

IMPLICIT EQUIVALENCE SCALES

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Given an actual tax system, by observing the tax schedule, the income exemptions and the tax credits, it is possible to reconstruct either relative or the absolute equivalence scales, which implicitly underlie the tax system.

IMPLICIT *ABSOLUTE* EQUIVALENCE SCALES

Let x_s an income level related to the reference family typology (e.g. the single).

Let $t_s(x_s)$ the tax the single pays at income x_s

As x_f and x_s are equivalent if $x_s = x_f - sa_f$

the horizontal equity command asks that, after tax:

$$x_s - t_s(x_s) = x_f - t_f(x_f) - sa_f$$

From which, using the pre-tax equivalence relation $x_f - sa_f = x_s$:

$$t_f(x_f) = t_s(x_s) = t_s(x_f - sa_f)$$

Given x_s , we look for the income level, x_f , for family typology f , which pays the tax

$$t_f(x_f) = t_s(x_s), \text{ that is to say } x_f = t_f^{-1}[t_s(x_s)],$$

the implicit absolute equivalence scale which relates income x_s for the single, to income x_f for the typology f , is

$$e_f(x_s) = x_f - x_s, \text{ that is to say } e_f(x_s) = t_f^{-1}[t_s(x_s)] - x_s.$$

$e_f(x_s)$ is the estimate for sa_f .

Problem: $e_f(x_s)$ depends on x_s .

Ebert and Lambert observe that when the scale depends on x_s ,

$e_f(x_s)$ is an approximation approximations.

The Authors show that the exact relations should be

$$x_f = t_f^{-1} \left\{ t_s(x_s) + [sa_f(x_s) - sa_f(y_s)] \right\},$$

$$y_s = x_s - t_s(x_s),$$

$$sa_f(x_s) = t_f^{-1} [t_s(x_s) + sa_f(x_s) - sa_h(y_s)] - x_s.$$

IMPLICIT *RELATIVE* EQUIVALENCE SCALES

Let x_s an income level related to the reference family typology (e.g. the single).

Let $t_s(x_s)$ the tax the single pays at income x_s .

Let x_f the income level which for family f is equivalent to x_s , that is

to say $x_s = \frac{x_f}{sd_f}$

The horizontal equity command asks that, after tax,

$$x_s - t_s(x_s) = \frac{x_f - t_f(x_f)}{sd_f} = \frac{x_f}{sd_f} - \frac{t_f(x_f)}{sd_f} \quad (\spadesuit)$$

From which, using the pre-tax equivalence relation, $x_f / sd_f = x_s$, (\spadesuit) simplifies into

$$t_s(x_s) = \frac{t_f(x_f)}{sd_f}.$$

After division of both members by x_s , we get

$$\frac{t_s(x_s)}{x_s} = \frac{t_f(x_f)}{sd_f x_s} = \frac{t_f(x_f)}{x_f}$$

Which means that if $x_s = \frac{x_f}{sd_f}$, then the tax rate for x_s and x_f should be the same.

Then, given x_s , we look for the income level, x_f , for family typology f , which pays the same tax rates as x_s .

From

$$\frac{t_f(x_f)}{x_f} = \frac{t_s(x_s)}{x_s} \rightarrow x_f = q_f x_s \rightarrow q_f(x_s) = \frac{x_f}{x_s}.$$

$q_f(x_s)$ indicates that q_f depends on x_s .

Ebert and Lambert observe that when the scale depends on x_s , $q_f(x_s)$ is an approximation of the real scale.

The Authors show that the relative equivalence scale should verify the relation

$$\frac{t_f(x_f)}{x_f} = \frac{t_s(x_s)}{x_s} + \left[1 - \frac{sd_f(y_f)}{sd_f(x_f)} \right] \frac{y_s}{x_s}.$$

$$y_s = x_s - t_s(x_s),$$

The Italian personal tax system is characterized by

- Increasing marginal tax rates with 5 brackets**
- Piecewise decreasing tax credits**

Income production costs are *taken into account* by tax credits; they are different according to the quality of earned income and fixed by law.

Living costs, either for the earner's **spouse** or for his/her **children** or for other relatives are *taken into account* by other specific tax credits.

Tax credits are inverse functions of income.

Progressivity works both by increasing marginal tax rates
decreasing tax credits.

Italian tax System

Central Government marginal tax rates from 2008 onward

Tax base (euro)		Tax rate (%)		
	up to	15,000	23	
from	15,000	up to	28,000	27
from	28,000	up to	55,000	38
from	55,000	up to	75,000	41
above	75,000			43

Source: Ministry of Finance, 2007.

Income Tax Law (2014)

Incomes	Tax credits					
	Income production (sub. jobs)	Spouse alimony	Children alimony (children older than 3 years)			
			1 child	2 children	3 children	
15,000	1,564	690	800	1,641	2,508	
18,000	1,429	690	770	1,589	2,440	
20,000	1,339	690	750	1,555	2,394	
30,000	906	710	650	1,382	2,166	
40,000	543	690	550	1,209	1,938	
55,000	0	431	400	950	1,596	
75,000	0	86	200	605	1,140	
90,000	0	0	50	345	798	

Source: Application of Ministry of Finance's schedules.

Income Tax Law (2014) Single, subordinate jobs

Incomes	Net P.I.T.	Net average rate %
15,000	1,886	12.57
18,000	2,831	15.73
20,000	3,461	17.31
30,000	6,814	22.71
40,000	10,977	27.44
55,000	17,220	31.31
75,000	25,420	33.89
90,000	31,870	35.41

Source: Application of Ministry of Finance's schedules.

Implicit equivalent incomes and exemptions (one income earner)

s	c		$c1$		$c2$		$c3$	
x_s	x_c	$e_c(x_c)$	x_{c1}	$e_{c1}(x_{c1})$	x_{c2}	$e_{c2}(x_{c2})$	x_{c3}	$e_{c3}(x_{c3})$
15,000	17,190	2,190	19,595	4,595	22,015	7,015	24,475	9,475
18,000	20,190	2,190	22,495	4,495	24,860	6,860	27,275	9,275
20,000	22,190	2,190	24,430	4,430	26,755	6,755	28,870	8,870
30,000	31,715	1,715	33,190	3,190	34,845	4,845	36,515	6,515
40,000	41,593	1,593	42,795	2,795	44,225	4,225	45,760	5,760
55,000	56,010	1,010	56,905	1,905	58,110	3,110	59,515	4,515
75,000	75,195	195	75,630	630	76,490	1,490	77,610	2,610
90,000	90,000	0	90,125	125	90,810	810	91,765	1,765

Source: Application of Ministry of Finance's schedules.

Implicit relative scales (one income earner)

x_s	Net average tax rate %	c	$c1$	$c2$	$c3$
15,000	12.57	1.243	1.498	1.752	1.965
18,000	15.73	1.243	1.483	1.666	1.821
20,000	17.31	1.243	1.445	1.591	1.738
30,000	22.71	1.125	1.224	1.334	1.440
40,000	27.44	1.108	1.184	1.270	1.361
55,000	31.31	1.069	1.122	1.191	1.269
75,000	33.89	1.010	1.032	1.074	1.133
90,000	35.41	1.000	1.006	1.041	1.090
OCSE	1	1.5	1.8	2.1	2.4
French tax	1	2	2.5	3.0	4

Source: Application of Ministry of Finance's schedules

Let's focus on a single, s , and on a married couple with 3 children, $c3$, who live in a middle/great Italian town.

Absolute scales:

- s 's pre-tax income is equal to 30,000 euro - post tax 23,186;
- $c3$'s equivalent income is equal to 36,515-post tax 29,701

The Italian Statistical Office [ISTAT 2009] evaluates that, on average, a five-member family spends 366 (per month) euro more than a single just on food; obviously, the necessities are not limited to food.

$6515/12=543$: which means that five member family should spend just $(543-366)=177$ euro for necessities different from food, more than a single.

Absolute scales:

The relative scale for a five person family at the reference income level 30,000 is 1.44: the OCSE modified equivalence scale is for two adults and three children

$$\text{OCSE SCALE} = 1 + 0.5 + nch * 0.3 = 2.4.$$

The maximum value in the table is 1.96.