REDISTRIBUTIONAL EFFECTS
OF PUBLIC EXPENDITURE AND TAXATION IN GREECE

By
JOHN VARTHOLOMEOS

Piraeus Graduate School of Industrial Studies

1. Introduction

The question of the effects of the budget on income distribution has received particular attention in the literature of public finance [1]. The argument has been centered mainly around the effects of fiscal policy on the scale distribution of income following the framework of partial equilibrium analysis. On the contrary, the effects of fiscal policy on the distribution of disposable income by occupation have received little empirical investigation. This seems to be due to statistical data limitations, namely, that «National Accounts Statistics», provide data concerning only factor incomes. But they do not disaggregate total disposable income according to the occupational characteristics of the population. However, the analysis of the effects of fiscal policy on the distribution of factor income is of relatively little importance. Indeed, fiscal policy affects the distribution of factor income only indirectly, while it affects the distribution of disposable income both directly and indirectly.

The purpose of this paper is to study the redistributive effects of the various fiscal policy instruments - particularly those connected with the budget-on the distribution of disposable income by occupation. The methodology followed for this disaggregation is provided in the Appendix of this paper.

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1. The bibliography on the subject is voluminous, see for example J. Pechman and B. Okner, «Who Bears the Tax Burden», Studies in Government Finance, The Brookings Institution, Washington D.Ç. 1974.

2. **The** analytical framework

By definition, income redistribution implies transfer of income from one income group to another. In the context of the present analysis, income distribution is approximated by means of the following indices : Y^d_F/Y^d, $Y^d w/Y^d$, $Y^d p/Y^d$ and Y^d_0/Y^d, namely, the share of disposable income of farmers, that of wage and salary earners, that of profit earners and that of others including pensioners respectively[2]. Obviously, if these ratios do not change income distribution remains stable[3]. On the same line, if the disposable incomes change at the same rate income distribution remains unchanged. Therefore, an essential and sufficient condition for the stability of these ratios is that the ratio of elasticity (with respect to every policy instrument) of each component of disposable income over that of aggregate disposable income be equal unity. Thus the redistribution index may be defined as :

$$d_{sk} = \frac{dY^d_s/dR_k.\ R_k/Y^d_s}{dY^d/dR^k.\ R_k/Y^d} \qquad (1)$$

where s denotes the occupational groups (s = F, w, p and o) and R_k the policy instrument (k = 1,2,. . . ., μ). Values of d_sk equal to unity denote that a unit change in the R_k instrument does not have any redistributional effect. On the contrary, values of dsk higher of lower than unity denote the existence of redistributive effects. Values of d_{esk} higher than unity related with policy instruments such as transfer payments, which increase effective demand, denote a positive redistribution of income. Values lower than unity indicate negative redistribution. The opposite is true for policy instruments such as taxes which decrease effective demand.

The ratios of partial derivatives dY^d_s/dRk and dY^d/dRt are the reduced form coefficients derived from the solution of a disaggregated fully cloced income

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2. Taking into account that the model is a short-run one these ratios can be assumed as proxies for defining income distribution on a per capita basis.

3. Mathematically it is sufficient for the stability of income distribution that only three of these ratios remain stable since by définition

$$Y^d F + Y^d_w + Y^d p + Y^d o = Y^d.$$

determination model constructed for the Greek Economy[4]. The basic demand -
supply balance system of equations of which has as follows :

$$X'_i + M_i^{com} = \sum_{j=1}^{n} a_{ij}X'_j + C_i + G_i + IP_i + IG_i + E_i + ST_i \tag{2}$$

where X'_i = gross output of the tth sector at market prices

M_i^{com} = competitive imports of the ith sector at market prices

a_{ij} = technical coefficients, i.e. the input (domestic and or imported) of the ith sector required to produce a unit of output of the jth sector

C_i = private consumption satisfied by the ith sector

G = public consumption satisfied by the ith sector

IP_i = private investments produced by the ith sector

IG_i = public investments produced by the ith sector

E_i = exports of the ith sector

ST_i = changes in stocks produced by the ith sector

Formula (2) states that total gross output plus competitive imports equal intermediate plus final demand. To make (2) appropriate for our purposes we proceed as follows : Intermediate imports of the ith sector are defined as :

$\sum_{j=1}^{n} M_{ij}X'_j$ where $m_{ij} = M_{ij}^{Ind}/X'_j$ and M^{ind} represents intermediate

imports. Therefore intermediate domestic gross output at market prices of sector

i is equal to : $\sum_{i=1}^{n} (a_{ij}-m_{ij}) X'_j$. By substracting total indirect taxes imposed

on domestic production, T. INTD, adding in subsidies SUB, and moving competitive imports to the right hand side of (2) we obtain gross output at factor cost, Xi, which is defined as :

4. For further details see, J. Vartholomeos «A Fiscal Policy Model of the Greek Economy : A. Disaggregated Closed System Approach», Ph. D. Thesis, University of Leicester 1980.

$$X_i - \sum_{j=1}^{n} (a_{ij} - m_{ij})\ X_j = C_i + G_i + IP_i + IG_i + E_i + ST_i - M_i^{com} - T.IND_i + SUB_i \qquad (3)$$

The left hand side of (3) is equal to the gross domestic product of sector i at factor cost while the right hand side to the domestic use at factor cost. Formula (3) holds either ex-post as an identity or ex-ante as a system of equations. This implies that supply adapts automatically to demand which is a keynesian type hypothesis consistent with short-run effects.

The right hand side of formula (3) can be further modified by disaggregating the various final demand elements according to the analysis provided by the National Accounts Statistics (N.A.A.). The reason for such a further disaggregation is to increase the number of variables serving as instruments of economic policy.

The disaggregation covers six functional categories for public consumption, six functional categories for public investments, thirteen categories of indirect taxes and two categories of subsidies. Therefore, the demand-supply balance system of equations takes the form of (4)

$$X_i - \sum_{j=1}^{n} (a_{ij} - m_{ij})\ X_j = c_{1i}\ C + c_{2i}\ IP + c_{3i}GA + c_{4i}GD$$

$$+ c_{5i}\ GH + c_{6i}GS + c_{7i}GE + c_{8i}iGo + c_{9i}IA$$

$$+ c_{10i}iII + c_{ui}IT + c_{12ii}IC + c_{13i}IH + c_{14i}i0 \qquad (4)$$

$$+ c_{15i}ST + c_{16i}E - c_{17i}M^{com} - c_{18i}T.TOB - c_{19i}T.SUB$$

$$- c_{20i}T.CR - c_{21i}T.NCR - c_{22i}TPR - c_{23i}T.BE - c_{24i}T.MAZ$$

$$- c_{25i}T.DIZ - c_{2ei}T.PET - c_{27l}T.TURD - c_{28i}T.STD - c_{29i}T.S\ M$$

$$- c_{30i}T.INTO + c_{31i}\ SUBA + c_{32i}SUBE$$

where i = j = 1,. . ., 36, and

G A = Public consumption expenditures in administration and justice

GD =   »   »   »   » defence
GH =   »   »   »   » health

GS   =   »   »   »   » social security

GE   =   »   »   »   » education

GO   =   »   »   »   » other activities

IA   = Public gross fixed capital formation in agriculture

II   =   »   »   »   »   »   » industry

IT   ==   »   »   »   »   »   » transportation

IC   =   »   »   »   »   »   » communnications

IH   = Public gross fixed capital formation in housing

IO   =   »   »   »   »   »   » other activities

T.TOB = Tax revenue from tobacco

T.SUB —   »   »   »   sugar

T.CR. =   »   »   »   running cars

T.NCR =   »   »   »   an excise tax on new cars

T.PR   =   »   »   »   transfering real estate

T.BE   =   »   »   »   beer

T.MAZ =   »   »   »   mazout

T.DIZ =   »   »   »   diesel

T.PET =   »   »   »   petrol

T.TUR =   »   »   »   turn over taxes on domestic production

T.STD ==   »   »   »   stamp duties   »   »   »

T.SM   =   Tax revenue from state monopolies

T.INTO=   »   »   »   other indirect taxes

SUB A = Subsidies to agricultural sector

SUBE   = Subsidies to exports

The various $c_1, c_2, ..., c_{32}$ are column vectors denoting the average industrial distribution of the corresponding final demand categories by sector. The various symbols i.e. C, IP,. . ., SUBE, are scalars corresponding to the various final demand elements.

Table 1

Redistributional effects of fiscal policy instruments upon disposable income

Fiscal policy instruments	Disposable income ratios			
	dfk	dwk	dpk	dok
GA	0.63	1.34	1.22	0.43
GD	0.67	1.30	1.23	0.43
GH	0.76	1.14	1.35	0.43
GS	1.13	1.13	1.12	0.42
GE	0.62	1.41	1.15	0.42
GO	0.55	0.54	2.17	0.46
IA	0.79	1.14	1.34	0.42
II	0.73	0.97	1.57	0.43
IT	0.71	1.01	1.54	0.43
IC	0.73	0.96	1.58	0.43
IH	0.71	1.01	1.54	0.43
IO	0.73	1.01	1.54	0.43
hTg[5]	0.48	0.48	0.59	2.14
SUBA	3.57	0.30	0.47	1.00
SUBE	1.36	0.89	1,26	0.41
T.TOB	2.89	0.57	0.73	0.36
T.SUG	3.00	0.52	0.71	0.36
T.GR	0.32	0.91	1.94	0.40
T.NGR	0.32	0.91	1.94	0.40
T.PR	1.01	1.06	1.28	0.42
T.BE	1.64	1.28	1.46	0.38
T.MAZ	0.92	0.46	2.23	0.35
T.DIZ	0.45	1.03	2.07	0.17
T.PET.	0.23	1.55	1.48	1.07
T.TURD	1.63	0.92	1.33	0.40
T.STD	1.63	0.92	1.33	0.40
T.TURM[6]	0.52	1.25	2.73	0.46
T.STM[7]	0.52	1.25	2.73	0.46
T.SM	1.01	1.15	1.82	0.38
T.SU[8]	0.45	2.47	0.08	0.37
T.PINC[9]	0.24	2.48	3.17	2.77

5. Transfer payments to households.

6. Tax revenue from turn – over – taxes imposed on imports.

7. Taxrevenue from stamp duties imposed on imports.

8. Social insurance contributions.

9. Tax revenue from personal income taxation.

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3. The empirical results

The estimated values of the above redistribution index are presented inTable 1. As shown in this table, the estimated indices, except in a very few cases, differ substantially from unity which implies that the various policy instruments are not neutral with respect to income distribution. More precisely, public expenditure on consumption and investment, redistribute income against farmers and pensioners and in favour of wage and salary earners. This should be attributed to the fact that the greatest portion of these expenditures accrues directly as income to wage and salary earners. On the other hand, positive changes in public investment redistribute income significantly in favour of profit earners, while public expenditure in social services, redistributing income in favour of farmers. The latter is not an unexpected result since social services provide benefits to this group without reducing their income in the form of contributions to a social insurance fund. As expected, subsidies to farmers redistribute income significantly in favour of this group and against wage and profit earners, while they are neutral with respect to pensioners. Subsidies to exports redistribute income in favour of farmers and profit earners and against wage earners and pensioners. This is because these subsidies are given as an incentive to exporters, viz, to farmers and entrepreneurs.

Transfer payments, redistribute income in favour of pensioners. This is not an unexpected result since they accrue primarily to this income group.

Excises on tobacco and sugar[10] redistribute income against farmers and in favour of the other groups. This should be attributed to the fact that the goods on which these taxes are imposed constitute a large proportion of their expenditure in relation to the other income groups. As expected, taxes on transfer of real estate, redistribute income against profit earners. This reflects the fact that this income group devotes a relatively high proportion of its income for purchases of real estate. Excises on petrol and diesel redistribute income against wage and profit earners and in favour of the other groups, because a larger proportion of the expenditure of these two groups is devoted to these items.

Turnover taxes on imports, redistribute income against wage and profit earners. This is due to the fact that the goods and services, on which these taxes are imposed, constitute a large proportion of their expenditure. It should be noticed that the negative redistributive effect of import taxes is considerably higher as

10. It is assumed that a unit change in the corresponding tax revenues result from the required change in the corresponding nominal tax rates which are used as instruments of fiscal policy.

compared with that of turnover taxes imposed on domesticallhy produced goods, reflecting the fact that imports are taxed effectively at higher rates than the domesticaly produced goods.

Social insurance contributions redistribute income against wage earners and in favour of other groups. This is because this taxation affects almost exclusively the gross income of the former group.

Income taxes redistribute income in favour of farmers and against all other groups. This is not surprising considering that farmers are practically excluded from income taxation.

Let us examine now the theoretical postulate that a change over from indirect to direct taxation will reduce income inequality.[11] In the context of the present analysis we cannot deal with whether or not such a change will affect equality in the scale distribution of income. What we can do is to determine whether or not such a change will redistribute income in favour or against a certain income group. In particular, a change over from indirect to direct taxation will redistribute income in favour of the first income group. This is because, on average, the estimated coefficient for indirect taxation is about 1.14, while that of direct taxation is 0.24. By contrast a change over from the indirect to direct taxation will redistribute income against wage earners, since on the average the indirect tax coefficient is equal to 0.98 while the direct tax coefficient is equal to 2.48. Similarly, the above mentioned change will redistribute income against profit earners (indirect tax coefficient 1.79, direct tax coefficient 3.17) and pensioners (indirect tax coefficient 0.43 and direct tax coefficient 2.77). Of course, the above mentioned results hold on average. As can be seen from Table 1, a change-over from some categories of indirect taxation with respect to various income groups may differentiate the results.

The conclusion is that a change - over from an indirect tax structure to a direct one may or may not redistribute income in favour of an income group in question. The latter depends on the particular indirect tax and income group considered. The difference between the theoretical postulates and the empirical evidence should be attributed to the fact that the former are based on partial equilibrium analysis, and therefore ignore the indirect effects that may occur from such structural changes, and secondly, to the fact that they use only two income groups, mainly wage and non-wage income earners, which is unrealistic.

11. See for example, B. Hansen «T h e E c o n o t r i c T h e o r y of F i s c a l P o ! i cy», George Allen andUnwin, London 1967, pp. 260.

4. Conclusions

The main conclusion drawn from the above analysis is that, in the case of Greece, the various fiscal policy instruments are not neutral with respect to the redistribution of disposable income among the various income groups. Therefore, they can effectively be used to redistribute income in favour or against a certain income group. Among the most effective instruments are income taxation, transfer payments and subsidies. The various categories of public expenditure and indirect taxation can also be used successfully in redistributing income in favour or against a certain income group. Changes in the functional distribution of public expenditure does not exercise uniform redistributional effects. The abolition of income taxation, combined with an equal yield increase in indirect taxation, will redistribute income in favour of profit, wage and other income earners and against farmers.

A p p e n d i x

The Computation of Disposable Income by Occupational Group

The starting point for the disaggregation of disposable income by ocupation is the aggregate disposable income identity, i.e.

$$Yd = YF_{f+}(_YF_w \_ SU) + (Y^Fp - YH) + hTg + hTa - \quad T^{dp+} \quad Y^h \quad (5)$$

where Y^d stands for the aggregate disposable income, Y^Ft for the factor income of farmers, Y^Fw for the factor income of wage and salary earners including social-insurance contributions, SU for social insurance contributions, Y^FP for factor income of entrepreneurship including income from property, Y^h for income from property (ownership of dwellings), ^hTs for current transfers from government to households, $^hT^a$ for current transfers to households from abroad and T^dP for total revenues raised from personal income taxation.

The next step is to formulate hypotheses concerning the allocation of the various components of disposable income by occupation.

In empirical work[12], the simplified hypothesis used is that some components of disposable income are allocated to only one income category, while other components are allocated to more than one income category.

This approach, however, suffers from serious over - simplification. Indeed, many households within an income group may have more than one source of income and the relative importance of the various sources is not fixed, but variable over time. This depends upon various factors linked to the changing structure of employment and production in a growing economy. For instance, persons belonging to the last group may obtain income accruing «customarily» to other groups, while professional people may obtain part of farm income «customarily» accruing to farmers. The same can hold true for the various forms of transfer payments. In short, one can say that single allocation bases do not exist, and that the allocation coefficients of income components for the various income groups are not constant, but variable over time.

Consequently, the disposable income accruing to the various occupational groups should resprectively be equal to :

$$Y^d{}_{ft} = a_1 t Y^F{}_{f_t} + a_2 t (Y^{F \cdot}{}_{wt} - SU_t) + a_3 t (YF_{p_t} - Y^h t) + a_{4t} Y^h t + a_6 t \ {}^h Tg_t + a_{6t} \ {}^h T^a t - T^{dq} ft$$

$$Y^d{}_{wt} = b_1 t Y^F ft + b_2 t (Y^F{}_{wt} - SUt) + b_3 t (Y^F pt - Y^h t) + b_4 t Y^h t + b_5 t^h Tgt + b_{6t} h T^a t - Tdp_{wt} \qquad (6)$$

$$Y^d{}_{Pt} = C_1 t Y^F (t + C_{21}(YF_{wt} - SUt) + C_3 t (YPpt - Y^{hl} t) + C_{4t} Y^h t + C_5 t^h Tgt + C_e t \ {}^h Ta_t \sim TdP_{pt}$$

$$Y^d{}_{ot} = d_1 t Y^F{}_f t + d_2 t (Y^F wt - SU_t) + d3 t (Y^F pt - Y^h t) + d_{4t} Y^h{}_t + d_6 t^h Tg_t + d_6 t^h Ta_1 - Tdp_{ot}$$

where $Y^d{}_f$, $Y^d{}_w$, $Y^d{}_p$ and $Y^d{}_0$ denote the disposable income of farmers, wage and

salary earners, professionals, and others including pensioners, respectively. The coefficients ait, bit, Cit and dit denote the percentage of various factors income and transfer payments that are allocated to each particular income group at time t. The symbols $T^{dq}{}_f$ $T^d P_w$, $T^d P_p$ and $T^{dq}{}_0$ stand respectively for the personal income tax revenue s that are attributed re spectively to each one of the afo rementioned occupations.

In order to allocate the various components of disposable income to the particular income groups, information is necessary regarding the sources of income of various groups on the one hand, and the coefficients of allocation on the other. This information is required for at least two different points over a period of time.

12. See L. Fra'ne and L. Klein «The estimation of disposable incorre by distributive shares», The Review of Economics and Statistics, 1953, pp. 333 - 37.

The «Household Sample Surveys» conducted by the National Statistical Service of Greece (NSSG) provide such information[13]. Analytically, these surveys[14] conducted both for 1958 and for 1974 provide data concerning the percentage distribution of various sources of income by income groups. The percentage distributions for the intermediate years can be estimated by interpolation. The allocation bases are summarized in Table 2. The numbers refer to 1958 while those in parentheses to 1974.

Reading Table 2 horizontally, income from agriculture, for instance, is attributed 82.8% to farmers, 3.0% to wage and salary earners, 7.8% to professional people and 6.4% to the last group. For 1974, the corresponding percentage distribution is 64.4%, 11.6%, 12.4% and 11.6%. The information provided by this Table becomes even more useful in Table 3 which follows, where the income of each group for 1958 and 1974 is presented broken down according to its origin. Table 3 shows that in 1958 the prime sources of income accounted for 82.6%, 83.4%, 80.2% and 37.7% of the total income of each income group respectively. Conversely, the secondary sources contributed 17.4 %, 16.6%, 19.8% and 62.3% respectively. In 1974, the prime sources accounted for 65.7%, 78.8%, 80.7% and 39.9% of total income respeciively while the secondary sources 34.3%, 21.2%, 19.3% and 60.1 % respectively. These results show a considerable increase in the contribuᵀion of the secondary sources for the first two income groups, while for the last two a relatively small decrease. The former should be attributed partly to the effects of urbanization and partly to the economic and social development of the country which has created complementary sources of income, mainly for the agricultural population.

The main conclusions drawn from the statistical Tables are that it would be an oversimplification to allocate incomes according to their main destination, and that the allocation of various income components under constant proportions is far removed from reality.

What remains to be done for the estimation of disposable income by income group, is to allocate the personal income tax revenues paid by the particular groups.

13. These data are not normally available but they were prepared following a special request to the «Household Survey Department», of the National Statistical Service of Greece.

14. See, «Households Expenditure Survey for 1957-58» and «Households Expenditure Survey for 1974». National Statistical Service of Greece, Athens 1959 and 1975 respectively.

Table 2

Allocation bases of various income components by coccupational group and source of income for 1958 and 1974

Sources of family income	Income groups				
	Farmers	Wage and Salary Earners	Professionals and Profit Earners	Other Income Earners Including Pensioners	TOTAL
Sales of agricultural products	82.8 (64.4)	3.0 (11.6)	7.8 (12.4)	6.4 (11.6)	100.0 (100.0)
Wages and salaries less of social insurance contributions	2.0 (7.8)	88.1 (78.2)	2.0 (2.7)	7.9 (11.3)	100.0) (100.0)
Income from profession, investments, etc.	1.5 (4.3)	4.3 (6.6)	79.0 (76.7)	15.2 (12.4)	100.0 (100.0)
Incume from property	26.2 (15.7)	28.0 (28.8)	22.3 (22.6)	23.5 (32.9)	100.0 (100.0)
Current transfers from Government to households (pensions, etc)	3.0 (6.2)	8.0 (12.2)	5.0 (7.4)	84.0 (74.2)	100.0 (100.0)
Current transfers from abroad to households	12.2 (18.2)	7.5 (11.9)	2.5 (2.9)	72.8 (67.0)	100.0 (100.0)

However, such an allocation is not a difficult task since Treasury Statistics [15] provide tax collections not only by size distribution of income, but also by factor and according to the occupational characteristics of the taxpayer.

A problem arises in that Treasury collections are actually less than those tabulated in the National Accounts Statistics. This is due to the fact that persons earning wages and salaries below a certain limit do not submit an income declaration and the corresponding taxes are paid out on a pay-as-you-earn ba-

15. See «Declared Personal Income Taxation», National Statistical Service of Greece, Athers' various issues.

Table 3

Percentage distribution of family income by occupational group and source of income for 1958 and 1974

Sources of family income	Income groups			
	Farmers	Wage and salary earners	Professionals and profit earners	Other income earners including pensioners
Sales of agricultural	82.6	2.7)	7.5	9.8
products	(65.7)	(6.1)	(8.2)	(10.7)
Wages and salaries less	2.9	83.4	2.4	14.8
social insurance contributions	(15.3)	(78.8)	(3.4)	(19.9)
Income from profession,	1.8	3.7	80.2	23.9
Investments, etc.	(7.0)	(5.6)	(80.7)	(18.4)
Income from property	10.1	8.3	8.6	13.8
	(5.8)	(5.6)	(5.4)	(11.1)
Current transfers from	0.7	1.4	1.0	26.2
Government to households	(2.6)	(2.6)	(1.9)	(27.7)
Current transfers from	1.9	0.6	0.3	11.5
abroad to households	(3.7)	(1.3)	(0.4)	(12.2)
Total family income	100,0	100.0	100.0	100.0

sis. Accordingly, the difference has been allocated to the second group, i.e. «wage and salary earners».

The income taxes paid have been estimated only for the last three groups, because farmers do not pay income taxes on their factor income, and the taxes paid from their other sources are quite small and without importance. This is due to the fact that their taxable income does not exceed the limit and hence it is not subject to taxation.

On the basis of the allocation coefficients estimated for each particular year during the period 1958 - 1974 and the time series data for Y^F_f, Y^F_w, Y^F_P, Y^h, ^hTs, hTa, Tdq_{wj} $T{<}ip_p$ and T^aP_0 the disposable income the four income groups can be estimated. This is given in Table 4.

Table 4

Estimated disposable income by occupational group during the
period 1958 – 74

		Disposable income of :			
Years	Farmers	Wage and salary earners	Professionals and profit earners	Other categories inluding pensioners	Total disposable income [16]
1958	20849	23766	20766	14059	79440
1959	20770	25246	21479	14950	82445
1960	20782	27707	23342	16100	87931
1961	25309	29912	25577	18181	98979
1962	25109	31939	27065	20494	104607
1963	28822	34989	30618	23537	119966
1964	31180	39451	34909	26331	131871
1965	35732	45643	39757	30915	152047
1966	38207	51092	43479	34654	167432
1967	39459	56303	46504	38062	180328
1968	38126	61917	50943	41327	192313
1969	41659	68941	58653	45980	215233
1970	45598	76810	66348	51923	240679
1971	50570	85999	75732	59558	271859
1972	57489	99084	84324	67484	308381
1973	77375	121674	113051	83672	395772
1974	91494	146725	135530	97245	470994

16. Total disposable income does not coincide with that of National Accounts Statistics, because it has been adjusted to correspond to the United Nations definition, namely, that personal disposable income equals private consumption plus households savings.