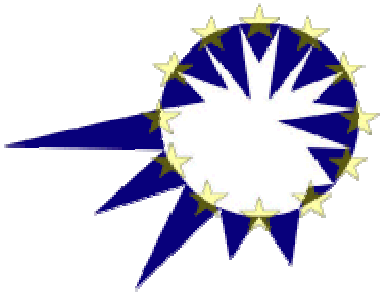

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Deliverable 2.7: Implications of tax evasion for tax-benefit models

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Implications of tax evasion for tax-benefit models

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Tax evasion is a widespread phenomenon that has significant distributional implications insofar, as it distorts tax liabilities and consequently alters tax payers' disposable incomes. Therefore, ignoring tax evasion is likely to cause analysts seriously to misjudge the distributive and fiscal effect of changes in social benefits and the tax system. For this reason, the objective of this paper is to provide a standardised procedure for correcting income data for income tax evasion. The paper summarises the main issues that arise from accounting for tax evasion in three countries (Greece, Hungary and Italy) in the context of the European tax-benefit model EUROMOD.

Our aim is to provide the tax-benefit modeller with guidelines and advise on both conceptual and technical aspects of such exercise. Examples are given throughout, drawing mainly on the Greek experience. The paper is organised as follows: Section 1 sets out the objectives and our general strategy. Section 2 highlights the critical issues regarding data handling. Section 3 discusses the crucial conceptual and practical aspects of our methodology. Section 4 presents the incorporation of our results in EUROMOD. Finally, section 5 points to the limitations and possible extensions of our work.

1. **Objectives and general strategy**

The aim of this project was threefold. The first and most obvious aspect was to provide an estimate of the size of tax evasion as a proportion of household income and to quantify its effect on tax receipts. The second aspect had a qualitative nature and concerned the study of the characteristics of tax evaders. The third aspect focused on the distributional effects of tax evasion, i.e. the analysis of the potential effects of tax evasion in terms of the progressivity of the tax system, horizontal and vertical equity, inequality and poverty, and re-ranking in the income distribution.

Such questions can be examined within a tax-benefit model provided the income distribution reported to the tax authorities is imputed, embedded in the model and results are compared with those of the income distribution underlying the income survey on which the tax-benefit

model is based. The crucial assumption underlying the general strategy is that respondents of the income survey truthfully and informatively reveal their income to the survey conductors.

2. **Data issues**

Our strategy, as outlined above, is grounded upon the comparison of two income distributions: the 'true' income and the 'reported' income distribution of taxpayers. The 'true' income distribution is assumed to be revealed in the income survey underlying the tax-benefit model. On the other hand, the 'reported' income distribution – describing incomes as reported to the tax authorities – has to be obtained from an external data source, such as for example a sample of income tax returns.

Ideally, 'reported' incomes would be directly introduced into the tax-benefit model. The effective requirement for this is the presence of a common personal identifier allowing the merging of the external data source with the income survey embedded in the tax-benefit model. In reality, however, this is typically impossible, as the most obvious candidate for detailed information on reported incomes is tax returns administrative data, which is highly confidential and anonymous. All three country studies in this project relied on such data. Hence, practical considerations necessitate the indirect imputation of the 'reported' income distribution.

Prior to the imputation exercise, which is discussed in detail in the next section, at least two data validity checks are essential. First, preliminary checks should ensure that the tax returns sample obtained is representative of the population of tax filers. Second, the distribution of tax filers across income brackets in the tax returns sample should be similar to that underlying the income survey.

The representativeness of the sample may be assessed by comparing it to official aggregate statistics alongside two dimensions:

(i) distribution of the population across demographic groups, and

(ii) average family income by demographic group.

The choice of the demographic breakdown is of course constrained both by the availability of the relevant variables in the tax returns data and by the demographic breakdown achieved in aggregate statistics tables. To illustrate this, the above exercise was implemented across 13 geographical peripheries and 4 occupational groups in Greece. Table A.1 in the Appendix

presents the sample's distribution (column TR) of tax filers next to the distribution implied by aggregate statistics (column AG). Table A.2 similarly compares the average tax unit income distributions. Tables A.1 and A.2 indicate that there were indeed distributional discrepancies that necessitated corrective action.

Reconciliation of our sample with population aggregates was achieved by applying appropriate weights to the tax returns data. Weights calculated to adjust our sample's population distribution and average family income are presented in Tables A.3 and A.4 respectively. Weights are essentially the ratio of the aggregate data value to the tax returns sample value for the relevant demographic sub-group. Tables A.5 and A.6 present the post-weighing distributions achieved.

The second critical issue essentially boils down to selecting the reference population for which 'true' and 'reported' incomes will be compared. Options considered here may be all tax filers, tax filers reporting positive income, tax filers reporting income above the tax-free threshold or tax filers paying a positive amount of tax. Independent of choice, an imminent obstacle for the tax-benefit modeller is how to identify tax filers in the income survey, as typically this information is not available. However, this may be circumvented if there are legal rules which exempt population subgroups from filling in a tax form, and these rules can be simulated within the tax-benefit model. In this case the obligation to fill in a tax form can be output as an indicator variable.

For example, in Greece, those *not* having to fill in a tax form are individuals:

* whose tax base is less than €3,000 per annum, or
* whose only source of taxable income is employment income not exceeding €6,000 per annum or
* who are farmers whose self-employment income does not exceed €3,000 per annum.

However, individuals falling under the categories below are still obliged to fill in a tax form even if their income is low. These are:

* the self-employed,
* those owning a car or boat,
* those with gross property income greater than €600 per annum,
* those earning self-employment income from agriculture even though they are not farmers,

* and numerous other cases specified in detail in income tax rules.

The above, except for the cases referred to last, were modelled in EUROMOD as a new policy to derive an estimate of the tax filer population in the income survey (see Figure 1 in the Appendix). Note that as numerous cases making tax filing compulsory could not be fully modelled, we anticipate that our estimate of the tax filer population is a lower-bound estimate. This is a constraint relevant to all tax-benefit modellers as the full information set required for a perfect simulation of the tax filer population is unlikely to be found in any income survey.

Once the tax filer population has been identified in the income survey, the next step is to examine how, for different definitions of the reference population, the resulting distribution of tax filers across income brackets compares to that obtained from the tax returns data. A graphical representation of the options considered may in this case be very informative. For example, Figures 2 and 3 in the Appendix graphically demonstrate the comparison made for two reference populations in Greece: tax filers reporting positive income and tax filers reporting income above the tax-free threshold. Figure 2 shows that the tax records data is characterised by a prominent concentration of tax filers in income brackets below the tax-free threshold when compared to the income survey. However, once we curtail our reference population to include only tax filers reporting income above the tax-free threshold, the two distributions are sufficiently harmonious as shown in Figure 3. On these grounds, this was our preferred reference population.

3. **Methodology**

As discussed in the previous section, at the core of our methodology lays the imputation of the 'reported' income distribution or, in other words, the adjustment of incomes contained in the income survey so as to replicate as closely as possible the income distribution underlying the tax returns data. In this context, the first step naturally arising is the comparison of incomes across the two data sources. The concomitant conceptual issues facing the modeller are the quest for the appropriate income concept to compare and the decision upon the suitable level of comparison. Tax returns data contains information not only on total reported income but also on reported income by income source, i.e. wages and salaries, self-employment income from agriculture, other self-employment income, and pensions. Further, tax returns data usually provides basic demographic information, which may be exploited in order to define sub-groups whose characteristics are informative of tax evasive behaviour.

There are hence many options open to the modeller, ranging from the most simplistic to more sophisticated comparisons. In any case, the crucial issue is that income concepts and demographic variables should be unanimously defined in the two data sources. For example, should the modeller decide to compare total incomes, a variable or income list should be created within the tax-benefit model which contains the exact same income components as the ones which form part of the total reported income in tax returns. For example, in the Greek case, employees and pensioners report their total income to the tax authorities *net of social insurance contributions*. This amounts to subtracting from an existing income list in EUROMOD containing income components that are in principle taxable ('taxabley') employees' and pensioners' social insurance contributions to create a new income list, named 'compy'. Figure 4 in the Appendix shows how 'taxabley' compares to 'compy'. With regard to the choice of the level of comparison, the modeller can experiment with different sub-group specifications: gender, family status, region, main income source or other relevant characteristics may be combined to define the groups for which average incomes will be most informatively compared across the two data sources.

To illustrate the issues outlined above, for Greece, the chosen breakdown was by 4 *regions*

(a) Thrace, Macedonia and Thessaly (Northern)

(b) Central, Western and Peloponnese (Southern)

(c) Athens and surrounding area (Athens)

(d) Islands

and 4 *main income sources*

(i) wages and salaries

(ii) pensions

(iii) self-employment income from agriculture

(iv) other self-employment income.

The comparison was made on an income source basis. Effectively, for each region, average wages were compared for those whose main income source was wages and salaries, average pensions were compared for those who main income source was pensions and so on. Wages and salaries as well as pensions in the income survey had to be redefined so as to be net of

social insurance contributions. A calculation algorithm was further applied to total self-employment income as contained in the income survey to split it into its two components, self-employment income from agriculture and other self-employment income, thus making it directly comparable with tax returns data. Comparability considerations also necessitated the addition of property income and maintenance payments onto the non-agricultural self-employment income component. The output of this comparison can be seen in Table A.7 of the Appendix, which presents for each subgroup the ratio of two averages: that of the relevant income component as reported in tax returns to its value as self-reported in the income survey. In effect, Table A.7 presents the factors by which we need to adjust the relevant income components in the survey data in order to obtain their reported values to the tax authorities. The imputed 'reported' income distribution will then be the sum of these adjusted components. In the next section we discuss how these results may be incorporated in a tax benefit model.

4. **Incorporation in EUROMOD**

Two driving forces underlie the emerging changes in tax benefit models. First and foremost is the desire for flexibility in the future use of the model. Flexibility considerations effectively concern the treatment of the estimated 'adjustment factors'. A first option would be to adjust income components externally and then run the tax benefit model on the updated income survey data. Alternatively, adjustment factors could be introduced in EUROMOD as separate *parameters* that may be revised or updated. New modules in the model would then simulate the synthetic (imputed) income distribution as well as that part of income which is not reported to the tax authorities. Clearly, the second option is superior on flexibility grounds and would be the choice recommended to the tax-benefit modeller.

The parameterisation within EUROMOD of the estimated adjustment factors was in fact the chosen strategy for Greece. Figure 5 in the Appendix shows how adjustment factors for Northern Greece were applied to various income components, while Table 1 below presents the underlying calculations.

Similar calculations are performed for all four regions. The synthetic (imputed) income distribution may then be defined as an income list consisting of the relevant income components. This is illustrated in Figure 4 of the Appendix, where the income list 'impy' is defined.

Table 1

income component	input variable (read-off data)	adjustment factor	output variable (simulated)
wages and salaries	coEMPY	0.978	coEMPY = coEMPY×0.978
self-employment income from agriculture	grYSEAGTX	0.412	coSLFEMY = 0.412×grYSEAGTX+ 0.860×grYSETX
other self-employment income	grYSETX	0.860	
pensions (old-age benefits)	grben_oa	1.000	grben_oa = 1.000×grben_oa
pensions (invalidity pension)	grben_inv	1.000	grben_inv = 1.000×grben_inv
pensions (survivors' pension)	grben_surv	1.000	grben_surv = 1.000×grben_surv
pensions (orphans' pension)	grben_or	1.000	grben_or = 1.000×grben_or
pensions (farmers' pension)	grogapns	1.000	grogapns = 1.000×grogapns

Adjustment factors should be parameterised in an additional module, to be run last, which calculates that part of income which is unreported to the tax authorities. The ultimate goal is for the tax-benefit model to add these unreported components onto households' disposable incomes taken into account in the distributional analysis. Figure 6 in the Appendix shows how adjustment factors for Northern Greece were used to calculate unreported income components. Table 2 overleaf summarises the calculations performed in the model.

Independent of whether adjustment of survey incomes takes place internally or externally, a second source of changes in the tax-benefit model concerns income definitions. In practical terms, the modeller may need to implement changes in the income lists used in the tax evasion simulation. To avoid confusion with baseline results, it is advisable that a new income list set is created. The modeller should investigate which income lists are affected by the imputation of the various income components. For example, in Greece EUROMOD simulates total 'reported' self-employment income (coSLFEMY) based upon survey information on self-employment income from agriculture (grYSEAGTX) and other self-employment income (grYSETX).

Table 2

income component	**input variable (simulated)**	**adjustment factor**	**output variable (simulated)**
wages and salaries	coEMPY	0.978	co_temp1 = coEMPY/0.978 – coEMPY
self-employment income from agriculture	grYSEAGTX*****	n.a.	co_temp2 = grYSEAGTX + grYSETX – coSLFEMY
other self-employment income	grYSETX*****	n.a.	
all self-employment income	coSLFEMY	n.a.	
pensions (old-age benefits)	grben_oa	1.000	co_temporary_var1 = grben_oa/1.000 – grben_oa
pensions (invalidity pension)	grben_inv	1.000	co_temporary_var10 = grben_inv/1.000 – grben_inv
pensions (survivors' pension)	grben_surv	1.000	co_temporary_var2 = grben_surv/1.000 – grben_surv
pensions (orphans' pension)	grben_or	1.000	co_temporary_var3 = grben_or/1.000 – grben_or
pensions (farmers' pension)	grogapns	1.000	co_temporary_var4 = grogapns/1.000 – grogapns

***** These two variables are read off the data.

However, as already mentioned, the non-agricultural part of self-employment income (grYSETX) is defined so as to contain property income and maintenance payments, which are not included in the baseline definition of coSLFEMY. Table 3 below shows the mapping between variable definitions in the baseline and tax evasion simulations.

Table 3

Baseline	**Tax evasion**
coSLFEMY	coSLFEMY
coPROPY	
coMAINTY	

The immediate implication for the tax-benefit modeller is to check which income lists contain the above variables and in the new income list set replace the presence of all three components in a specific income list with just coSLFEMY. In Greece, this affected eight income lists.

The income list which will inevitably have to be changed is that of standard disposable income. This is because in the baseline specification income components are assumed to be truly revealed, whereas in the tax evasion scenario income components are as 'reported' to the tax authorities. Clearly, the unreported part of incomes needs to be added onto disposable incomes for an informative distributional analysis to take place. Figure 7 in the Appendix compares the standard disposable income list in Greece across baseline and tax evasion scenarios.

5. **Issues for further research**

The analysis presented in this paper may be extended along three dimensions, all of which are implementable in the framework of a tax-benefit model. The first refinement concerns the introduction of stochastic variation in the adjustment factors used to simulate the 'reported' income distribution. The assumption that all members of a given category under-report their incomes by the same ratio is somehow crude: some will do so by a higher percentage, some by a lower one, while some others may even faithfully reveal their incomes to the tax authorities. From a technical point of view, stochastic variation involves introducing random noise around estimated adjustment factors by category.

Second, the modeller may extend the scope of analysis by incorporating not only tax evasion but also evasion of social insurance contributions into the tax-benefit model. Note that part of contribution evasion has been implicitly captured in the context of the analysis presented in this paper. Insofar as social insurance contributions have been simulated in EUROMOD upon lower than true incomes, we may at least obtain a lower bound estimate of contribution evasion. However, a full treatment of the issue would also include cases that fully abstain from social insurance contribution payments.

Finally, an area for further research concerns the dynamic effects of tax evasion. Analysing the distributional effects of tax evasion solely by looking at its static impact on disposable incomes is perhaps overly simplistic insofar as taxation affects decisions concerning labour

supply and demand, the allocation of disposable income between consumption and savings, the allocation of consumption between different goods and services, and so on. Such behavioural responses may be accounted for in a tax-benefit model through a link to an externally estimated labour supply function.

Appendix

Table A.1

Pre-Weighting Distribution of Population										
(AG=Published Aggregate Data, TR=Sample of Tax Records)										
	Farmers		Employees		Self-employed		Pensioners		All	
	AG	TR	AG	TR	AG	TR	AG	TR	AG	TR
Athens	0.7%	0.6%	16.5%	16.6%	11.8%	11.6%	9.8%	9.7%	38.8%	38.4%
Thessaly	0.8%	0.8%	1.9%	1.9%	1.8%	1.7%	1.9%	2.0%	6.4%	6.4%
Peloponnese	0.9%	0.9%	1.4%	1.4%	1.5%	1.5%	1.5%	1.4%	5.3%	5.2%
Central	0.6%	0.7%	1.5%	1.5%	1.2%	1.1%	1.4%	1.4%	4.7%	4.7%
Western	0.8%	0.8%	1.8%	2.0%	1.5%	1.6%	1.7%	1.7%	5.7%	6.0%
Crete	0.8%	0.7%	1.7%	1.7%	1.5%	1.6%	1.2%	1.1%	5.1%	5.1%
E. Macedonia, Thrace	0.6%	0.6%	1.5%	1.7%	1.6%	1.5%	1.5%	1.6%	5.2%	5.4%
Central Macedonia	1.3%	1.4%	5.6%	5.7%	5.4%	5.3%	4.5%	4.5%	16.8%	17.0%
W. Macedonia	0.2%	0.2%	0.8%	0.7%	0.9%	0.8%	0.7%	0.7%	2.6%	2.5%
Epirus	0.3%	0.3%	0.8%	0.7%	0.9%	0.9%	0.8%	0.8%	2.8%	2.7%
North Aegean	0.3%	0.3%	0.5%	0.5%	0.6%	0.7%	0.5%	0.5%	1.9%	1.9%
South Aegean	0.2%	0.2%	1.0%	1.0%	1.0%	1.0%	0.5%	0.6%	2.7%	2.8%
Ionian Islands	0.2%	0.2%	0.6%	0.6%	0.7%	0.8%	0.5%	0.6%	2.0%	2.1%
Total	7.5%	7.6%	35.6%	36.0%	30.3%	29.9%	26.6%	26.5%	100.0%	100.0%

Table A.2

Pre-Weighting Average Household (Tax Unit) Income										
(AG=Published Aggregate Data, TR=Sample of Tax Records)										
	Farmers		Employees		Self-employed		Pensioners		All	
	AG	TR	AG	TR	AG	TR	AG	TR	AG	TR
Athens	14,411	14,962	17,279	16,897	17,331	17,346	14,721	14,713	16,597	16,446
Thessaly	8,617	8,661	14,905	14,363	11,814	13,273	10,352	9,955	11,900	12,036
Peloponnese	7,397	8,193	13,916	13,486	10,783	11,533	10,217	10,124	10,914	11,117
Central	10,417	10,435	14,497	14,488	12,618	11,903	10,928	10,408	12,443	12,107
Western	7,734	7,962	14,329	13,616	12,342	11,227	10,456	11,252	11,788	11,535
Crete	9,019	9,019	13,897	13,510	13,507	13,563	11,517	11,363	12,507	12,359
E. Macedonia, Thrace	7,607	7,363	14,457	14,435	11,137	12,581	9,866	9,668	11,320	11,657
Central Macedonia	8,444	8,797	14,372	14,493	12,081	11,717	11,147	11,273	12,320	12,304
W. Macedonia	9,163	8,936	16,514	17,796	10,296	11,843	10,332	11,243	12,019	13,154
Epirus	7,487	7,944	15,200	14,213	12,022	13,059	10,588	9,616	12,081	11,895
North Aegean	9,181	9,979	15,317	14,249	10,560	11,569	10,700	11,018	11,611	11,861
South Aegean	9,653	9,524	12,474	12,772	12,691	10,905	11,543	11,705	12,180	11,667
Ionian Islands	7,194	6,950	12,183	11,394	10,751	12,068	10,651	9,987	10,859	10,927
Total	8,955	9,198	15,698	15,424	14,003	14,130	12,198	12,181	13,749	13,704

Table A.3

Weights for the Distribution of Population				
	Farmers	Employees	Self-employed	Pensioners
Athens	1.119	0.992	1.021	1.017
Thessaly	0.960	0.980	1.074	0.999
Peloponnese	0.943	1.032	1.024	1.034
Central	0.881	1.009	1.065	1.006
Western	0.960	0.891	0.956	0.998
Crete	1.118	1.021	0.938	1.021
E. Macedonia, Thrace	1.122	0.912	1.022	0.952
Central Macedonia	0.915	0.978	1.016	1.007
W. Macedonia	1.061	1.058	1.129	0.997
Epirus	0.928	1.141	1.041	1.049
North Aegean	0.939	1.046	0.878	1.056
South Aegean	0.956	0.986	0.969	0.941
Ionian Islands	0.879	1.036	0.951	0.857

Table A.4

Weights for Average Family Income				
	Farmers	Employees	Self-employed	Pensioners
Athens	0.963	1.023	0.999	1.001
Thessaly	0.995	1.038	0.890	1.040
Peloponnese	0.903	1.032	0.935	1.009
Central	0.998	1.001	1.060	1.050
Western	0.971	1.052	1.099	0.929
Crete	1.000	1.029	0.996	1.014
E. Macedonia, Thrace	1.033	1.002	0.885	1.020
Central Macedonia	0.960	0.992	1.031	0.989
W. Macedonia	1.025	0.928	0.869	0.919
Epirus	0.943	1.069	0.921	1.101
North Aegean	0.920	1.075	0.913	0.971
South Aegean	1.014	0.977	1.164	0.986
Ionian Islands	1.035	1.069	0.891	1.066

Table A.5

Post-Weighting Distribution of Population										
(AG=Published Aggregate Data, TR=Sample of Tax Records)										
	Farmers		Employees		Self-employed		Pensioners		All	
	AG	TR	AG	TR	AG	TR	AG	TR	AG	TR
Athens	0.7%	0.7%	16.5%	16.5%	11.8%	11.8%	9.8%	9.8%	38.8%	38.8%
Thessaly	0.8%	0.8%	1.9%	1.9%	1.8%	1.8%	1.9%	1.9%	6.4%	6.4%
Peloponnese	0.9%	0.9%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	5.3%	5.3%
Central	0.6%	0.6%	1.5%	1.5%	1.2%	1.2%	1.4%	1.4%	4.7%	4.7%
Western	0.8%	0.8%	1.8%	1.8%	1.5%	1.5%	1.7%	1.7%	5.7%	5.7%
Crete	0.8%	0.8%	1.7%	1.7%	1.5%	1.5%	1.2%	1.2%	5.1%	5.1%
E. Macedonia, Thrace	0.6%	0.6%	1.5%	1.5%	1.6%	1.6%	1.5%	1.5%	5.2%	5.2%
Central Macedonia	1.3%	1.3%	5.6%	5.6%	5.4%	5.4%	4.5%	4.5%	16.8%	16.8%
W. Macedonia	0.2%	0.2%	0.8%	0.8%	0.9%	0.9%	0.7%	0.7%	2.6%	2.6%
Epirus	0.3%	0.3%	0.8%	0.8%	0.9%	0.9%	0.8%	0.8%	2.8%	2.8%
North Aegean	0.3%	0.3%	0.5%	0.5%	0.6%	0.6%	0.5%	0.5%	1.9%	1.9%
South Aegean	0.2%	0.2%	1.0%	1.0%	1.0%	1.0%	0.5%	0.5%	2.7%	2.7%
Ionian Islands	0.2%	0.2%	0.6%	0.6%	0.7%	0.7%	0.5%	0.5%	2.0%	2.0%
Total	7.5%	7.5%	35.6%	35.6%	30.3%	30.3%	26.6%	26.6%	100.0%	100.0%

Table A.6

Post-Weighting Average Household (Tax Unit) Income										
(AG=Published Aggregate Data, TR=Sample of Tax Records)										
	Farmers		Employees		Self-employed		Pensioners		All	
	AG	TR	AG	TR	AG	TR	AG	TR	AG	TR
Athens	14,411	14,408	17,279	17,285	17,331	17,329	14,721	14,727	16,597	16,600
Thessaly	8,617	8,617	14,905	14,909	11,814	11,813	10,352	10,353	11,900	11,900
Peloponnese	7,397	7,399	13,916	13,918	10,783	10,783	10,217	10,215	10,914	10,915
Central	10,417	10,414	14,497	14,502	12,618	12,617	10,928	10,928	12,443	12,444
Western	7,734	7,731	14,329	14,324	12,342	12,339	10,456	10,453	11,788	11,784
Crete	9,019	9,019	13,897	13,902	13,507	13,509	11,517	11,522	12,507	12,511
E. Macedonia, Thrace	7,607	7,605	14,457	14,464	11,137	11,134	9,866	9,861	11,320	11,320
Central Macedonia	8,444	8,445	14,372	14,377	12,081	12,081	11,147	11,149	12,320	12,322
W. Macedonia	9,163	9,160	16,514	16,515	10,296	10,291	10,332	10,332	12,019	12,018
Epirus	7,487	7,491	15,200	15,194	12,022	12,028	10,588	10,587	12,081	12,081
North Aegean	9,181	9,181	15,317	15,318	10,560	10,563	10,700	10,699	11,611	11,611
South Aegean	9,653	9,657	12,474	12,478	12,691	12,693	11,543	11,541	12,180	12,183
Ionian Islands	7,194	7,193	12,183	12,180	10,751	10,753	10,651	10,646	10,859	10,857
Total	8,955	8,955	15,698	15,702	14,003	14,002	12,198	12,200	13,749	13,751

Table **A.**7: Adjustment factors for income under-reporting (2004)

	Athens	Northern	Southern	Islands
wages / salaries	1.000	0.978	0.992	1.000
pensions	1.000	1.000	1.000	1.000
agriculture	0.468	0.412	0.530	0.519
self employment	0.770	0.860	0.640	0.712

Figure 1: Identifying those who have no legal obligation to fill in a tax form

pa	param_name	Period	firs	GR_2004	end_system
	first_module			**Policy to identify those who have no legal obligation to fill in a tax form**	
	co_formula				
	formula			il1 - var1	*calculate difference between taxableY and coEMPY*
	nvars			1	*(to be used below)*
	nils			1	
	il1			taxableY	
	var1			coEMPY	
	output_var			co_temp1	
	TAX_UNIT			individual_gr	
	SWITCH			1	
	co_formula				
	formula			var1	
	nvars			1	
	var1			grCARBOAT	
	output_var			co_temp2	
	TAX_UNIT			household_gr	
	SWITCH			1	
	co_SBEN_Elig				
	first_cond			0	
	eq_var1			-1	
	ge_var1			-1	
	eq_var2			-1	
	le_var1			1	
	le_var2			2	
	le_inc1			2	
	eq_var3			3	
	le_var3			3	
	end_cond			0	
	eq_var1_name			coEMPST	***not eligible if ...***
	eq_var1_lt			2	*... self-employed*
	ge_var1_name			coPROPY	
	ge_var1_lt			600	*... property income exceeds this amount*
	eq_var2_name			co_temp2	*... owning a car/boat (head of unit)*
	eq_var2_lt			1	
	le_var1_name			gr_it_taxbase	***eligible if ... either***
	le_var1_lt	y		3000	*taxable income is less than this amount*
	le_var2_name			co_temp1	
	le_var2_lt			1	*... or: employment income is equal to taxable income (allow a difference of 1 for rounding reasons) ...*
	le_inc1_lt	y		6000	*... and does not exceed this amount*
	le_inc1_il			taxableY	
	eq_var3_name			coEMPST	
	eq_var3_lt			1	*... or: is a farmer ...*
	le_var3_lt	y		3000	*... and self-employment income does not exceed this amount*
	le_var3_name			coSLFEMY	
	SBEN_elig_type			1	
	TAX_UNIT			individual_gr	
	SWITCH			1	
	co_set_var				
	nvars			1	*transfer result from co_sben_elig to module output variable*
	var1			cosim_polout	
	def_var1			co_sben_elig	
	TAX_UNIT			individual_gr	
	SWITCH			1	

Figure 2

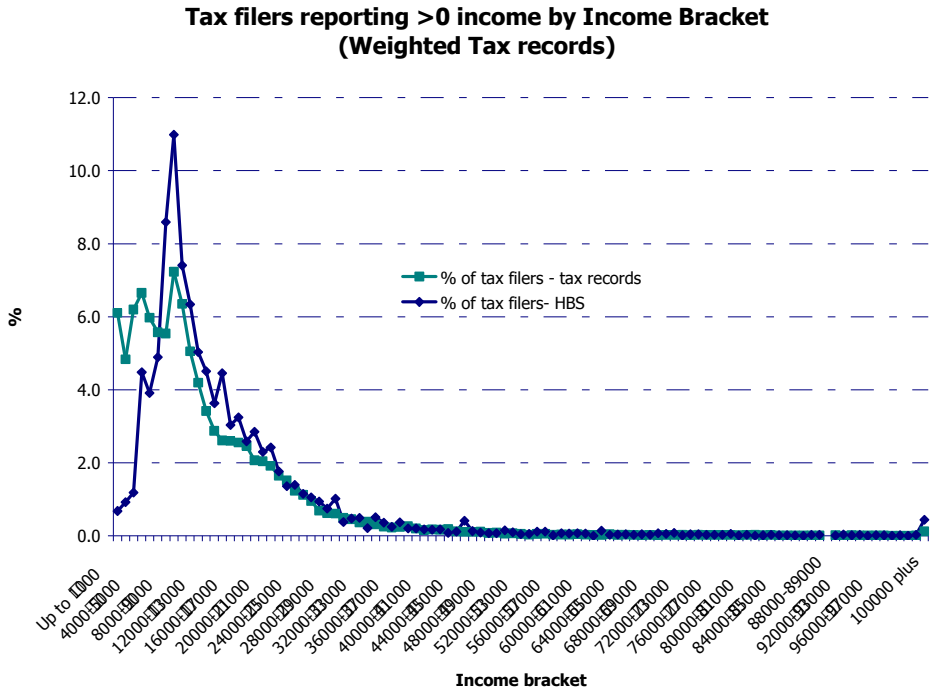

Figure 3

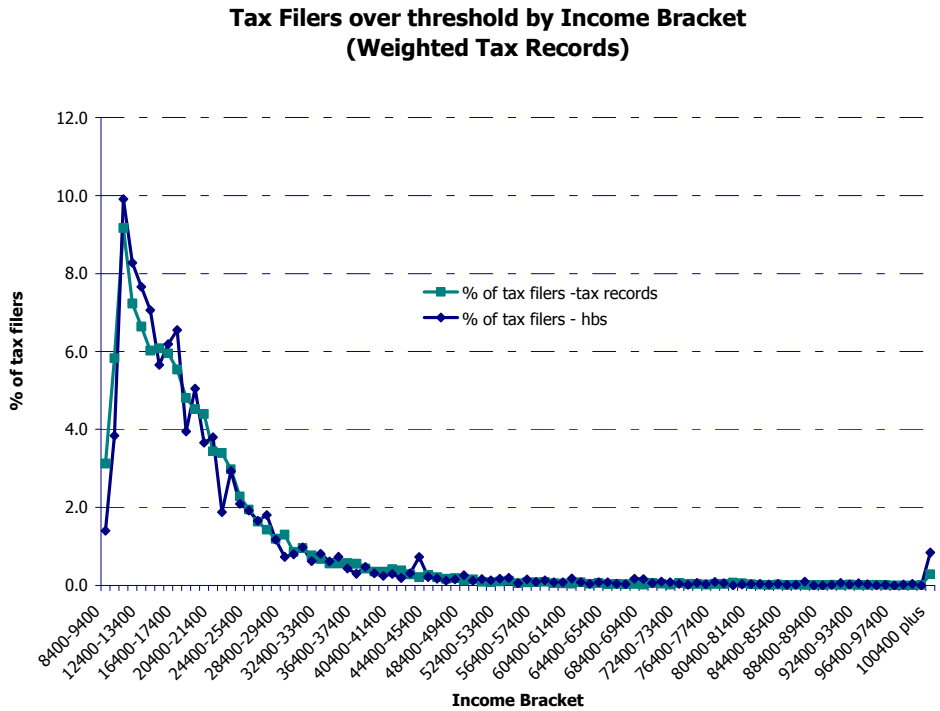

Figure 4: Comparison of ‘taxabley’, ‘compy’ and ‘impy’ income lists

		Income Lists		
		taxabley	compy	impy
Income component	**Variable**			
wages and salaries	coEMPY	1	1	1
lump-sum income	coLUMPY	1	1	1
maintenance payments	coMAINTY	1	0	0
other income	coOTHERY	1	1	1
property income	coPROPY	1	0	0
regular income	coREGY	1	1	1
self-employment income	coSLFEMY	1	0	1
social pension	gr_sben_socpen	1	1	1
ΕΚΑΣ social solidarity benefit	gr_sben_socsolidarity	1	1	1
invalidity pension	grBEN_INV	1	1	1
old-age pension	GRBEN_OA	1	1	1
orphans' pension	grBEN_OR	1	1	1
survivors' pension	grBEN_SURV	1	1	1
farmers' pension	grOGAPNS	1	1	1
self-employment income from agriculture	grYSEAGTX	0	1	0
other self-employment income	grYSETX	0	1	0
private employees' social insurance contributions	gr_eesic	0	-1	-1
civil servants social insurance contributions	gr_cssic	0	-1	-1
bank employees social insurance contributions	gr_banksic	0	-1	-1
public enterprises employees social insurance contributions	gr_pubsic	0	-1	-1
professional employees social insurance contributions	gr_profeesic	0	-1	-1
pensioners' social insurance contributions	gr_pesic	0	-1	-1

Figure 5: Adjusting income components for under-reporting to the tax authorities

Name	Period	GR_2004	end_system								
first_module		**Adjusting Income Sources for Tax Evasion**									
co_SBEN_Elig											
first_cond		0									
eq_var1		1									
end_cond		0									
eq_var1_name		coregion									
eq_var1_lt		1	*region is Northern Greece*								
SBEN_elig_type		1									
TAX_UNIT		individual_gr									
SWITCH		1									
co_formula											
must_be_elig		1									
namounts		1									
nvars		1									
formula		var1 * amt1									
amt1		0,978	*adjustment factor for wages and salaries in Northern Greece*								
var1		coEMPY	*gross earnings from employment*								
output_var		coEMPY	*adjusted earnings from employment*								
TAX_UNIT		individual_gr									
SWITCH		1									
co_formula											
must_be_elig		1									
namounts		2									
nvars		2									
formula		var1*amt1 + var2*amt2									
amt1		0,860	*adjustment factor for other self-employment income in Northern Greece*								
amt2		0,412	*adjustment factor for self-employment income from agriculture in Northern Greece*								
var1		grYSETX	*gross other self-employment income*								
var2		grYSEAGTX	*gross self-employment income from agriculture*								
output_var		coSLFEMY	*adjusted self-employment income*								
TAX_UNIT		individual_gr									
SWITCH		1									
co_formula											
must_be_elig		1									
namounts		1									
nvars		1									
formula		var1 * amt1									
amt1		1	*adjustment factor for pension income in Northern Greece*								
var1		grben_OA	*gross old-age pensions*								
output_var		grben_OA	*adjusted old-age pensions*								
TAX_UNIT		individual_gr									
SWITCH		1									

Figure 5: Adjusting income components for under-reporting to the tax authorities (cont'd)

co_formula											
must_be_elig		1									
namounts		1									
nvars		1									
formula		var1 * amt1									
amt1		1		*adjustment factor for pension income in Northern Greece*							
var1		grben_inv		*gross invalidity pensions*							
output_var		grben_inv		*adjusted invalidity pensions*							
TAX_UNIT		individual_gr									
SWITCH		1									
co_formula											
must_be_elig		1									
namounts		1									
nvars		1									
formula		var1 * amt1									
amt1		1		*adjustment factor for pension income in Northern Greece*							
var1		grben_surv		*gross survivors' pension*							
output_var		grben_surv		*adjusted survivors' pension*							
TAX_UNIT		individual_gr									
SWITCH		1									
co_formula											
must_be_elig		1									
namounts		1									
nvars		1									
formula		var1 * amt1									
amt1		1		*adjustment factor for pension income in Northern Greece*							
var1		grben_or		*gross orphans' pension*							
output_var		grben_or		*adjusted orphans' pension*							
TAX_UNIT		individual_gr									
SWITCH		1									
co_formula											
must_be_elig		1									
namounts		1									
nvars		1									
formula		var1 * amt1									
amt1		1		*adjustment factor for pension income in Northern Greece*							
var1		grogapns		*gross oga pension*							
output_var		grogapns		*adjusted oga pension*							
TAX_UNIT		individual_gr									
SWITCH		1									

Figure 6: Calculating unreported income

Name	Period	firs	GR_2004	end_system
first_module			**Calculating part of income not reported**	
co_formula				
nvars			3	*same for all regions*
formula			var1 + var2-var3	
var1			grYSETX	
var2			grYSEAGTX	
var3			coslfemy	
output_var			co_temp2	
TAX_UNIT			individual_gr	
SWITCH			1	
co_SBEN_Elig			**region condition**	
first_cond			0	
eq_var1			1	
end_cond			0	
eq_var1_name			coregion	
eq_var1_lt			1	*region is Northern Greece*
SBEN_elig_type			1	
TAX_UNIT			individual_gr	
SWITCH			1	
co_formula				
must_be_elig			1	
namounts			1	
nvars			1	
formula			var1/amt1-var1	
amt1			0,978	*adjustment factor for wages and salaries in Northern Greece*
var1			coEMPY	*adjusted employment income*
output_var			co_temp1	*employment income not reported*
TAX_UNIT			individual_gr	
SWITCH			1	
co_formula				
must_be_elig			1	
namounts			1	
nvars			1	
formula			var1/amt1-var1	
amt1			1	*adjustment factor for pension income in Northern Greece*
var1			grben_OA	*adjusted old-age pension income*
output_var			co_temporary_var1	*old-age pension income not reported*
TAX_UNIT			individual_gr	
SWITCH			1	

Figure 6: Calculating unreported income (cont'd)

co_formula		
must_be_elig	1	
namounts	1	
nvars	1	
formula	var1/amt1-var1	
amt1	1	*adjustment factor for pension income in Northern Greece*
var1	grben_inv	*adjusted invalidity pension income*
output_var	co_temporary_var10	*invalidity pension income not reported*
TAX_UNIT	individual_gr	
SWITCH	1	
co_formula		
must_be_elig	1	
namounts	1	
nvars	1	
formula	var1/amt1-var1	
amt1	1	*adjustment factor for pension income in Northern Greece*
var1	grben_surv	*adjusted survivors' pension income*
output_var	co_temporary_var2	*survivors' pension income not reported*
TAX_UNIT	individual_gr	
SWITCH	1	
co_formula		
must_be_elig	1	
namounts	1	
nvars	1	
formula	var1/amt1-var1	
amt1	1	*adjustment factor for pension income in Northern Greece*
var1	grben_or	*adjusted orphans' pension income*
output_var	co_temporary_var3	*orphans' pension income not reported*
TAX_UNIT	individual_gr	
SWITCH	1	
co_formula		
must_be_elig	1	
namounts	1	
nvars	1	
formula	var1/amt1-var1	
amt1	1	*adjustment factor for pension income in Northern Greece*
var1	grogapns	*adjusted oga pension*
output_var	co_temporary_var4	*oga pension not reported*
TAX_UNIT	individual_gr	
SWITCH	1	

Figure 7: Standard disposable income list in baseline and under tax evasion

Standard Disposable Income Lists			
Income Component	**Income Variable**	Baseline	Tax Evasion
tax : income tax	co_nat_inctax	-1	-1
unreported income: wages and salaries	co_temp1	1	0
unreported income: self-employment income	co_temp2	1	0
unreported income: old-age benefits	co_temporary_var1	1	0
unreported income: invalidity pension	co_temporary_var10	1	0
unreported income: survivors pension	co_temporary_var2	1	0
unreported income: orphans pension	co_temporary_var3	1	0
unreported income: farmers pension	co_temporary_var4	1	0
benefits : education	coEDY	1	1
income : employment	coEMPY	1	1
benefits : housing	coHB	1	1
income : investment	coINVY	1	1
income : private transfers : maintenance payment	coMAINTY	0	1
benefits : maternity	coMATERY	1	1
income : Other	coOTHERY	1	1
income : property	coPROPY	0	1
income : private pension	coPRVPEN	1	1
income : private transfers : Other	coPRVTRN	1	1
benefits : Other : regular, periodic	coREGY	1	1
income : self employment	coSLFEMY	1	1
GR: banking employees' social insurance contributions (ETE)	gr_banksic	-1	-1
Civil Servants Social Contribution	gr_cssic	-1	-1
ika employee contributions	gr_eesic	-1	-1
Gr: Farmer's SIC	gr_frmsic	-1	-1
GR: Unemployment Assistance for Old Workers	gr_iben_ua_old_workers	1	1
GR: social insurance agencies' solidarity account	gr_lafka	-1	-1
GR: other self-employed social insurance contributions (TAE)	gr_osesic	-1	-1
ika pensioner contributions	gr_pesic	-1	-1
GR: liberal professions' social insurance contributions on employment income (ΤΣΑΥ)	gr_profeesic	-1	-1
GR: liberal professions' social insurance contributions on self-employment income (ΤΣΑΥ)	gr_profsesic	-1	-1
GR: public enterprise workers' social insurance contributions (ΤΑΠ-ΟΤΕ)	gr_pubsic	-1	-1
Gr: Third Child Benefit	gr_sben_cb_third	1	1
Gr: Social Pension	gr_sben_socpen	1	1
Gr: EKAS Social Solidarity Benefit	gr_sben_socsolidarity	1	1
GR:Scheme TEBE(selfempl.)	gr_sesic	-1	-1
GR: disability benefit (non-contributory)	GRBEN_DI	1	1
GR: invalidity pension	grBEN_INV	1	1
GR: old age pension	GRBEN_OA	1	1
GR: orphans' pension	grBEN_OR	1	1
GR: sickness benefits	grBEN_SICK	1	1
GR: widows' benefits	grBEN_SURV	1	1
GR: Unemployment Benefit	GRBEN_UN	1	1
GR: child benefit	grCB	1	1
GR: large family child benefit	grCBLARGEFAM	1	1
GR: many-children child benefit	grCBMANY	1	1
GR: other family benefits	grFAMBEN	1	1
GR: OGA Old Age Pension	grOGAPNS	1	1