DEMOGRAPHIC TRENDS AND PERSONAL INCOME TAX IN ITALY IN THE CONTEXT OF RAISING CHILDREN

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Abstract: Since the 1970s, Italians have experienced considerable demographic changes: a sharp fall in the birth rate with a contemporaneous ageing of the population, and more residents aged 65 years and over than under the age of 20. These changes are due not only to a change in cultural attitude: they depend also on the economic difficulties Italian families face when increasing their family size. At the same time, we have to observe that in Italy, the personal tax system does not recognise, as it should, the social and economic efforts families undertake in their role of bringing up children and increasing human capital. This is verified by looking at both the implicit costs recognised by the personal tax system, and the violations of three axioms, which according to Kakwani and Lambert [1998], a fair tax system should respect. The Italian tax system recognises rather low implicit costs to income earners when they have to take care of children: moreover these implicit costs are an inverse function of taxable income and become irrelevant for middle level incomes. With reference to Kakwani and Lambert's axioms, the overwhelming majority of violations are made against families with children.

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1. Introduction

During the last thirty years, the interval that identifies the generation lag between parents and children, the Italian population has faced an extraordinary transformation process, greater even than one which took place between the unity of Italy (1861) and the end of the Second World War. At present, about 60 million people live in Italy. It is a population with both increasing multi-ethnic characteristics, and an age structure becoming increasingly older. The percentage of people younger than 20 is less than 20%; this percentage is decidedly lower than that of people aged 65 and older.

The number of births is lower than 600 thousand per year, and lower than the annual number of deaths. In order to reach and maintain a *zero growth* rate, 150 thousand additional births would be needed annually. Since 1977, the total fertility rate has become lower than 2 children per woman; now it is 1.4, significantly lower than what would be required to guarantee the generational replacement. Despite this, a significant proportion of Italian women express a desire to have more children than they have now; the organisation of social life and economic difficulties appear among the main reasons that restrain this desire. The demographic transformations that are taking place in Italy are outlined in Section 2 of this article, while sections 3 and 4 will discuss the framework of the personal tax system that is accompanying such transformations.

In a democracy, personal income tax is still an important instrument by which citizens have an influence upon the conduct of the government in the public interest.[1] The personal income tax structure reflects the cultural approach of governments towards their civil societies, their citizens, and their natural and essential relationships. Following the basic principle that it is not correct "to draw tax revenues from income that is essential for life", as Karlsruhe Court stated,[2] in Section 3 we focus on the implicit amount of income which current Italian tax law considers non-taxable, due to the existence of children which have to be fed and educated by the income earners. Section 4 considers how the Italian tax law behaves with respect to the three axioms which, according to Kakwani and Lambert [1998], an equitable tax system should respect in order to be fair. Monti, Pellegrino and Vernizzi [2012] have recently estimated the level of axiom violations in Italy, and how these violations affect equity with respect to different family types, using, as input data, those provided by the Bank of Italy in its Survey on Household Income and Wealth in the 2010 fiscal year.[3]

Section 5 concludes our findings.

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[1] In Italy the personal income tax is roughly 70% of direct taxes, and about 11% of GDP, including local surtaxes.

[2] BVerfGE 82, 60, Familienexistenzminimum.

[3] For further details on the sample selection and aggregate statistics, see [Brandolini 1999] and [Bank of Italy 2012]. As the SHIW provides information on each individual's Personal Income Tax (PIT) net income, we estimate the PIT gross income for each taxpayer, following the methodology described in [Pellegrino et al. 2011].

2. Characteristics and trends of the demographic context in Italy

The main demographic characteristics of Italy are common to many other developed countries. However, the decrease of the number of births and the ageing population are particularly marked.

Table 1. Structural characteristics of the Italian population and registered families at censuses 1971, 1981, and 2011

	1971	1981	2011
	Thousands		
Resident population	54 137	56 557	59 434[a]
foreigners *	121	211	4 029[a]
– people 0-19 years old	17 077	16 816	11 196[a]
– people ≥ 65 years old	6 102	7 485	12 385[a]
– people ≥ 85 years old	349	445	1 691[a]
Families	15 981	18 362	25 406[b]
Average number of family members	3.4	3.0	2.3[b]

* Non-citizens.

[a] Provisional data; [b] years 2006-2010.

Source: ISTAT.

Table 2. Annual average frequencies of some demographic parameters in the Italian population

	1970-1974	1980-1984	2007-2011	2012[a]
	Thousands			
Births	899	626	563	538
Deaths	528	548	586	616
Births-deaths	+371	+78	−23	−78
Net immigration	−11	−39	+359	+177
Marriages	408	311	238[b]	205[c]

[a] Provisional data; [b] years 2006-2010; [c] year 2011.

Source: ISTAT.

From Table 2 we can see a sudden decrease of births, which in 1970-1974 were nearly 900 thousand per year, while ten years later, in

1980-1984, the number of births was reduced by almost 300 thousand. Births have recently shown a further decrease: in 2012 they were less than 540 thousand, including the contribution of 80 thousand births by the foreign population. As a consequence, the difference between births and deaths, which in 1970-74 was greater than 370 thousand, fell to 78 thousand ten years later and is currently negative (–78 thousand). Without immigration from abroad, which 30 years ago presented a negative net balance (–39 thousand), and in 2012 still a positive balance of 150--200 thousand (despite the reduction due to the economic crisis), the resident population would have started to decrease from the beginning of this century. Other characteristics in the 21st century, which are common to other developed countries, include: a decrease in the number of marriages (419 thousand in 1972 and 218 thousand in 2010); divorces now occur in one quarter of marriages (54 thousand); abortions, which have been legally allowed since 1978, are now at 120-130 thousand per year; young people tend to delay leaving their parental home (40 % of male and 22 % of female residents aged 30-34 are still living with their parents); an increase in cohabitation before getting married; and an increase in out-of-wedlock births. On average, Italian women tend to procreate when they are about thirty years old, due to the prolongation of their studies and the consequent delay of the start of their careers. As a consequence, their first child is often the only one. In fact, 80 % of women who are forty years old have given birth to at least one child, as their mothers did, and the number of first children has remained stable. What has fallen, is the number of second children and, particularly, of children from the higher social orders. Moreover, three quarters of births are registered inside marriage, even if the number of births out of wedlock is growing.

For immigrant women, in 2006 the total fertility rate was 2.5 children, but in 2011 it fell to an average of just above 2. This shows that low fertility rates are due to the context of family life, i.e. the general social and economic environment, and they show little dependence upon ethnic characteristics. It is interesting to observe that the average number of children per woman is 1.9 in Milan, 1.4 in Rome, 1.2 in Naples and 1.6 in Palermo (Blangiardo, 2011): this point should be better investigated as it shows the false cliché of the fertility of immigrants as an adequate response to the declining birth rate among Italians.

With regard to the structural changes of the Italian population, for which the decrease in birth rate is one of the main causes, we have already pointed out that nowadays the number of residents at the age of 65 and over is one million greater than those aged less than 20. If the present trend continues, in 20 years the difference could be greater than 6 million people. At the same time, the number of residents aged 80 and over will become greater than the number of children younger than 10 years of age. If the present trend does not change, in 2051 the number of people younger than 65 will decrease by 6 million, whilst the 65+'s will increase by 8–9 million, and people aged 90 and more will quadruple (+1.6 million). The intensity and the rapidity of the above changes are impressive; they will certainly present a great challenge for the political, economic and social organisation of Italian society.

The notion that immigration can solve these problems must be dropped. Undoubtedly, the history of the last 40–50 years shows that the political solution reacting to the demographic and social changes in Italy has been feeble, if not absent. If Italian society wants a future with a balanced structure that allows sustainable development, politicians can no longer delay solving the questions related to families: the organisation of their work and their commitment to the increase of human capital, the procreation and education of new members of society. This is not a matter of introducing incentives for fertility, instead it is a matter of freedom, which consists in removing the obstacles that prevent families that would desire to have children, or more children, from giving birth.

3. The implicit costs of children according to Italian tax law

Italian tax law is based on a piecewise linear tax system with increasing bracket tax rates, as Table 3 shows.[4] The gross tax is calculated for each individual, without taking into account his/her family composition.[5]

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[4] E.g. given an annual income equal to 78 000, the gross tax liability is calculated as follows: $(78\,000 - 75\,000) \times 0.43 + 20\,000 \times 0.41 + 27\,000 \times 0.38 + 13\,000 \times 0.27 + 15\,000 \times 0.23$.

[5] A description of the Italian tax system can be found in [Pellegrino, Vernizzi 2010].

Personal incomes are further taxed by applying local surtaxes, which can be different according either to the region, or to the municipality where the income earner is registered.

Once the gross tax has been calculated, some tax credits can be applied according to the income source and the composition of the income earner's family. Table 4 illustrates the tax credits that can be detracted from the gross tax when one parent is an income earner and the income earner is a subordinate worker. We note that in the Italian tax system, tax credits decrease with respect to income. Table 4 shows the tax credits corresponding to the gross income level reported in the first column.

Table 3. 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.

When children are younger than three years of age, the tax credit due to child alimony is roughly one eighth greater. Furthermore, tax credits can be applied in the case of a handicap. When there are more than three children, a further tax credit can be deducted from taxes: the overall amount cannot exceed 1 200 euro; it decreases with growing income, and the decrease is lower when the number of children is greater. In any case, the number of families with more than three children is small in Italy.

The tax law allows further tax credits related to children's education and training:
– 19% of gym fees (with an annual ceiling equal to 210 euro per child);
– 19% of nursery fees (with an annual ceiling equal to 632 euro per child);

- 19% of secondary school and university fees (with ceilings not greater than the fees requested by state schools, or by state universities).
- 19% of health expenses exceeding 125 euro.

Table 4. Tax credits (for families with one income earner) in the Italian Personal Income Tax Law (2011)

Incomes	Tax credits (euro)				
	Income production (subordinate jobs)	Spouse alimony	Child alimony (children older than 3 years)		
			1 child	2 children	3 children
15 000	1,338	690	674	1 382	2 112
18 000	1 238	690	648	1 338	2 054
20 000	1 171	690	632	1 309	2 016
30 000	836	710	547	1 164	1 824
40 000	502	690	463	1 018	1 632
55 000	0	431	337	800	1 344
75 000	0	86	168	509	960
90 000	0	0	42	291	672

Source: application of Ministry of Finance's schedules.

For nursery fees we observe that, on average, the annual ceiling per child is just 70% of the actual monthly nursery fees; the same applies to gym fees.[6] No transport expenses are considered relevant for tax purposes.

Using Tables 3 and 4, it can be estimated how much income is necessary, according to the tax planner, to preserve welfare when an income earner has to take care of other members of their family. In order to describe the procedure, some pieces of notation have to be introduced. Let x_s be the pre-tax income of a single, s, and let x_h be the income that is necessary for a family h, e.g. of two parents and three

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[6] The French tax law allows subtraction of the whole of the education expenses that a family incurs, not only the 19 % of a part of them; the whole education and training cycle is taken into account, from nursery to university, including baby-sitter services.

children, to enjoy the same welfare standard as s. Let $t_s(x_s)$ and $t_h(x_h)$ be the tax paid by s and h, respectively.[7]

According to Feldstein [1976, p. 83], a tax system preserves horizontal equity "if two individuals would be equally well-off in the absence of taxation, they should be equally well-off if there is taxation". If we assume that a tax system respects the horizontal equity command described by Feldstein, the post-tax incomes $y_s = x_s - t_s(x_s)$ and $y_h = x_h - t_h(x_h)$ should still allow both s and h to enjoy the same welfare level, even if the post-tax welfare is obviously lower than the one they both would have enjoyed by x_s and x_h, respectively.

The difference $sa_h(x) = x_h - x_s$ measures the money which should be added to x_s to allow h to enjoy the same welfare as enjoyed by s with income x_s. Income x_s, and income x_h, are defined as *equivalent incomes*, as they allow the two families, h and s, to achieve the same welfare level; the function $sa_h(\cdot)$ is called absolute equivalence scale, henceforth aes.[8]

From the pre-tax and post-tax equivalence relations $x_h=x_s+sa_h(x)$ and $y_h=y_s+sa_h(y)$, respectively [Ebert, Lambert 2004], hereafter EL, we can state that the tax debt should satisfy the following relation:

$$t_h(x_h) = t_s(x_s) + \left[sa_h(x) - sa_h(y) \right]. \tag{1}$$

As EL observe, in (1) the pre-tax *aes*, $sa_h(x)$, is generally different from the post-tax $sa_h(y)$, unless they are income invariant.

From (1), by writing x_h as $x_s+sa_h(x)$, one obtains

$$sa_h(x) = t_h^{-1}\left[t_s(x_s) + sa_h(x) - sa_h(y) \right] - x_s. \tag{2}$$

In (2) the inverse function $t_h^{-1}(\cdot)$ gives the income which corresponds to the tax $t_s(x_s)$, corrected by the difference $sa_h(x) - sa_h(y)$.

As EL observe, it is common practice to approximate $sa_h(x)$ by

$$e_h(x) = t_h^{-1}\left[t_s(x_s) \right] - x_s. \tag{3}$$

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[7] $t_i(\cdot)$ indicates that the tax debt is calculated by applying the tax schedule of family type i. According to Italian law, as described here, the tax schedule depends both on tax rates and on tax credits.

[8] Notice that an *aes* is not necessarily positive: if the reference typology s has more needs than h, $sa_h(\cdot)$ is negative.

When $sa_h(\cdot)$ is an inverse function of income, $e_h(x)$ is an upward biased estimation of $sa_h(x)$.

Notice that $e_h(x)$ can act as an implicit exemption that, when subtracted from x_h, allows the calculation of the tax debt for family h, by applying the tax schedule of the single, being $t_h(x_h) = t_s[x_h - e_h(x)]$.

Table 5 reports the values for $e_h(x)$, and for the approximated equivalent incomes, x_s, obtained with relation to some reference incomes of the single, s, which are listed in the first column. The table shows that $e_h(x)$ is decreasing with respect to income[9]. For reference incomes greater than 40 000 euro, which corresponds to a net income equal to 28 000 euro, the implicit exemptions become quite low.

Table 5. Implicit equivalent pre-tax incomes and exemptions (families with one income earner)[10]

s Single's reference income	C Married couple		$c1$ Married couple +1 child		$c2$ Married couple +2 children		$c3$ Married couple +3 children	
x_s	x_c	$e_c(x)$	x_{c1}	$e_{c1}(x)$	x_{c2}	$e_{c2}(x)$	x_{c3}	$e_{c3}(x)$
15 000	17 274	2 274	19 373	4 373	21 516	6 516	23 715	8 715
18 000	20 274	2 274	22 291	4 291	24 440	6 440	26 629	8 629
20 000	22 274	2 274	24 301	4 301	26 412	6 412	28 288	8 288
30 000	31 717	1 717	32 981	2 981	34 378	4 378	35 811	5 811
40 000	41 602	1 602	42 625	2 625	43 836	3 836	45 161	5 161
55 000	56 009	1 009	56 763	1 763	57 787	2 787	58 977	3 977
75 000	75 193	193	75 559	559	76 289	1 289	77 243	2 243
90,000	90 000	0	90 096	96	90 655	655	91 496	1 496

Source*:* own elaborations.

In the present article, we report implicit equivalent pre-tax incomes and exemptions, concerning five families' typologies: single (s), married couples without children (c), married couples with one child (c_1), couples with two children (c), and couples with three or more children (c_3).[11]

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[9] This is not surprising, as a tax credit corresponds to an implicit exemption which is an inverse function of income (see the appendix in [Vernizzi, Monti, Kośny 2006]). *A fortiori* this holds when tax credits also decrease with respect to income.

[10] Implicit equivalent incomes are calculated as $x_h = t_h^{-1}\left[t_s\left(x_s\right)\right]$, which is an approximation of $x_s + sa_h(x)$.

[11] In section 3 the label $c3$ represented couples with exactly three children.

Let us focus on a single individual having a pre-tax income equal to 30 000 euro, and on a couple with three children having an equivalent income equal to 35 811; suppose that both families live in a medium/large Italian town. After taxes, the disposable income is 22 300 for the single and 28 100 for the latter. Suppose both families live in a medium/large town and pay 10 000 euro per year for housing: consider that this amount may not be enough for a five-person flat, while it may be enough for a one-person flat. The net available income after taxes and housing becomes 12 300 for the single and 18 100 for the family with five members. As a consequence, after having deducted taxes and housing, the single can spend 1025 euro per month for his/her needs. Suppose that in a family with three children, the income earner needs the same amount as the single; the other 4 members of the family should live with 483 euro per month. In order to evaluate the suitability of this amount, consider that the Italian Statistical Office [ISTAT 2009] evaluates that, on average, a five-member family spends 366 euro more than a single just on food[12]; obviously, the necessities are not limited to food.

When a family income is mainly earned by subordinate work, families with children receive a money transfer, which depends on the family's gross income and on the number of children. This money transfer is not related to taxes: it is paid by the Italian central social institute (INPS) and is funded by employees' and employers' contributions.[13]

Table 6 summarises the amount of allowances corresponding to the equivalent incomes reported in Table 5. These family allowances are inversely related to income. Focussing again on our family with two adults and three children with one income earner as a subordinate worker, when the gross income is 35 811, our family's disposable income is increased by 188 euro per month; this money transfer is still clearly insufficient to compensate for the needs that the family has to face due to the presence of a further four persons.

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[12] Consider that self-employed workers do not receive any allowance and they are allowed to receive lower tax credits for income production.

[13] Before the 1980s employers and employees paid specific contributions devoted to family allowances. Nowadays these contributions are merged together with other sources designed to fund social expenditure in general.

Table 6. Family allowances[*] for families having one income earner, subordinate worker (in euro)

c1 Married couple +1 child		c2 Married couple +2 children		c3 Married couple +3 children	
Gross annual income	Family annual allowances	Gross annual income	Family annual allowances	Gross annual income	Family annual Allowances
19 373	1 176	21 516	2 177	23 715	3 453
22 291	925	24 440	1 839	26 629	3 155
24 301	757	26 412	1 605	28 288	2 982
32 981	551	34 378	935	35 811	2 260
42 625	507	43 836	858	45 161	1 836
56 763	236	57 787	468	58 977	1 225
75 559	0	76 289	0	77 243	428
90 096	0	90 655	0	91 496	0

[*] Money transfers paid by the central social institute (INPS) under the condition that at least 70 % of family income derives from subordinate work.

Source: own elaborations.

The point is not that a family should receive, either from central or local governments, the money for such necessary goods, the crucial point is that taxes should not be applied to the amount of money that an income earner uses to pay for the necessities of the people who live on the same earner's income.

In this section we have evaluated the tax system by investigating its implicit aspects. In the next section we will test the equity of the tax system with regard to the three axioms which were stated by [Kakwani, Lambert 1998].

4. The fairness of Italian tax law with respect to families with children

Although there is already a broad literature basis on this issue, it is not easy to check to what extent a tax system is fair. Moreover, this task becomes particularly difficult when one deals with a population partitioned into groups. This paper pursues this goal, applying some results recently obtained by [Monti, Pellegrino, Vernizzi 2012], hereafter MPV. MPV's starting point is the axiomatic definition of an equitable tax system, given by Kakwani and Lambert [1998], hereafter KL. KL state that a tax system should respect the following three axioms in order to be equitable.

(Axiom 1): tax should increase monotonically with respect to people's ability to pay.

(Axiom 2): richer people should pay taxes at higher rates.

(Axiom 3): no re-ranking should occur in people's living standards.

KL observe that a violation of Axiom 1 automatically entails a violation of Axiom 2, although not necessarily the other way round. Moreover, Axiom 3 can be violated only if Axiom 2 (and consequently Axiom 1) holds.

The three axioms can be formally expressed as follows. Let us denote by X the pre-tax income distribution, by T the tax liability distribution, and by A the average tax rate distribution. Moreover let Y denote the post-tax income distribution. Formally, for each pair of income units ($\{i,j\}$, $i,j = 1, 2, \dots, K$) it must hold:

Axiom 1: $x_i \geq x_j \Rightarrow t_i \geq t_j$.

Axiom 2: $x_i \geq x_j \ \ and \ \ t_i \geq t_j \Rightarrow a_i \geq a_j$.

Axiom 3: $x_i \geq x_j \ \ and \ \ t_i \geq t_j \ \ and \ \ t_i/x_i \geq t_j/x_j \Rightarrow y_i \geq y_j$.

KL suggest detecting axiom violations by inspecting if the ordering of the distribution of T, A and Y, are the same as the ordering of X.

KL use summary re-ranking indices to evaluate changes in the orderings. Let G_X, G_T, G_A and G_Y be the Gini coefficient for pre-tax incomes, tax liabilities, average tax rates and post-tax incomes, respectively; let $C_{T/X}$, $C_{A/X}$ and $C_{Y/X}$ be the corresponding concentration

coefficients when *T*, *A* and *Y* are ordered by pre-tax income. KL suggest the following re-ranking indexes:

$$i)\ R_T = G_T - C_{T|X};\ \ ii)\ R_A = (G_A - C_{A|X});\ \ iii):\ R_Y = G_Y - C_{Y|X}. \tag{4}$$

Axiom violations are detected by $R_T > 0$, for Axiom 1, $R_A > 0$ for Axiom 2, and $R_Y > 0$ for Axiom 3. Moreover, as a violation of Axiom 1 automatically entails a violation of Axiom 2, KL suggest to evaluate the extent of Axiom 2 violations by $R_A - R_T$.[14]

MPV have recently estimated the extent of axiom violations between different family typologies. In their paper, by making use of a new formalisation for Gini and concentration indexes, they also evaluated how axiom violations discriminate among groups in their reciprocal relations.

Let us consider *H* family typologies. The re-ranking extent, which refers to each axiom, can be split as:

$$R_Z = \sum_{h=1}^{H} \sum_{j=1}^{H} R_Z^{h,j},\ h,j = 1, 2,\ldots,H;\quad Z \in \{T, A, Y\}. \tag{5}$$

In (5), the components $R_Z^{h,h}$ ($h = 1, 2,\ldots,H$) depend on each family typology re-ranking. The remaining $H(H-1)$ components $R_Z^{h,j}$, $h \neq j$, depend on re-rankings between families belonging to different family typologies.

MPV split the components $R_Z^{h,j}$, $h \neq j$, in two parts:

$$R_Z^{h,j} = R_Z^{h>j} + R_Z^{h<j}. \tag{6}$$

$R_Z^{h>j}$ is the part of $R_Z^{h,j}$, which is due to *h* units overtaking *j* units, in the ranking of *Z* (*Z* = *T*, *A*, *Y*) with respect the ranking of *X*. Conversely, $R_Z^{h<j}$ is the part of re-ranking between *h* and *j* units, which is due to *h* units when they are overtaken by *j* units, passing from the ranking of *X* to the ranking of *Z*.[15] Obviously, when *Z* is either *T* or *A*, which are non-desirable attributes, $R_Z^{h>j}$ concerns violations which are against *h* (are in favour of *j*), and $R_Z^{h<j}$ concerns violations which are in favour

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[14] For a discussion of this measure, see [Pellegrino, Vernizzi 2012].

[15] As $R_Z^{h,j}$ is necessarily non-negative, $R_Z^{h>j}$ and $R_Z^{h<j}$ are non-negative as well.

of h (are against j). Opposite considerations are drawn when Z is Y, which is a desirable attribute.

MPV estimate axiom violations by making use of the Bank of Italy Survey on Household Income and Wealth.[16] MPV do not focus only on families with one income earner; moreover, they consider any income source, not only incomes from dependent work. In order to make groups comparable, and to take into account the lack of homogeneity within groups, partly due to the main characteristics of children's ages, the number and the working status of income earners per family, they apply KL's relative equivalence scale to the sum of monetary incomes in a family h; the scale is given by the expression[17]:

$$sd_h = \left(ad_h + 0.2ch_{1,h} + 0.4ch_{2,h} + 0.7ch_{3,h}\right)^{0.8} + 0.1w_h, \qquad (7)$$

where ad is the number of adults within the family, ch_1 is the number of children aged 5 years or less, ch_2 the number of children aged between 6 and 14, ch_3 the number of children aged between 15 and 17, w the number of employees or self-employed people within the families, and 0.8 the parameter that indicates the economies of scale attached to the equivalence scale.[18]

In this article, we report MPV's results concerning five families' typologies: single (s), couples without children (c), parents with one

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[16] For further details on the sample selection and aggregate statistics, see [Brandolini 1999] and [Bank of Italy 2012]. As the SHIW provides information on each individual's Personal Income Tax (PIT) net income, we estimate the PIT gross income for each taxpayer, following the methodology described in [Pellegrino 2011].

[17] When a relative equivalence does not depend on income, between the equivalent pre-tax and post-tax incomes of the reference family s, and the corresponding ones of a generic family h, the following relations hold: $x_{s=} x_h/sd_h$ and $y_{s=} y_h/sd_h$, respectively. From these relations, the tax debt of families h can be expressed as: $t_h(x_h) = sd_h \times t_s(x_h/ sd_h)$ [Ebert, Lambert 2004]. The scale (7) is 1, when there is one adult and he/she is neither employed nor self-employed.

As EL observe, a relative equivalent scale sd_h, which does not depend on income, can be transformed into an absolute equivalent scale $sa_h(x)$, which depends on income. The relation $x_h/sd_h=x_s$ becomes $x_h-sa_h(x) = x_s$, with $sa_h(x) = [(sd_h-1)/sd_h]\cdot x_h$; the relation $x_h = sd_h\cdot x_s$ becomes $x_h = x_s+sa_h(x)$, with $sa_h(x) = (sd_h-1)\cdot x_s$.

[18] We just observed that KL's equivalence scale is dominated by the scale applied in France to calculate the personal income tax in France: (*i*) the French system does not tax the 10 % of incomes originated by working; (*ii*) the remaining 90 % is then divided by a quotient which imputes weight 1 to each parent, 0.5 to each of the first two children and 1 to each child after the second one.

child ($c1$), parents with two children ($c2$), and parents with three or more children ($c3$).[19]

Tables 7, 8 and 9 report the shares and the directions of violation extents for each axiom. From the tables it appears that axiom violations are not at all equilibrated between the different family typologies.

Let us focus on axiom violations among income units of the typology c3, parents with three or more children, and the typology s, singles. From Table 7 we can see that, when we consider Axiom 1 among c3 and s, 90.3% of the violation extent derives from relative tax excess paid by c3 income units (row c3, column s). Concerning Axiom 2, 77.31% of the violation extent is due to the relative excess of tax rates applied to c3 units (Table 8: row c3, column s). When considering Axiom 3 violations, we see from Table 9 that the disproportions are reversed: just 6.6% of net income re-ranking is in favour of c3 income units, with respect to s ones (row c3, column s): this means that, among c3 and s, more than 93.40% of Axiom 3 violations are against c3.

In general, we can observe that the disproportions are unfavourable to families with children and that they depend on the number of family components. We have to observe some exceptions to this general rule when we consider Axiom 2: in Table 8 couples with three children appear marginally less penalised than couples with two children and couples with one child, when these typologies are related to singles.

Table 9 substantially mirrors the situation described by Table 7 and Table 8, with the penalization directions reversed. As stressed above, whilst either the tax rate or tax excesses are an unfavourable outcome, the contrary applies to net income excesses. Then, in Tables 7 and 8, a percentage greater (lower) than 50 % reveals a disproportion unfavourable (favourable) to the typology indicated at the beginning of the row. Conversely, in Table 9, when a percentage is greater (lower) than 50 %, the disproportion is favourable (unfavourable) to the typology to which the row refers.

The analysis of KL axiom violations reveals strong evidence of bias against families with children, that by applying a scale flatter than KL's scale, even percentages could probably be smoothed towards

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[19] In section 3 the label $c3$ represented couples with exactly three children.

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more proportioned values. However, the direction of bias would in most cases remain the same.

Table 7. Axiom 1: shares and directions of violation extents between family typologies

$\frac{R_T^{h>j}}{R_T^{h,j}}\%$				J		
		S	c	$c1$	$c2$	$c3$
	s	-	34.82	14.34	10.83	9.70
	c	65.18	-	25.23	17.69	15.76
h	$c1$	85.66	74.77	-	38.46	34.55
	$c2$	89.17	82.31	61.54	-	47.46
	$c3$	90.30	84.24	65.45	52.54	-

Source: [Monti, Pellegrino, Vernizzi 2012].

Table 8. Axiom 2: shares and directions of violation extents between family typologies

$\frac{R_A^{h>j}-R_T^{h>j}}{R_A^{h,j}-R_T^{h,j}}\%$				J		
		S	c	$c1$	$c2$	$c3$
	s	-	40.51	20.79	17.75	22.69
	c	59.49	-	25.65	19.26	18.59
h	$c1$	79.21	74.35	-	40.73	41.39
	$c2$	82.25	80.74	59.27	-	52.31
	$c3$	77.31	81.41	58.61	47.69	-

Source: [Monti, Pellegrino, Vernizzi 2012].

Table 9. Axiom 3: shares and directions of violation extents between family typologies

$\frac{R_Y^{h>j}}{R_Y^{h,j}}\%$				J		
		S	c	$c1$	$c2$	$c3$
	s	-	67.31	85.83	91.30	93.40
	c	32.69	-	74.31	83.14	85.52
h	$c1$	14.17	25.69	-	59.08	68.67
	$c2$	8.70	16.86	40.92	-	58.21
	$c3$	6.60	14.48	31.33	41.79	-

Source: [Monti, Pellegrino, Vernizzi 2012].

5. Concluding remarks

Section 2 has illustrated why Italy is putting at risk its sustainable development: the breakdown of its demographic equilibrium. In the next 20 years, the number of residents aged 65 and over will be six million more than those under 20 years of age. The personal tax system does not seem to be aware of this situation, as it gives very little consideration to the increase in the costs of basic necessities due to the presence of further members in the income earner's family. This is checked by both estimating the implicit absolute equivalence scale, and by checking the extent of progressivity and tax fairness violations in Italian personal income tax.

In order to provide a solid base for sustainable development, decision makers have to free the resources that the social and economic actors, especially citizens, families and their associations, could use to autonomously develop the civil society. From this perspective, the decision makers should not tax the income which is necessary for a family to improve human capital, consisting in the procreation of new members of the society and their education. To this aim, parents should be allowed to allocate their time between activities that produce monetary income, and their children's education, which can improve the quality of human capital and, as a consequence, result in the future increase in GDP. Italians have been waiting too long for a tax structure that preserves these principles. Any reform in the architecture of the tax system should not be reduced to mere fertility supports. In the long run there is a high risk of altering delicate equilibriums, when decision makers base their policies, intended to either increase or restrain fertility, on paternalistic visions of society. Decision makers should not be a substitution for people's free-will; rather they should stimulate and support peoples' collaboration for the common good. Any equal and sustainable development cannot be generated without relying on human relations and synergies coming from inside society [Fornari 2011].

Acknowledgements

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TRENDY DEMOGRAFICZNE A SYSTEM PODATKOWY WE WŁOSZECH W KONTEKŚCIE WYCHOWYWANIA DZIECI

Streszczenie: Od 1970 r. Włosi doświadczają znaczących zmian demograficznych: silnego spadku urodzeń przy jednoczesnym starzeniu się społeczeństwa. Zmiany powodowane są czynnikami kulturowymi, a także trudnościami ekonomicznymi. Istniejący system podatkowy nie sprzyja wysiłkom tych rodzin, które wychowują dzieci. Zostało to wykazane zarówno przez analizę kosztów uwzględnianych przez system podatkowy, jak i przez analizę trzech aksjomatów Kakwaniego i Lamberta, które powinny być spełnione przez sprawiedliwy system podatkowy.

Słowa kluczowe: rozkład wieku, urodzenia, zgony, podatek dochodowy od osób fizycznych, zasada progresywności, efekt redystrybucji, indeks rerankingu.