

**Methodological note for the calculation of top
income shares in Greece (1967-2017)**

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April 2019



World Inequality Lab

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1 Tax data

Income tax data are among the longest time series available for Greece. Since 1957, the [Greek Statistical Authority \(ELSTAT\)](#) has been publishing tables of tax returns by income group and source. Since 2003, more detailed tables were published by the [Ministry of Finance](#) and the [Independent Authority for Public Revenue \(AADE\)](#).

Our coverage period omits the first decade and begins the calculations in 1967 because from this date onwards tax data were declared (and published) on individual basis¹. Beginning from this year makes our results homogeneous, or at least this is the earliest we can apply the individual income approach of this study without seriously compromising the validity of our results.

1.1 Pareto approximation

The thresholds dividing the income groups in the published tables vary considerably between years and do not generally coincide with the percentiles we are trying to estimate. We follow the standard Kuznets-Piketty approach assuming that top incomes are well described by the Pareto distribution.

In brief, given a population with incomes above some threshold k , the Pareto distribution defines a cumulative distribution function $F(y)$ that gives the share of population with income below y :

$$F(y) = 1 - \left(\frac{k}{y}\right)^a, \quad k > 0, \quad a > 1$$

where a is the parameter that determines the shape of the distribution.

Differentiating $F(y)$ with respect to y we obtain the density function $f(y)$ of the distribution, i.e. the share of population with income exactly y

$$f(y) = \frac{ak^a}{y^{1+a}}$$

¹The problem with pre-1967 data is that the wife's income (above some threshold depending on the source) was added to husband's income and taxed accordingly. This practice was abolished in the first months of the dictatorship with the income tax reform 239/1967 that effectively established the individual-based income tax that is still in place.

The average income $E(y)$ of individuals with income greater than k is given by:

$$E(y) = \int_k^{\infty} yf(y) = \frac{a}{a-1}k \equiv bk$$

According to the above equation, the ratio $E(y)/k$ is equal to a constant $b \equiv a/(a-1)$. Therefore, by setting any arbitrary k we can directly observe $E(y)$ from tax data, calculate the parameter b (or a) and derive the relevant income shares.

2 Control Total for Income

The aggregate (control) income that we use as the base to calculate the respective shares is derived from National Accounts data. The Household sector (S14) is provided in detail by [Eurostat](#) since 1995 but the previous years require some adjustments. National accounts for 1988-1995 follow different classification and can be found in a publication of the Greek Statistical Authority. Fortunately we can map the components in the different classifications and thanks to the overlapping year 1995 we can apply backwards the growth rates and construct a single series for the control income. For the remaining years (1967-1987) we only have GDP. To estimate the control income we apply a linear extrapolation using the average ratio of control income to GDP of the years 1988-2017.

2.1 Sequence of Household Accounts 1995-2017

Following [ESA 2010](#) (pp. 603-606) the sequence of Household accounts is briefly described in Table 1 below.

2.2 Derivation of control income and mapping of accounts

For our purposes we need the components that would in principle amount to the declared income in tax returns. We begin with B2A3N "Operating surplus and mixed income, net" that includes income from individual business and self-employment. In terms of 1988-1995 accounts this is equivalent

Table 1: Simplified sequence of Household accounts (S14)

USES	RESOURCES
Production Account	
	P1 - Output <i>of which</i> <i>P11 - Market output</i> <i>P12 - Output for own final use</i>
P2 - Intermediate consumption	
B1G - Value added, gross	
P51C - Consumption of fixed capital	
B1N - Value added, net	
USES	RESOURCES
Generation of income account	
D1 - Compensation of employees - P <i>of which</i> <i>D11 - Wages and salaries - P</i> <i>D12 - Employers' social contributions- P</i>	B1N - Value added, net D3 - Subsidies
D2 - Taxes on production and imports	
B2A3N - Operating surplus and mixed income, net	
USES	RESOURCES
Allocation of primary income account	
B2A3N - Operating surplus and mixed income, net D1 - Compensation of employees - R <i>of which</i> <i>D11 - Wages and salaries- R</i> <i>D12 - Employers' social contributions- R</i>	D4 - Property income - R <i>of which</i> <i>D41 - Interest- R</i> <i>D421 - Dividends- R</i> <i>D422 - Withdrawals from the income of quasi-corporations- R</i> <i>D45 - Rents- R</i>
D4 - Property income - P	
B5N - National income/Balance of primary incomes, net	
USES	RESOURCES
Secondary distribution of income account	
D5 - Current taxes on income, wealth, etc.	B5N - National income/Balance of primary incomes, net
D6 - Social contributions and benefits - P <i>of which</i> <i>D611 - Employers' actual social contributions</i> <i>D612 - Employers' imputed social contributions</i> <i>D613 - Households' actual social contributions</i>	D62 - Social benefits other than social transfers in kind - R D7 - Other current transfers - R
D7 - Other current transfers - P	
B6N - Disposable income, net	

to N12 "Net operating surplus". Still, as we care about actually received income, we must subtract the component P12 "Output for own final use" since the latter refers to imputed rents, R&D, etc. that does not generate any kind of receipts. Unfortunately, 1988-1995 accounts do not report the respective component for households, therefore we approximate it applying the average ratio of P12 to Total Output (P1), which is broadly stable for the period 1995-2007.

Next we add labour income from D1 "Compensation of employees (received)". The equivalent amount in 1988-1995 accounts is R10 "Compensation of employees" which is itself the sum of three separate components (R101 "Gross wages", R102 "Actual social contributions" and R103 "Imputed Social Contributions"). Income from pensions and social benefits is given by D62 "Social benefits other than social transfers in kind" while for 1988-1995 derives from General Government sector, R64 "Social Benefits".

To remove employers' and workers' social security contributions we subtract D611 "Employers' actual social contributions", D612 "Employers' imputed social contributions" and D613 "Households' actual social contributions". For 1988-1995 we must again turn to General Government sector and use the components R62 "Actual Social security contributions" and R63 "Imputed Social security contributions".

Finally we add specific elements of D4 "Property income (received)". In particular, until 2013 we include only D45 "Rents (received)²" as the other components D41 "Interest (received)", D421 "Dividends" and D422 "Withdrawals from the income of quasi-corporations" were not required in the tax declarations (taxes for interest and dividends were withheld in source). Since 2014, however, interest and dividends were also included in the tax declarations, therefore the respective components are added in the control income aggregate. The derivation of control income is shown in Table 2 below.

²Note that pre-1995 accounts do not report rents separately, therefore we impose the average ratio of rents to property income

Table 2: Mapping of accounts and derivation of control income

National accounts 1988-1995		National accounts 1995-2017
N12 - Net operating surplus	plus	B2A3N - Operating surplus and mixed income, net
P14 - Output of non-market services*	minus	P12 - Output for own final use - R
R10 - Compensation of employees	plus	D1 - Compensation of employees - R
sum of:		
R101 - Gross wages - R		
R102 - Actual social contributions - R		
R103 - Imputed social contributions - R		
General Government - R64 - Social Benefits	plus	D62 - Social benefits other than social transfers in kind
General Government - R62+R63 Social security contributions	minus	Social security contributions
		sum of:
		D611 - Employers' actual social contributions
		D612 - Employers' imputed social contributions
		D613 - Households' actual social contributions
Rents*	plus	D45 - Rents - R
Control Income 1988-1994		Control Income 1995-2013
	plus	D41 - Interest - R
	plus	D421 - Dividends - R
		Control Income 2014-2017

3 Control Total for Population

Finally, the calculation of average income and shares requires a metric for total population. This is not the same as the number of tax fillers as many individuals do not submit tax declarations. The control total used is the population over the age of 18 from [Eurostat](#). Note that we assume that the income of non-fillers is zero.

4 Some important caveats

Both controls, income and population, are used as denominators to calculate average income and income shares. The fact that they are in excess of declared income and number of fillers respectively, introduces some bias in our estimations.

Specifically, the assumption that non-fillers have zero incomes increases the income thresholds for all top income groups and therefore reduces their income share. Moreover, the assumption that non-declared income does not belong to the top income groups, reduces their income shares further.

In brief, the implicit assumption is that individuals who belong to the top income groups always declare their full income, something that is not necessarily correct.

Finally, the income tax reform in 2014 that required incomes from interest and dividends to be also declared, results in a jump of top income shares, especially their higher ranks. We suspect that their income shares in the previous years (without interest and dividends) are probably underestimated.

5 Income shares

Table 3: Income Shares

Year	Top 10% share	Top 10-6% share	Top 5% share	Top 5-2% share	Top 1% share	Top 0.1% share
1967	28.6%	6.2%	22.5%	12.4%	10.0%	2.4%
1968	29.3%	6.6%	22.7%	12.8%	9.9%	2.4%
1969	28.8%	7.5%	21.3%	12.2%	9.2%	2.2%
1970	28.8%	7.8%	21.0%	11.9%	9.1%	2.1%
1971	29.3%	8.4%	20.8%	11.9%	8.9%	2.1%
1972	28.4%	8.3%	20.1%	11.4%	8.7%	2.0%
1973	26.8%	7.9%	18.9%	11.2%	7.7%	2.1%
1974	27.1%	8.3%	18.8%	11.5%	7.3%	1.9%
1975	26.5%	8.4%	18.0%	11.3%	6.7%	1.6%
1976	25.9%	8.5%	17.4%	11.1%	6.3%	1.4%
1977	26.8%	8.9%	17.9%	11.6%	6.3%	1.4%
1978	27.3%	9.4%	17.9%	11.7%	6.2%	1.4%
1979	26.7%	9.4%	17.3%	11.4%	6.0%	1.3%
1980	26.4%	9.3%	17.1%	11.3%	5.8%	1.3%
1981	27.6%	9.8%	17.8%	11.8%	6.0%	1.3%
1982	26.8%	9.9%	16.9%	11.4%	5.4%	1.1%
1983	25.9%	9.7%	16.2%	11.3%	4.9%	1.1%
1984	25.3%	9.7%	15.6%	10.9%	4.8%	1.0%
1985	25.9%	9.9%	16.0%	10.9%	5.1%	1.2%
1986	24.2%	9.7%	14.6%	9.7%	4.8%	1.1%
1987	24.2%	9.5%	14.7%	9.9%	4.8%	1.1%
1988	23.5%	9.3%	14.2%	9.5%	4.7%	1.0%
1989	22.9%	8.9%	14.1%	9.4%	4.6%	1.0%
1990	23.6%	9.1%	14.6%	9.8%	4.8%	1.1%
1991	23.5%	8.9%	14.6%	9.7%	5.0%	1.2%
1992	23.3%	8.8%	14.5%	9.7%	4.8%	1.1%
1993	24.4%	9.5%	14.8%	9.9%	5.0%	1.1%
1994	25.4%	9.5%	15.9%	10.6%	5.3%	1.1%
1995	25.7%	9.6%	16.0%	10.6%	5.4%	1.1%
1996	26.1%	9.7%	16.4%	10.8%	5.6%	1.2%
1997	26.8%	10.0%	16.8%	11.0%	5.8%	1.3%
1998	27.0%	10.0%	17.1%	11.1%	6.0%	1.3%
1999	27.5%	9.8%	17.7%	11.3%	6.5%	1.6%
2000	28.7%	10.1%	18.5%	11.8%	6.8%	1.6%
2001	28.4%	10.1%	18.3%	11.6%	6.7%	1.6%
2002	27.7%	9.8%	18.0%	11.4%	6.6%	1.6%
2003	26.2%	9.2%	17.0%	10.7%	6.3%	1.5%
2004	26.1%	9.3%	16.8%	10.7%	6.1%	1.4%
2005	26.6%	9.5%	17.2%	10.9%	6.2%	1.5%
2006	25.6%	9.1%	16.5%	10.5%	6.0%	1.4%
2007	26.2%	9.1%	17.0%	10.9%	6.1%	1.5%
2008	26.5%	9.5%	17.0%	10.9%	6.1%	1.5%
2009	26.3%	9.3%	17.0%	11.0%	6.0%	1.4%
2010	28.4%	10.1%	18.3%	11.7%	6.6%	1.5%
2011	28.5%	10.1%	18.4%	11.8%	6.6%	1.5%
2012	28.9%	10.5%	18.5%	11.7%	6.7%	1.6%
2013	28.7%	10.1%	18.6%	11.6%	7.0%	1.8%
2014	29.2%	9.8%	19.4%	10.8%	8.7%	3.1%
2015	29.2%	9.3%	19.9%	11.1%	8.8%	3.3%
2016	29.0%	9.4%	19.6%	11.2%	8.4%	3.1%
2017	28.1%	9.4%	18.7%	10.9%	7.8%	2.6%