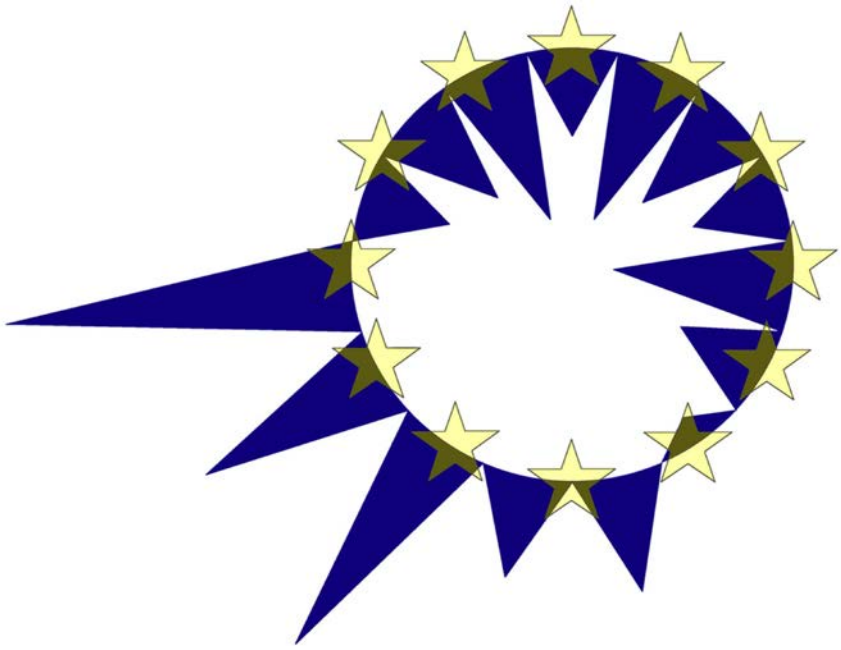
EUROMOD

WORKING PAPER SERIES



EUROMOD Working Paper No. EM17/13

Distributional Implications of Tax Evasion and the Crisis in Greece

Chrysa Leventi
Manos Matsaganis
Maria Flevotomou

November 2013

Distributional Implications of Tax Evasion and the Crisis in Greece[1]

Chrysa Leventi[a]

Manos Matsaganis[b]

Maria Flevotomou[c]

[a]ISER, University of Essex

[b]Athens University of Economics and Bussines

[c]Bank of Greece

Abstract

The current Greek crisis and the government's fiscal consolidation effort have elevated tax evasion to one of the most crucial policy issues in the domestic debate. The paper attempts to shed light on one aspect of the phenomenon, namely its distributional implications. We compare a large panel data sample of personal income tax returns in 2006-2010 (incomes earned in 2005-2009) with data from the European Union Survey of Income and Living Conditions of the same years. We show that the deviation of incomes between the two data sources is greater in the case of farming and self-employment income. Based on these findings we then calculate stylised factors of income under-reporting by income source. These factors are fed into a tax-benefit microsimulation model to provide tentative estimates of the size and distribution of income tax evasion in Greece in 2009. We estimate income under-reporting at

[1] In this study we use the European tax-benefit model EUROMOD. The model is continually being improved and updated; the results presented here represent the best available at the time of writing. We are particularly grateful to Andrea Brandolini, Nikos Christodoulakis, Francesco Figari, Carlo Fiorio, Markus Jantti, Orsolya Lelkes, Daniela Mantovani, Eric Marlier, Vassilis Monastiriotis, Alari Paulus, Emmanuel Saez, Veli-Matti Törmälehto, Panos Tsakloglou and Alberto Zanardi for their useful comments and suggestions. The usual disclaimer applies. This work has been co-financed by the European Union (European Social Fund – ESF) and Greek national funds through the Operational Program "Education and Lifelong Learning" of the National Strategic Reference Framework (NSRF) - Research Funding Program "Heracleitus II - Investing in knowledge society through the European Social Fund"

12.2%, resulting in a shortfall in personal income tax receipts of 29.7%. The paper shows that the effects of tax evasion in Greece are higher income inequality and much lower progressivity of the income tax system.

JEL Classification: H26, H23

Keywords: tax evasion, inequality, microsimulation

Corresponding author:
Chrysa Leventi
E-mail: cleventi@essex.ac.uk

1. Introduction

As most people already know, Greece is in the throes of a dramatic crisis. Starting off in 2009 as a fiscal crisis, it soon turned into a sovereign debt crisis, and finally mutated into a full-blown recession, unprecedented in depth and duration. The latest official figures estimated the size of (negative) growth in 2011 at -7.1%, -6.4% in 2012 and forecasted a -4.2% real GDP growth rate for 2013 (Eurostat, 2013). Based upon that forecast, in 2013 GDP will have contracted by 23.4% in real terms relative to 2007. So deep and drawn out a recession had never been experienced in the country's economic history at peacetime.

In May 2010, at the height of the debt crisis, the Greek government negotiated a €110 billion loan with the European Union, the European Central Bank and the International Monetary Fund. As a condition for the loan, the government signed up to a three-year Memorandum of Economic and Financial Policies, committing Greece to sweeping spending cuts, steep tax increases, and an ambitious programme of structural reforms (IMF, 2010; EC, 2010). Both the loan agreement and the Memorandum have been since revised several times, the latest case being the November 2012 'Mid-term Fiscal Strategy Framework of 2013-2016', which specified fiscal savings to the tune of 6.5% of GDP in 2013-2014.

Fiscal consolidation, a crucial part of the programme, proved moderately successful. During 2009–12, the country's primary balance improved by approximately 9% of GDP. This improvement was largely driven by the revenue side of the economy: total general government revenues followed a steady upward course, rising from 38.3% of GDP in 2009 to 44.7% in 2012. On the other hand, general government expenditures fell from 54% of GDP in 2009 to 51.4% in 2010 only to start rising again, reaching 54.8% of GDP in 2012 (Eurostat, 2013). Most of the deficit reduction (about 5% of GDP) was actually achieved in 2010, prompting the OECD to observe that 'no other OECD country has achieved such a fiscal improvement in a single year over the past three decades' (OECD, 2011). Moreover, a major part of fiscal consolidation in 2013-2014 (1.5% of GDP) is expected to come from improved tax collection (IMF, 2013a).

As recognised from the outset, the reasons for placing the issue of tax evasion high on the political agenda are numerous. First of all, because of sheer size: at an estimated 27.5% of GDP in 1999-2007, the informal economy in Greece was six percentage points above the EU average[(2)] (Schneider, 2012). Furthermore, the outstanding tax debt as a share of annual net tax revenue in Greece was 89.5% in 2010, compared to an OECD average of 13.5% (OECD, 2013). In this context, the scope of improving the fiscal efficiency of tax policies is broad.

Equally obvious is the social and political importance of progress in tackling the issue of tax evasion. By differentiating the tax burden of individuals with similar ability to pay, tax evasion exacerbates horizontal inequalities and violates the notion of equal treatment. As put by the OECD: "A decisive reduction in tax evasion is indispensable for fairness and [the] acceptance of the broader fiscal consolidation effort. [...] Reduction in tax evasion has become a major yardstick of success of the adjustment programme for many observers" (OECD, 2011). In turn, the distribution of the revenue burden across society, and perception that

[(2)] The estimated size of informal economy in 1999-2007 varies widely within the EU: from 9.7% of GDP in Luxemburg to 35.3% of GDP in Bulgaria. Greece occupies the 21st position and it is followed by Cyprus (28.0% of GDP), Latvia (29.2% of GDP), Estonia (31.2% of GDP), Lithuania (32.0% of GDP), Romania (32.6% of GDP) and Bulgaria (35.3% of GDP).

everyone is paying their fair share, plays a key role in gaining support for the fiscal adjustment mix (IMF, 2013a).

Furthermore, tax evasion can seriously undermine the intended distributional effects of tax policies. For example, if the rich of a country are more prone to evading taxes, the progressivity of income tax would turn out to be lower than expected. Likewise, the inequality and poverty estimates of a microsimulation model based on the assumption of full compliance to tax rules would portray an inaccurate reflection of reality. In the long-run, tax evasion could also lead to the introduction of more distortionary (but less easy to evade) taxes and to a sub-optimal allocation of resources in the economy.

So far, progress on that front has been at best limited. The third review of the economic adjustment programme for Greece has concluded that "fiscal consolidation was held back by a less than successful fight against tax evasion" (EC, 2011). A year later, the European Commission again stressed that "steps taken in the fight against tax evasion […] have remained far too timid" (EC, 2012). In its 2013 mission concluding statement, the International Monetary Fund bluntly stated that "very little progress has been made in tackling Greece's notorious tax evasion. The rich and self-employed are simply not paying their fair share, which has forced an excessive reliance on across-the-board expenditure cuts and higher taxes on those earning a salary or a pension" (IMF, 2013b). The latter seems to be an accurate description of the perception of most observers both at home and abroad.

Our paper focuses on one aspect of tax evasion in Greece, namely its distributional implications. It builds on earlier studies (Matsaganis et al., 2012; Matsaganis and Flevotomou, 2010), estimating the size and distribution of evasion of personal income tax in Greece in 2004 and 2006, by suggesting a more refined methodological approach. The paper combines an estimation of non-compliance patterns in terms of income under-reporting, with an estimation of the distribution of gains from tax evasion in the general population using a tax-benefit microsimulation model.

The findings of this paper can be summarised as follows. We estimate the average rate of income under-reporting in 2009 at 12.2%, resulting in a shortfall in tax receipts of 29.7%. We show that tax evasion causes inequality to rise, and the tax system to become significantly less progressive. Finally, we observe that tax evasion results in a slight -yet statistically significant- poverty reduction.

The structure of the paper is as the following. Section 2 explains the methodology of the study and presents the data. Section 3 reports the results and discusses the main findings. Section 4 reflects on the policy implications of our findings, the limitations of our approach, and issues for further research.

2. Methodology and data

The measurement of tax evasion has stimulated a large body of empirical work. Alternative methods for estimating tax evasion can be divided in four broad categories, depending on the type of information required: tax audit data, income surveys, discrepancies in economic statistics and consumption data. The first three methods also require access to (individual or aggregate) tax return data; they aim to calculate the extent of tax evasion by comparing two alternative and independent measurements of the same variable. In consumption-based studies the measurement of noncompliance is derived from the relationship of reported income and

food expenditure. Finally, although tax evasion is not identical to the informal economy, it is related to it insofar as no taxes are paid on shadow economic activities. To that extent, estimates of the size of the informal economy may also serve as indicators of the size of tax evasion.

There is compelling evidence that the rate of under-reporting of wages and salaries is much lower than in the case of self-employment earnings. The analysis of US tax audit data collected under the Taxpayer Compliance Measurement Program (TCMP) in 1988 estimated the former at 0.5% and the latter at 58.6% (Slemrod and Yitzhaki, 2002). Similar data from the successor to TCMP, the National Research Program (NCP), estimated that 57% of self-employment income was under-reported, compared to 1% of wages and salaries (Slemrod, 2007). These findings are supported by studies from other countries, or using different research designs (or both). 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, while Marino and Zizza (2008) found self-employed earnings to be under-reported by as much as 56.3%. In Hungary, Benedek and Lelkes (2011) showed that 67% of self-employment income was under-reported, compared to 4% of wages and salaries. In Greece, Matsaganis and Flevotomou (2010) estimated these rates at 24.4% and 0.6% respectively. Finally, by comparing bank data with aggregate tax return data, Artavanis et al. (2012) found that, on average, the true income of self-employed in Greece is 1.92 times larger than what is actually reported to the tax authorities.

While the evidence on patterns of non-compliance by income source seems robust, this is not the case with respect to non-compliance by income class. Although the theory predicts that tax evasion should generally rise with income (Andreoni et al., 1998), the empirical evidence is mixed. 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, as Slemrod (2007) has shown, that study classified taxpayers with high permanent income reporting business losses as low incomes, while it failed to account for illegal tax shelters and for non-compliance in partnership and corporate tax returns. Fiorio and D'Amuri (2005) 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.

Our paper builds on the methodology applied in Fiorio and D'Amuri (2005), Marino and Zizza (2008), Matsaganis and Flevotomou (2010), and Benedek and Lelkes (2011) in the sense that we also compare data from an income survey with a sample of tax returns and use the assumption that taxpayers concealing part of their income from tax authorities might consider declaring a higher figure to an anonymous interviewer. In the case of Fiorio and D'Amuri (2005), the fact that the authors had no direct access to their sample of tax data forced them to apply a post-stratification procedure that implicitly assumes away re-ranking effects, which in turn leads to an under-estimation of the regressive impact of tax evasion. On the contrary, we had direct access to a large sample of tax returns.

More specifically, our work draws on two sets of data: (a) a large panel data sample of unaudited income tax returns filed in 2006-2010 (incomes earned in 2005-2009) provided in anonymised form by the Ministry of Finance and (b) the European Union Surveys of Income and Living Conditions (EU-SILC) of 2006-2010 (incomes earned in 2005-2009).[(3)] EU-SILC 2010 contains detailed information on personal incomes and demographic characteristics of 17,611 individuals in 7,005 households (0.16% of population). The 2010 sample of tax returns covers 391,428 individuals in 196,742 tax units (3.6% of population). The tax returns sample's basic unit is the tax payer; for each tax payer the total income is available together with its breakdown into separate income items. The tax payer also reports the income of his/her spouse and the total number of children and other dependent family members. Having access to panel tax data allows us to have more than a single snapshot of income under-reporting and thus enables us to check for the existence of possible patterns concerning this behaviour.

In order to make the two samples comparable, we first have to ensure that income variables in the two datasets are consistently defined: in tax returns, incomes are reported gross of income tax and net of social insurance contributions; in EU-SILC, incomes are reported net of income tax and social insurance contributions. We use the European tax-benefit model EUROMOD to compute income taxes, which are then added to net incomes.[(4)]

For data harmonisation purposes we restrict the two samples to those eligible for submitting a tax return. In view of current tax rules, we narrowly define tax filers as those meeting at least one of the following conditions: (a) wage/salary earners with annual income above €6,000 a year; (b) persons with farming or self-employment income above €3,000 a year; and (c) persons paying non-zero tax.

We then compare average incomes across the two datasets according to their source, i.e. wages/salaries, pensions, farming and self-employment income.[(5)] In contrast with many of the above mentioned studies, we focus on income source rather than employment status or main source of income so as to allow for individuals earning income from multiple sources ('moonlighting'). In line with most of these studies, we initially assume no variation by income class (except, of course, from the variation resulting from composition effects, i.e. the distribution of income by income source).

Based on this comparison we then calculate stylised factors of income under-reporting by income source (r_i). These factors are fed into EUROMOD to provide tentative estimates of the size and distribution of income tax evasion in Greece in financial year 2010 (i.e. incomes earned in 2009). In contrast with Matsaganis et al. (2012) and Matsaganis and Flevotomou (2010), income under-reporting factors are not directly multiplied with gross incomes in order to estimate a 'synthetic' income distribution (i.e. adjusted for under-reporting) in EU-SILC data.[(6)] In accounting for tax evasion we use our initial assumption that individuals reveal their

---

[(3)] With the exception of EU-SILC 2009.

[(4)] EUROMOD combines information from income surveys with the current rules of the tax and benefit system in order to simulate entitlements to cash benefits, direct taxes and social insurance contributions due. For more information, see (Sutherland and Figari, 2013) and https://www.iser.essex.ac.uk/euromod.

[(5)] Although property income represents an important income source in the tax data, amounting to 9.3% of total declared income in 2009, it is left out of the scope of this analysis. This is due to its significant underrepresentation in the EU-SILC survey, where it represents a mere 0.4% of total declared income. For the same reason, capital income is also excluded from the analysis.

[(6)] According to this methodology, the 'full compliance' scenario provides an estimate of income tax variables assuming incomes are reported to tax authorities as observed in the survey, whereas the 'tax evasion' scenario

real total net income (say N_i) to survey interviewers. Let G_i denote individuals' real gross income (which includes the part of income which is not reported to the tax authorities). Further, let $T(G_i, r_i)$ denote the personal income tax function. The relevant tax schedule for incomes earned in 2009 is shown in Table 1. In the presence of tax evasion, it follows that:

$G_i = N_i + T((1-r_i) * G_i)$

By solving this recursive problem iteratively and for each income source separately, we obtain the values of real gross income, G_i. The income under-reporting factors are then used to separate the reported from the unreported part of gross income. In the 'tax evasion' scenario EUROMOD treats the former as subject to income tax and social insurance contributions (and as used in resource assessment for means-tested benefits), while it adds the latter to individuals' disposable income. In the 'full compliance' scenario the obtained gross income is assumed to be fully declared to the tax authorities.

Table 1: Income tax brackets and marginal tax rates

financial year 2010 (incomes earned in 2009)		
income brackets (€ p.a.)		**tax rate (%)**
from	**to**	
0	10,500	0
10,501	12,000	15
12,001	30,000	25
30,001	75,000	30
75,001	…	40

Notes: Personal income tax is individual. Spouses file a joint income tax return, but their income is separately recorded and individually taxed. The tax unit for the assessment of tax allowances and credits includes spouse and dependent child(ren). In financial year 2010 the zero-tax threshold was €12,000 for employees or pensioners, and was raised for taxpayers with dependent children (by €1,000 for one child, by €2,000 for two children, by €10,000 for three children, and by an extra €1,000 for each subsequent child).

Source: Ministry of Finance.

3. Results and discussion

Table 2 shows the average declared income in the tax data and EU-SILC and presents the percentage deviation of incomes between the two datasets. Our findings comply with previous evidence that the rate of under-reporting of wages and salaries is significantly lower than in the case of self-employment income. Persons gaining income from wages/salaries and pensions have modest or even negative rates of income under-reporting, a result which is also present in the work of Marino and Zizza (2008). On the contrary, farming and self-employment income seem to be heavily under-reported in the tax data.

Average income from wages/salaries in the EU-SILC data sample appears to be lower in 2009 than in 2007; this finding does not seem to be in line with the official statistics provided by

provides estimates of the same variables assuming incomes are under-reported to tax authorities as implied by the adjustment factors.

the Bank of Greece (2012).[7] As a result of that, total income in the tax data deviated less from EU-SILC in 2009 (2.4%) than in previous years (between 8.3% and 9.6%). Excluding 2009, the deviation of average income from pensions was from -4% to 1%, of wages/salaries from -1% to 5%, of self-employment income from 38% to 43%, and of farming income from 83% to 85%. Note that the positive (negative) sign denotes that income is lower (higher) in the tax data than in the EU-SILC survey.

Table 2: Average income and income deviation in tax data and EU-SILC

	2005	2006	2007	2009
	average income (€ per year)			
tax data sample				
wages / salaries	16,174	16,814	16,916	19,643
pensions	12,245	12,853	13,140	14,646
farming	1,834	1,763	1,809	1,711
self-employment	12,988	13,489	13,534	14,087
total	15,068	15,691	15,905	17,414
EU-SILC				
wages / salaries	16,071	17,746	17,537	17,527
pensions	11,886	12,354	13,330	13,735
farming	11,074	11,650	11,297	12,014
self-employment	22,755	23,342	21,641	24,835
total	16,527	17,353	17,352	17,847
	income deviation (%)			
wages / salaries	-0.64	5.25	3.55	-12.07
pensions	-3.02	-4.04	1.42	-6.63
farming	83.44	84.86	83.99	85.76
self-employment	42.92	42.21	37.46	43.28
total	8.83	9.58	8.34	2.43

Note: The positive (negative) sign denotes that average declared income is lower (higher) in the tax data than in the EU-SILC survey.

Source: Own elaboration of EU-SILC 2006-07-08-10 data and data provided by the Greek Ministry of Finance.

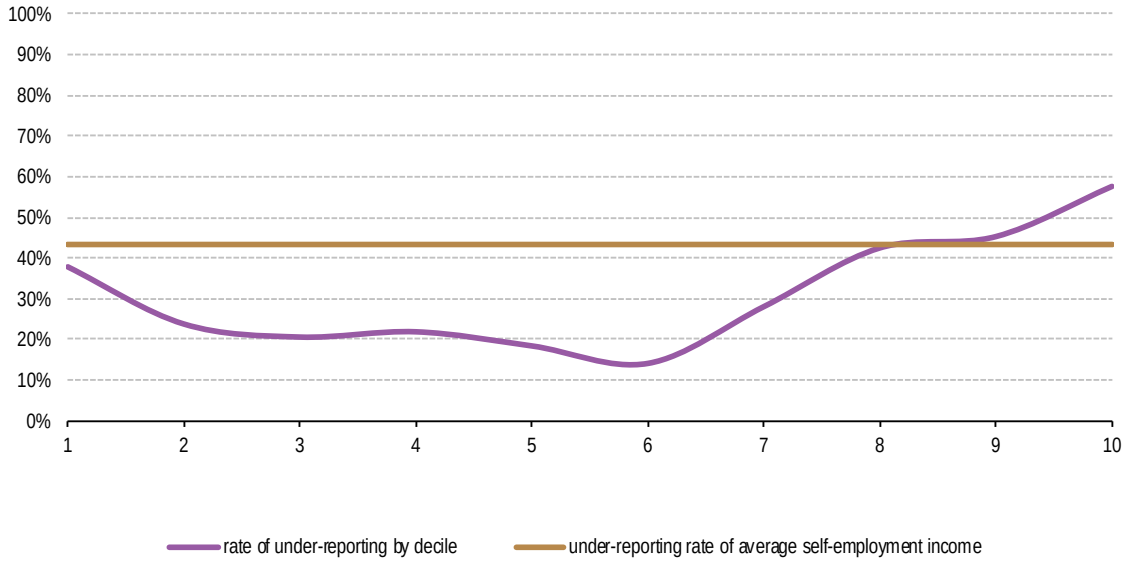
In order to study the variation of income under-reporting by income class, we focused on self-employment income. This choice was motivated by the fact that this income source amounts for a non-negligible 12.5% to 14.5% of total declared income in 2005-2009 (whereas farming income amounts for 1.6% to 2%) and by its high and time-persistent under-reporting rates.

Figure 1 shows the under-reporting rate of average self-employment income in 2009 (43%) with the respective rates by income decile. Note that income deciles were constructed according to tax filers' total declared income. The pattern of self-employment income under-reporting suggests something between a U- and a J-shape. It is higher in low-income groups

[7] According to Bank of Greece estimates, public (private) sector employees' average earnings growth was 7.1% (6.5%) in 2008 and 5.2% (2.8%) in 2009 (Bank of Greece, 2013). This increase is broadly confirmed by the tax data sample.

than middle-to-high income groups, and even higher in top incomes. More specifically, in the poorest decile average self-employment income is 38% lower in the tax data sample that in EU-SILC. The rate of income under-reporting falls as we move from decile 2 to decile 6 (14%) and then rises sharply reaching 58% in the richest decile.

Figure 1: Under-reporting rates of self-employment income by income decile (2009)



Notes: Income deciles are constructed according to tax filers' total declared income.

Sources: Own elaboration of EU-SILC 2010 (2009 incomes) data and tax data on 2009 incomes.

In order to draw out the implications of income under-reporting for the resulting distribution of post-tax disposable incomes, and in terms of tax evaded, we use the European tax-benefit model EUROMOD. Due to the significant discrepancy of income from wages/salaries in EU-SILC 2010 from official statistics, EU-SILC 2007 was used as EUROMOD's underlying dataset. All incomes variables were uprated to 2009 using official estimates provided by the Hellenic Statistical Authority (El.Stat) and the Bank of Greece (Matsaganis and Leventi, 2013). The rates of income under-reporting that were used for the derivation of real gross incomes were 0% for pensions, 5% for wages/salaries, 35% for self-employment income and 80% for farming income. These rates were chosen on the basis of the results of the comparison between the tax and the EU-SILC data but in a stylised (and in the case of self-employment and farming income, modest) way. The main reason for opting for the use of uniform rates of income under-reporting across the income distribution (and not for separate rates by income decile) was for avoiding predetermining the impact of incorporating tax evasion into the distributional analysis.

Table 3 presents the fiscal and distributional implications of tax evasion in terms of taxable income and tax receipts, inequality, poverty and tax progressivity under tax evasion and full compliance respectively. We show that tax evasion reduces taxable income by 12.2%, and lowers the tax yield by 29.7%. Moreover, when tax evasion is taken into account, taxable income and tax receipts better align with official aggregate data. All four inequality indicators

(Gini, S80/S20, coefficient of variation and Theil entropy measure) have lower values under full compliance, varying from 2.9% to 7.6%, indicating that tax evasion results in a more unequal income distribution.[8] In the absence of tax evasion, mean equivalised household disposable income (HDI) falls by 3.2%. The relative poverty threshold (defined as 60% of median equivalised HDI) for a person living alone falls from €570 to €560 per month. That results in a slight -yet statistically significant- poverty reduction of 0.33 percentage points. However, fixing the poverty line at the level of the tax-evasion scenario reverses the result and causes poverty to rise by 0.31 percentage points (from 19.96% to 20.27%). Finally, our tax progressivity and redistribution indices (Kakwani, Reynolds-Smolensky) imply that income under-reporting renders the tax system considerably more regressive (by around 32%). Note that, due to the use of uniform income under-reporting rates across the income distribution, the inequality-enhancing and progressivity-reducing results of tax evasion have to be considered as lower bound estimates.

The results on inequality and redistribution are in the opposite direction of those found in Fiorio and D'Amuri (2005) for Italy, where tax evasion leads to a slight decrease in inequality and increase in the progressivity of the tax system. On the other hand, they are broadly in line with the results of Benedek and Lelkes (2011). It seems that in both the Greek and the Hungarian case tax evasion is more beneficial to the richest income deciles of the population.

Table 3: Fiscal and distributional implications of tax evasion

	incomes earned in 2009			
	tax evasion	**full compliance**	**difference**	**official data**
fiscal effects				
taxable income (€ million)	103,735	116,426	12.23%	100,645
tax receipts (€ million)	8,787	11,394	29.67%	9,015
average tax rate	8.47%	9.79%	+1.30 p.p.	8.96%
inequality effects				
Gini	0.348	0.338	-2.85%	0.329
S80/S20	6.040	5.771	-4.45%	5.600
coefficient of variation	0.799	0.745	-6.80%	n/a
Theil entropy measure	0.221	0.204	-7.58%	n/a
poverty effects				
at-risk-of-poverty rate	19.96%	19.63%	-0.33 p.p.	20.10%
at-risk-of-poverty threshold (60% of median equivalised HDI)	570	560	-1.76%	598
mean equivalised HDI	1,163	1,126	-3.22%	1,164
distributional effects				
Kakwani	0.020	0.026	31.60%	n/a

[8] All estimated differences in inequality rates are statistically significant at the 5% level (P<0.05). They were calculated with the use of the statistical package DASP (V2.2).

Reynolds-Smolensky	0.033	0.043	31.89%	n/a

Notes: 'Full compliance' provides estimates of income tax variables assuming incomes are fully reported to tax authorities. 'Tax evasion' provides estimates of the same variables assuming incomes are under-reported to tax authorities. Fiscal effects (i.e. tax receipts) are non-equivalised. Distributional effects are computed on the basis of household disposable income, equivalised by the "modified OECD" equivalence scale. All estimated differences in inequality and poverty indices are statistically significant at the 5% level ($P<0.05$). All figures are in nominal prices.

Sources: EUROMOD version F4.00, DASP V2.2, Ministry of Finance and El.Stat.

4. Conclusion

The paper shows tax evasion in Greece to increase inequality and to reduce tax progressivity, while causing a considerable loss of tax receipts. Can these findings be trusted?

The difference between static and dynamic effects of tax evasion is a cause of concern. 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 dynamic effects lies 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.

While our approach focuses on personal income tax, the distributional impact of evading other taxes (e.g. company tax, capital tax, value added tax) is likely to reinforce these effects. Evasion of social insurance contributions -often taking place at the same time as income taxes- also falls outside the scope of this analysis.

Our approach relies on matching data from tax returns with survey data. While we have made an 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 leave our estimates vulnerable to measurement error. Therefore, our results should be best seen as tentative estimates under an experimental research design.

Our key assumption is to treat incomes observed in EU-SILC 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 is reasonable, but not necessarily correct. There are reasons to suspect that the actual but unknown level of tax evasion may be considerably higher than that implied by our estimates. In particular, there is some evidence that the very same factors causing tax evasion, combined with the wish of tax-evading individuals to be somehow 'consistent', may cause under-reporting in income surveys as well, albeit at a lower level (Elffers et al., 1987).

In spite of the above caveats, we believe that our results capture essential aspects of the problem we set out to explore. The fact that both taxable income and tax receipts better align with official statistics when tax evasion is accounted for in the EU-SILC data reinforces this belief. Moreover, our core finding, that tax evasion in Greece has a regressive impact, seems reasonably robust. In view of that, and under conditions of severe crisis, the task of combating

tax evasion assumes more urgency than ever before.

5. References

Andreoni, J., Erard, B. and Feinstein, J. (1998), 'Tax compliance', *Journal of Economic Literature* 36: 818-60.

Artavanis, A, Morse, A. and Tsoutsoura, M. (2012), Tax Evasion Across Industries: Soft Credit Evidence from Greece, Chicago Booth Paper No. 12-25 (4).

Bank of Greece (2013), 2012 Governor's Report, Athens: Bank of Greece.

Benedek, D. and Lelkes, O. (2011), 'The distributional implications of income under-reporting in Hungary', *Fiscal Studies*, 32 (4): 539–60.

Christian, C.W. (1994), 'Voluntary compliance with the individual income tax: results from the 1988 TCMP study', IRS Research Bulletin, 1993/1994, Publication 1500, 35–42, Washington DC: Internal Revenue Service.

EC (2010), The Economic Adjustment Programme for Greece (first review, summer 2010), European Economy Occasional Papers no. 61, European Commission, Directorate General for Economic and Financial Affairs, Luxembourg: Office for Official Publications of the European Communities.

EC (2011), The Economic Adjustment Programme for Greece (third review, winter 2011), European Economy Occasional Papers no. 77, European Commission, Directorate General for Economic and Financial Affairs, Luxembourg: Office for Official Publications of the European Communities.

EC (2012), The Second Economic Adjustment Programme for Greece (March 2012), European Economy Occasional Papers no. 94, European Commission, Directorate General for Economic and Financial Affairs, Luxembourg: Office for Official Publications of the European Communities.

Elffers, H., Weigel, R.H. and Dick, J. (1987), 'The consequences of different strategies for measuring tax evasion behaviour', *Journal of Economic Psychology*, 8: 311-37.

Eurostat (2013) Online statistics (last accessed: October 2013), Luxemburg: Eurostat.

Feldman, N. and Slemrod, J. (2007), 'Estimating tax noncompliance with evidence from unaudited tax returns', *Economic Journal*, 117: 327-52.

Fiorio, C.V. and D'Amuri, F. (2005), 'Workers' tax evasion in Italy', *Giornale degli Economisti e Annali di Economia*, 64: 241-64.

IMF (2010), Greece: staff report on request for stand-by arrangement, Country Report no. 10/110, Washington DC: International Monetary Fund.

IMF (2013a), Greece: First and Second Reviews Under the Extended Arrangement Under the Extended Fund Facility, Request for Waiver of Applicability, Modification of Performance Criteria, and Rephasing of Access, Country Report no. 13/20, Washington DC: International Monetary Fund.

IMF (2013b), Greece – 2013 Article IV Consultation Concluding Statement of the IMF Mission, Washington DC: International Monetary Fund.

Lyssiotou, P., Pashardes, P. and Stengos, T. (2004), "Estimates of the black economy based on consumer demand approaches", *Economic Journal*, 114: 622-40.

Marino, M.R. and Zizza, R. (2008), L'evasione dell'Irpef: una stima per tipologia di contribuente, Rome: Bank of Italy.

Matsaganis, M. and Flevotomou, M. (2010), 'Distributional implications of tax evasion in Greece', Hellenic Observatory Papers on Greece and Southeast Europe GreeSE Paper no. 31, The Hellenic Observatory, LSE, London, UK.

Matsaganis, M. and Leventi, C. (2013), 'The distributional impact of the Greek crisis in 2010', *Fiscal Studies*, 34 (1): 83-108.

Matsaganis M., Leventi, C. & Flevotomou, M. (2012), 'The crisis and tax evasion in Greece: what are the distributional implications?', *CESifo Forum*, 13 (2): 26-32.
OECD (2011), Economic Surveys: Greece, Paris: Organisation for Economic Co-operation and Development.
OECD (2013), Online tax administration database (last accessed: August 2013), Paris: Organisation for Economic Co-operation and Development.
Pashardes, P. and Polycarpou, A. (2008), 'Income tax evasion, inequality and poverty', *Cyprus Economic Policy Review*, 2 (2): 37-49.
Pissarides, C.A. and Weber, G. (1989), 'An expenditure-based estimate of Britain's black economy', *Journal of Public Economics*, 39: 17-32.
Sandmo, A. (2005), 'The theory of tax evasion: a retrospective view', *National Tax Journal*, 58 (4): 643-63.
Schneider, F. (2012), 'The shadow economy and work in the shadow: what do we (not) know?', IZA Discussion Paper 6423, Bonn: Institute for the Study of Labor.
Slemrod, J. (2007), 'Cheating ourselves: the economics of tax evasion', *Journal of Economic Perspectives*, 21 (1): 25-48.
Slemrod, J. and Yitzhaki, S. (2002), 'Tax avoidance, evasion, and administration', in A.J. Auerbach and M. Feldstein (editors) *Handbook of Public Economics*, Elsevier, Amsterdam: 1425-42.
Sutherland, H. and Figari, F. (2013), 'EUROMOD: the European Union tax-benefit microsimulation model', *International Journal of Microsimulation*, vol. 6, issue 1, pp. 4-26.