at low income levels in terms of unpaid tax are pretty minimal. In contrast, extensive under-reporting among high earners has a considerable impact on inequality and on the progressivity of the income tax system, and translates into sizeable losses in terms of tax receipts.

Using the tax-benefit model EUROMOD enabled us to compute the distributional and fiscal effects of tax evasion, by simulating tax due under tax evasion and under full tax compliance and by comparing the outputs. This produced a series of interesting results. To start with, we found that the progressive structure of income taxation and the distribution of tax payers along the taxable income scale heighten the fiscal effects of under-reporting. More specifically, as shown in Table 3, income under-reporting by 10% to 12% results in a shortfall in terms of tax receipts of around 20% (Hungary and Italy) up to 26% (Greece).

Distributional effects may be seen as rather predictable, given the pattern of under-reporting by level of income discussed above. However, this is less true than it may appear. The results shown in Table 4 were computed on the basis of the distribution of equivalised household disposable income, while the results shown in Table 2 relied on the distribution of non-equivalised personal pre-tax incomes instead.

In spite of this important difference, we find that tax evasion causes inequality to rise relative to what would have been the case under full tax compliance. The estimated

effect of tax evasion on inequality is highest for indices that are more sensitive to changes at high levels of income. Finally, the effects on tax progressivity and redistribution are estimated to be considerable, strongly suggesting that tax evasion renders the income tax system more regressive than its formal structure implies.

6. **Conclusion**

As shown above, the effects of tax evasion in Greece, Hungary and Italy seem to be higher income inequality and lower tax progressivity, as well as a significant loss of tax receipts. This is a strong finding, but is it to be trusted?

A cause for caution regards the distinction between static and dynamic effects of tax evasion. It is important to remember that taxation (and, by implication, tax evasion) does not simply reduce disposable incomes; it also affects decisions concerning supply of, and demand, for labour, the allocation of disposable income between consumption and savings, the allocation of consumption between different goods and services and so on (Slemrod and Yitzhaki 2002, Sandmo 2005). Although the analysis of such dynamic effects lies well beyond the scope of this paper, we need to recognise that the implications of tax evasion exceed what we can show with a static arithmetical recalculation of the income distribution.

On a related point, while our approach focuses on the effects of income tax evasion, the distributional impact of evading other taxes (e.g. company tax, capital tax, value added tax) is likely to reinforce these effects. The case of social contributions, often evaded at the same time as income taxes, deserves a comment. Two effects operate here. On the one hand, social contributions are paid at a flat rate in the case of employer and employee contributions, or as a lump sum in the case of self-employed contributions, and they are payable from the first €1 earned (i.e. no lower earnings threshold typically applies). As a

result of that, the distributional impact of evasion may be less regressive for social contributions than it is for income tax. On the other hand, employer social contributions are formally higher than employee contributions (twice as high in Greece, three times as high in Hungary and Italy), as a result of which unregistered work and incomplete reporting of wages will reduce employers' labour costs far more than will raise take-home workers' incomes. Recall also that, as recognised by (Slemrod, 2007), the presence of tax evasion calls into question the standard result that the incidence of taxes does not in the long run depend on which side of the labour market payroll taxes are levied. On balance, taking both effects into account, we think that evasion of social contributions is more likely to reinforce than mitigate the regressive impact of tax evasion.

Our approach relies on matching data from tax returns with income survey data. While we have made a serious effort to make the two sources comparable, our adjustment techniques offer at best good approximations. In particular, the truncated nature of tax records (i.e. low-income families pay no taxes) and the limited reliability of income statistics at either end of the income scale may cause residual estimation errors. Therefore, our results should be seen as tentative estimates under an experimental research design. Clearly, the design itself can be improved further, e.g. by trying other approaches to matching the two databases, by repeating the analysis with a larger sample of tax returns, or by collecting more information, enabling us to create smaller, more homogeneous categories.

A possible refinement concerns the introduction of stochastic variation. Specifically, there is no reason to think that all members of a given category under-report their incomes by the same ratio: some will report less, some more, some others may even faithfully reveal their incomes to the tax authorities. This would be consistent with the literature: a TCMP study found that among taxpayers with reported income between

$50,000 and $100,000 in 1988, 60% understated tax, 14% overstated it, and 26% reported tax correctly (Christian, 1994). Stochastic variation involves introducing a random term around an average rate of under-reporting by category. Again, this exceeds the scope of the current paper.

Our key assumption is to treat incomes observed in the household budget survey as closer approximations of "true income", on the grounds that people have no incentive to conceal their income from survey interviewers, since their disposable income would not be affected by their response. The intuition – reflected in similar approaches taken in other studies (Fiorio and D'Amuri, 2005) – is reasonable, but not necessarily correct. The role of measurement error, introducing indeterminacy and calling for a healthy dose of scepticism, was discussed above. Quite apart from that, there are at least two reasons to suspect that the actual but unknown level of tax evasion may be considerably higher than that implied by our estimates.

On the one hand, while our approach attempts to capture income under-reporting, in the sense of individuals reporting a lower figure in their tax return, some tax evasion is also caused by individuals who decline to file a tax return altogether. On the other hand, there is evidence (Elffers et al., 1987) that the very same factors causing tax evasion (low trust, low tax morale and so on), combined with the wish of tax-evading individuals to be somehow "consistent", may cause under-reporting of incomes in surveys as well, albeit at a lower level. To the extent that these factors are at work here, our estimates of tax evasion will be biased downwards. That would be consistent with the reflection of Schneider and Enste (2000), that "it is unlikely that [direct methods] capture all shadow activities, so they can be seen as lower-bound estimates".

A final word concerns the nature of our research. Even though the design of our work was experimental, the assumptions we have had to rely upon were sometimes crude,

and several issues (some of which discussed here) remain unresolved, we believe our results capture essential aspects of the problem we set out to explore. Our core finding, that tax evasion in Greece, Hungary and Italy has a regressive impact, seems reasonably robust. While we have not addressed the question of the optimal design of tax auditing policies, our results suggest that the payoff of efforts to reduce tax evasion could be very substantial indeed: higher tax receipts, lower poverty, reduced inequality, and a more progressive tax system.

After all, it may be that the "egalitarian policy maker" invoked by Cowell (1987) has little reason to "smile indulgently on evasion", and every reason actively to engage in a sustained effort to reduce it. How this could be achieved is another story altogether.

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Tables

TABLE 1

Adjustment factors by income source and geographical area

	wages and salaries	pensions	self employment	farming
Greece				
Athens	1.000	1.000	0.770	0.468
Northern	0.978	1.000	0.860	0.412
Southern	0.992	1.000	0.640	0.530
Islands	1.000	1.000	0.712	0.519
Hungary				
Central	0.960	*n.a.*	0.211	*n.a.*
Transdanubia	1.000	*n.a.*	0.288	*n.a.*
Great Plain and North	0.990	*n.a.*	0.342	*n.a.*
Italy				
North West	0.985	*n.a.*	0.512	*n.a.*
North East	1.000	*n.a.*	0.472	*n.a.*
Central	1.000	*n.a.*	0.405	*n.a.*
Southern (incl. Islands)	1.000	*n.a.*	0.466	*n.a.*

Note: The adjustment factors shown here, multiplied by survey incomes, are used to derive the distribution of reported incomes, i.e. those incomes assumed to be revealed to tax authorities and hence subject to income tax.

TABLE 2

Under-reporting by level of income

	Greece	Hungary	Italy
decile 1 (poorest)	9.9%	4.3%	2.6%
decile 2	10.4%	10.2%	2.0%
decile 3	11.2%	6.8%	5.0%
decile 4	5.1%	5.0%	6.5%
decile 5	5.7%	5.8%	6.7%
decile 6	7.0%	8.3%	4.1%
decile 7	7.9%	8.2%	5.5%
decile 8	7.3%	8.5%	7.6%
decile 9	6.8%	12.0%	10.7%
decile 10 (richest)	14.7%	19.2%	20.8%
top 1%	23.6%	29.6%	26.5%
top 0.1%	19.3%	51.2%	39.5%
total	9.9%	11.4%	11.4%

Notes: Rates of under-reporting are computed as difference of survey income from reported income divided by survey income.

Reported incomes, defined as incomes revealed to tax authorities, have been adjusted for under-reporting using the adjustment factors by geographical area and income source shown in Table 1.

Income quantiles are constructed on the basis of the distribution of non-equivalised personal pre-tax incomes.

TABLE 3

Fiscal implications of tax evasion vs. full compliance

	Greece	Hungary	Italy
reported income	-9.9%	-10.9%	-11.7%
taxable income	-10.3%	…	-12.3%
tax due	-26.1%	-19.4%	-20.6%
disposable income	+2.7%	+7.7%	+6.1%

Notes: Proportional change in income and tax variables is defined as difference of full compliance from tax evasion divided by full compliance.

Income and tax variables are derived by running the tax-benefit model EUROMOD under the two assumptions of tax evasion and full compliance.

Tax evasion provides estimates of income tax variables assuming incomes are under-reported to tax authorities as implied by the adjustment factors shown in Table 1.

Full compliance provides estimates of the same variables assuming incomes are reported to tax authorities as observed in the survey.

Income and tax variables are expressed in terms of non-equivalised personal incomes.

TABLE 4

Distributional implications of tax evasion vs. full compliance

	Greece	Hungary	Italy
poverty line (€ p.a.)	+1.0%	+3.4%	+3.7%
poverty rate (FGT α=0)	+2.3%	-1.5%	+3.8%
poverty gap (FGT α=1)	+1.6%	-2.8%	+4.6%
Gini	+3.5%	+6.8%	+5.5%
S80/S20	+5.2%	+7.5%	+2.6%
Atkinson (e=0.5)	+7.2%	+17.9%	+11.5%
Atkinson (e=2)	+2.7%	+7.6%	+4.0%
Theil	+9.2%	+24.5%	+14.3%
Kakwani	-10.0%	-10.8%	-16.1%
Reynolds-Smolensky	-23.5%	-26.9%	-40.0%
Suits	-16.2%	-13.5%	-22.4%

Notes: Proportional change in distributional indices is defined as difference of full compliance from tax evasion divided by full compliance, as explained in Table 3.

Distributional indices are derived on the basis of equivalised household disposable incomes.

The poverty line is set at 60% of median equivalised household disposable income, and is recalculated under full compliance and tax evasion.

Appendix

TABLE A.1

Income tax brackets and marginal tax rates

	income brackets (€ p.a.)		tax rate
	from	to	
Greece (2004)	0	8,400	0%
	8,400	13,400	15%
	13,400	23,400	30%
	23,400		40%
Hungary (2005)	0	6,046	18%
	6,046		38%
Italy (2002)	0	10,329	18%
	10,329	15,493	24%
	15,493	30,987	32%
	30,987	69,721	39%
	69,721		45%

Notes: In Greece, the personal allowance (i.e. the income bracket where the tax rate is zero) was set at €10,000 for employees or pensioners. The personal allowance was higher by €1,000 for tax payers with one child, by €2,000 for those with two children, and by €10,000 for tax payers with three or more children.

In Hungary, tax credits for employees (worth up to €496 for earnings up to €4,030) ensured that those on the minimum wage paid no income tax. No tax credits were available for the self-employed.

In Italy, tax credits were available for employees (worth up to €1,147 for incomes up to €6,197, with additions for those partly employed in the course of the year and/or employed in temporary jobs), for pensioners (as above, with additions rising with age), for the self-employed (worth up to €573 for incomes up to €4,700), for children and other dependent members of the household etc.

In all three countries, various other tax allowances and tax credits are applicable (and, where possible, have been simulated in EUROMOD).