- in all formulas defined on this section, it has to use equivalent income terms (the living standard);
- all the formulas derive results about households, not individuals;
- L_{X-T} is no more a Lorenz curve but a concentration curve; to define the position of the post tax Lorenz curve it has to take into account a correction factor reflecting the extent of reranking (R): when R is at work a difference between the pre tax and post tax rankings of (equivalent) income units is present and the post tax Lorenz curve is always dominated by the L_{X-T}. The original measures of effective progression change relationship, from[16]

$$\Pi^{RS} = g / (1 - g) \, \Pi^K \qquad \text{to} \qquad \Pi^{RS} = g / (1 - g) \, \Pi^K - R$$

It can refine the decomposition of the Reynolds-Smolensky index, capturing as well as the Kakwani index an effect (negative) of classical horizontal inequity[17] not present if equals had been treated equally;
- it still holds the last assumption of this section.

Now, it is time to verify if these instruments are useful to assess, where feasible, the Italian income tax reform using the empirical evidence.

3 - Empirical Evidence: First Results

The first stage of the Italian income tax reform started in 2003 (then, with the income tax document of 2004). The Executive method is proceeding by various steps: in accordance with the parliamentary majority objectives, at the beginning the tax cut has been concentrated on the bottom part of income parade (Bosi and Baldini 2004). Clearly only at the end of the transition period, the characteristics and the redistributive effect of the tax reform will be definitive.

All papers focus on the government proposal, but during period between 2000 up to July 2002 distinct information about the design of tax reform became available for the analysts: for instance, the first paper was on hand in 2000 and redistributive results went out according to the electoral plan of the upcoming government.

During time doubts are decreased by an improved definition of the proposal and, finally, by the appearance of 'official' case studies simulating the tax reform effects on individual tax liability, average rates and post tax income.

It can divide papers into three categories, according to different available information

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[16] - See Kakwani (1984, 1986).
[17] - See Aronson et al. (1994).

- from electoral plan (Baldini and Bosi 2000);
- from Law proposal on 2001, 3rd article (Arachi and Zanardi 2002; Padoa Schioppa, 2002; Baldini and Bosi 2002);
- from the conference of Law proposal reporter, the Member of Parliament V.E. Falsitta (Baldini et al. 2002).

It seems obvious to state that the degree of correctness of evaluations increases with the growth of qualifications.

The absence of important parameters or general information constrained the researchers to present various case studies. We shall see that consistent with these, different decreases in the total tax burden - as well as a variety of redistributive effects - was calculated, the ultimate pattern of gainers and losers changing in accordance with different chosen parameters magnitudes.

Especially by the outcomes of Baldini et al. (2002) a first evaluation of the proposal may be defined and therefore it pays more attention on this paper, summarizing the principal results that preceding papers achieve. Before to do that I am going to illustrate which are fundamental points that should be clarified by an exhaustive design of an income tax schedule.

3.1 Income Tax Reform Design

First, it should identify completely each variable into the functional form

$$s(y) \ = \ s(x - a_i - d_i(x)) - c_i$$

where $s(\cdot)$ = rate structure; y = taxable income; x = pre tax income; a_i = lump sum allowance; $d_i(x)$ = income related deductions; c_i = tax credits.

According to the 3rd article of the fiscal system broad reform, it focuses on:

1. which are the income sources that are taxable and how much they are liable to tax;
2. the choice between notions of effective or 'usual' income;
3. the designation of the unit type: individual or household?;
4. the rate structure;
5. the relief typology ($d_i(x)$), the type and the amount of exemption (a_i);
6. the role of tax credits.

Given these choices "an income unit's tax liability depends very much on its non income characteristics as well as its income" (Lambert 2001, p.180). At the same time by using a

sample of pre tax incomes it is feasible to estimate the total income tax revenue as well as the redistributive effect of a tax reform.

1 – To define which is the taxable income we must characterize what the term *x* represents. Usually

$$x = x_E + x_T + x_{SE} + x_F$$

where x_E = employment income; x_T = retirements and net transfers; x_{SE} = self-employment income; x_F = income by financial assets (interest rate * Assets stock).

First, the tax reform does not change radically the old approach: the latter term, x_F, continues to be excluded from the personal income tax, covered by a substitutive tax code.

On the other hand, the treatment of non-profit firms is included in the personal income tax, and different marginal rates should be applied on some income sources.

Different treatment of these income sources leads to HI among pre tax equals.

2 – Concerning the self-employment income and the individual firm performance the reform establishes the importance of '*sector studies*', hence giving relevance to a notion of *usual* income rather than *effective* income.

In contrast the simulations presented by Falsitta do not show these criteria as well as no distinction between treatments of, for instance, x_E and x_{SE}.

With this uncertainty about the choice and without improved information, the papers continue to use the old system approach: an *effective* income concept.

If not, relatively to the tax unit, differences among the *effective* and *usual* income, would lead also in this case to HI: given that the taxation should lead to an equal treatment of equals, in many cases the effective income may be different from the taxable income amount that *sector studies* define usual for that activity, or job, etc.

3 – As in the majority of the European and OECD countries[18] the actual income tax is a personal one. The choice of the tax unit in the tax reform is not defined exactly, but looking at other official technical articles it can read that household *should* be designed as the central subject of the public finance activity. Also in such a case the implicit consequences of Falsitta's case studies may allow us to apply the old procedures: the household relevance is maintained by the different lump sum allowances given to individuals living in different family sizes and not by an explicit definition of it as the passive subject.

In both cases the tax liability matter is relevant only if the tax income is progressive. If it were proportional (flat average rate for all the income level) for equal household incomes the

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[18] - See "Individual Taxes: a worldwide summary" (annually). London and New York: Price Waterhouse.

gain of splitting possibility is irrelevant: even if the household income is divided among the members, the total liability does not decrease. This matters only if, for different types of household income distribution among members of the family, the tax schedule is progressive.

On the other hand also with a personal income tax it is feasible to consider different composition of the household in which the individual subject lives.

According to the family size it may have several exemptions as well as reliefs[19], usually correlated with family characteristics that the law considers correct to protect.

4 – Probably the new rate structure is the only point that seems well defined by the tax reform.

From 5 increasing marginal rates along the income scale and relative thresholds, the tax reform reduces them to only two increasing, with the sole explicit threshold at 100000 Euro (more or less 62000 £).

The two rates are 23 % and 33%. There is only the 0.5 % of the actual distribution of pre tax incomes approximately above the threshold. For the 99.5 % of the population then it is possible to regard the Flat rate tax as the theoretical model, even with the occurrence of abatements and deductions.

5 – Given that it has been identified what is x, now it can define the behaviour of a_i and $d_i(x)$ to obtain a taxable income definition.

The abatement level must be equal to the level that identifies the poverty line. From Falsitta's relation implicitly it can derive that for a single adult the poverty line should correspond to 6300 Euro (around 3900 £).

Note that in a personal income tax it has to consider the existence of economies of scale into the family own life (and the different needs). Equivalence scale become the necessary instrument as means of adjusting measured income into comparable quantities to avoid dangerous interference with respect to the prior principle of Horizontal Equity, the typical causes of differentiation between households being the number of adults and the number and ages of their dependants.

For the other kind of tax-free incomes and income related deductions the tax reform focuses on: family, house, health care, education, research, retirement; non-profit, church donations, social voluntary activities, production costs to labour wage. We shall see which relation may be inferred between the old law and the tax reform regarding these issues.

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[19] - The tax liability could be differentiated among family also by using tax credits.

One of the goals of abatement (better if scaled up according to family features) it is to increase the degree of progression of the income tax[20] (vertical equity purpose). In contrast other a_i's are related directly to the family size and have Horizontal Equity objectives, while HI consequences derive usually from income related deductions, reducing the progressive effects of lump sum components and the rate structure[21].

6 − In the actual legislation there are also tax credits. They can be fully redeemed by, in the new fiscal year, the possibility to sum not exploited c_i's with the new tax credits, according to:

$$s\,(\,y_t\,) - c_{i,\,t} - c_{i,\,t-1}$$

In the actual law proposal, and also at the end of the transition period, they still continue to vanish becoming income deductions. The goal should be to simplify the procedure.

To conclude it has only to remind that greater (but not total) certainty regarding the design of tax reform has been obtained during time, constraining some researchers to choose different admissible scenarios from known documents. Even if many of the feasible interpretations of estimates may be judged with a range of uncertainty, nevertheless some points (e.g. the extent of revenue forgone, the fall of total tax ratio *g*) are apparent. This seems consistent with a law article relevant point that specifies: nobody has to lose from the tax reform; all must have a better or equal position relatively to the *old* income tax.

3.2 The Electoral Tax Reform Plan

In the electoral plan of Right Wing parties, before the vote for the new Assembly in 2001, a radical tax reform was proposed consistent with the purpose to cut the total tax burden as well as to simplify the tax schedule. With the available information it was possible to state that:

- From the old rate structure with 5 marginal rates (18% the lowest, 45% the highest) they should become two;
- A flexible exemption was introduced quote according to the family size and equal for any income source types (for a single adult 7746 euro, for a couple 10330 euro, a couple plus one, two or more children around 11362 euro).

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[20] - Also with a simple flat rate tax we can have a progression of the average rates. For instance, where social homogeneity exists, if $T_i = t\,x_i - a$ → $AT_i = T_i / x_i = (t\,x_i - a) / x_i = (t - a / x_i)$, where T_i = tax burden for individual i; t = tax rate; x_i = pre tax income; a = lump sum allowance.

[21] - Usually these deductions (and expenditure-related deductions too) rises along the income scale (Lambert, 2001, p. 182).

In the old legislation this abatement was lower as well as differentiated among different people with dissimilar income sources.

Doubts still survived about the income tax unit types (the plan gave the impression that the preference were for a household income tax) as well as the way by which the abatements applied (universal or selective, that is, always applicable - or not - on income levels higher than the tax free level, equal for any income level or decreasing along the income parade, etc).

Moreover these uncertainties were linked: if the personal income tax is operating, was the exemption for the family unique or depending on the number of the workers in the household? In the latter case which decisions about the economies of scale issue?

Furthermore the tax credits and income related deductions behaviour was not well thought-out totally.

Without this crucial information, different degrees of progression and distributional effects are possible, as well as large differences in the total tax ratio.

Hence, regarding the simulation, some choices among the potential range was compulsory:

- The household as tax unit; selective abatement (following the equivalence scale in accordance with the family size) decreasing above the tax-free income until 10000 Euro when it becomes 0 for a single adult (more for larger family); old c_i and $d(x_i)$ structure; finally there applied the new rate structure.

According to Baldini an Bosi's results: the total tax burden decreases considerably, with revenue forgone of 19579 million of euro approximately, corresponding to 16,5 % of the total old tax burden.

By the growth of the exemption level, equal for any income source, the population share with 0 tax liability increases.

The income tax reform is tax augmenting only for middle-income recipients (the average tax rate increasing slightly for the 4th decile, with a tax cut for other deciles).

Hence it is a double-crossing tax reform, with a higher average tax rate fall for the higher income group.

As a consequence the Gini index for the equivalent post tax income rises from 34.9 to 36.49, the Reynolds – Smolensky index decreases, consistent with the total tax ratio fall, and the Π^K index reduction (less disproportionality in the distribution of the tax burden).[22]

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[22] - The researchers proposed no decomposition of vertical equity, classical horizontal inequity and reranking.

	Income tax 2000	Estimated Income tax 2001	Tax reform electoral plan
Total tax burden variation		**-11837**	**-19579**
Average tax rate	**0.2093**	**0.1884**	**0.1738**
Gini equivalent pre tax income	39.89	39.89	39.89
Gini equivalent post tax income	**34.90**	**34.86**	**36.49**
Reynolds-Smolensky's index	0.0498	0.0503	0.0340
Kakwani's index	0.1914	0.2202	0.1635

MAPP98 model   **Sources: Bosi and Baldini 2000**

According to Baldini and Bosi, the reduced amount of redistributive effect is due to the highest part of total tax burden cut (a percentage share of 80%) charging on the richest last two deciles.

Immediately a question arises: how to get back the revenue forgone? Two ways are possible if the public expenditure deficit has to remain stable: either the growth of revenue from other types of tax or public expenditures reduction (in such a case, which should be expenditures to cut?).

3.3   The Executive Law Proposal

On 21 December 2001 the executive presented a Law proposal about a general fiscal system reform. It can find the fundamental principle of the personal income tax reform within the 3rd article exclusively.

Only now we are sure that tax credits are substituted by income related deductions although without to specify in which way they have to act (no indication on the precise form of d(x)). Note that they have to be concentrated on the low and middle-income group, according to the law.

Furthermore the income tax unit still continues to be uncertain as well as the concept of income. I still go on by using a range of parameters and choices that are compatible with the information summarized in the law article.

Arachi and Zanardi (2002) assumes for the new deduction system:

- A reduction of personal tax liability similar to that which is determined by the actual tax credits system (assumption of *equivalent* deduction, AED);
- The exemption works for all individuals in the same way;

- There are 3 case studies with 3 distinct abatement amount: 0, 6200 Euro (actual level of exemption), 7750 Euro (considered as the poverty line).

The form of the tax schedule could be: $s(x_i - a) - c_i$

where c_i continues to hold by the AED.

Arachi and Zanardi leave out the income related deductions, paying more attention to the evaluation of tax reform effects concerning the new rate structure and the different level of exemption consequences.

The results are[23]:

- with $a = 0$

  The tax burden goes down by 14000 million of euro ($\sim$ 11.5 % of the old total tax burden: this revenue forgone increases sharply together with the growth of the abatement level).

  There is an increase of average rates for the low and middle-income recipients, only the last 3 deciles gain (the top on gaining a 26% tax liability reduction).

- with $a \neq 0$

  The tax cut is generalized; tax liabilities diminish for all the income groups.

The higher the exemptions level the higher this reduction for all the groups. In both cases the highest reduction of average tax rates is assigned to the top decile.

Neither redistributive effect indexes nor the Gini index are on hand. Furthermore it seems that no equivalence scales are used to deflate pre tax incomes of different family sizes.

The results are unambiguous only in terms of the tax burden loss (and then the *certain* course of public spending deficit); in the same time reporting the pattern of the gainers and losers is not sufficient to evaluate the possible social welfare level.

Also Padoa Schioppa (2002) specifies it has to pay attention to the non-definiteness tax reform as well as the assessment of micro and macro effects resultant from the case studies.

Concerning the micro appraisal this study focuses on individual and households aspects. The former is distinguished according to the source of incomes, if from employment or self employment: in the old income tax, different tax free level are enjoined from distinct sources, an exemption of 6200 Euro for x_E and 3100 Euro for x_{SE}.

The hypothesis is to make this allowance equal to 10300 Euro for everyone: this should lead to higher Horizontal equity.

The author proposes 3 case studies according to different way of defining abatements:

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[23] - Tab. **1** and Charts **1** in the Appendix

- Universal: for any individual, for any income level;
- Selective: for any individual, but not above the tax-free quantity;
- Selective moderately: above the tax-free amount decreasing until 30900 euro where it becomes 0.

Also here the equivalent deduction assumption holds: the actual c_i (with old $d(x_i)$) continue to be suitable.

In the first case study the tax liability remains 0 until the new exemption level (favoring *actually* more the self-employer relatively to the *old* tax schedule).

The average tax rates decrease for all the population. This variation could be represented by a convex function nearly everywhere: along the income parade the gain is increasing and only for the richest 0.31% population share is it concave.

Total tax burden decreases by 43 %, changing from 117 billions to 67 billions of Euro. More than 85% of households gain by the tax reform and 15 % are indifferent (the lower incomes that already have not tax liabilities).

For selective case, for incomes immediately above the tax-free quota, it has the poverty trap problem (and reranking). For the middle-income group, the average tax rates increase, while for other income levels there is a gain: consistent with these results this should be a double-crossing reform.

The households' share that has higher tax liabilities is approximately equal to the share with lower tax burdens and the lower incomes continue to be quite indifferent to the tax reform. The revenue forgone is very much less relatively to the first case, only 6.5 % of the old total tax burden.

Finally Padoa Schioppa notes that losses are not compatible with the law article (which declare that no one may have a loss). Thus the last third case could be considered an average between previous cases, in the same time more consistent to the objective to concentrate exemptions on the low and middle-income group.

Now the loss in terms of total tax burden is around 23.5 % giving a value of 23 billion of Euro. No households lose, 14 % are indifferent, 86 % clearly not (especially the higher income level).

In all cases[24]:
- the low-income individuals below the tax-free quota are not able to use it fully, because the allowance is not a lump sum transfer and, observing the different results for different

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[24] - Tab. **2**.

income groups, we may infer that the degree of inequality of post tax incomes increases probably. No indexes of redistributive effect are presented.

Finally, the paper defines the macroeconomic effects positively, according to the demand effect (by Kahn's multiplier) and supply side effect: they should be able to cover a large part of revenue forgone as well as expand the economy. I agree with regard to the word "should", for the supply side effect especially: the well-known reservations about the current position on the Laffer curve, the sign (and the absolute value) of the derivative in the Slutsky's equation (the income effect) or the sign of elasticity of labour supply don't allow to be sure.

The last paper (Baldini and Bosi 2002) of this section can be considered the one that pay more attention on the redistributive characteristics researching to encapsulate the tax schedule, together with the pre tax distribution, in a single number, a progressivity index.

The case studies work by using the deductions rather than tax credits. The former are divided in three typologies looking at

- Household size (there is an exemption for a single adult as a function of the poverty level - 6000 Euro - equal for everyone, scaled up by the ISE equivalent scale for increasing family size);
- Income related deductions (the old tax credits become $d\,(x_i\,)$ by the rule: $c_i * 23\%$);
- Production costs for x_E and x_{SE}: 500 Euro for all income sources.

Eight cases are presented[25] according to dissimilar tax-free quota assumptions: the first (no deductions at all) and the last (AED) as limiting cases, selective, universal, selective decreasing (with different level where it becomes 0), 80% of a_i level, etc.

Table **4** and Chart **2** show the average marginal rate for deciles for some of the case studies. In contrast with the other papers, there are positive variations especially for the middle-income group[26]. This is not feasible in accordance with the tax reform objectives: as a consequence the 9th article says that in case of reduction of household post incomes, the Budget Ministry may modify the rate structure or other tax types to avoid those losses. The researchers note that this discretionarity is really not common, with no similar cases in the history of our fiscal system. They also note the risk that tax-free amount may be taken up partly by the lower income group.

All case studies show an augment Gini's index, then a higher inequality in the post reform income distribution and, excluding the no deduction and selective cases, a total tax burden cut.

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[25] - Tab. **3**

[26] - The reason could be the way by which c_i's are transformed in $d\,(x_i)$: $d\,(x_i) = c_i * 23\%$

The same reservations about the macro effect are proposed by Baldini and Bosi, especially about the supposed higher labour supply propensity.

3.4 Falsitta Case Studies

On 1 May 2002 the member of Assembly V. Falsitta presented some case studies (Tab. **5**) where promising scenarios for 5 different household typologies are illustrated (different incomes, different size, one or two incomes into the household).

By using them it can infer which may be the parameters of the functional forms of the tax schedule for the three marginal rates, the implicit 0, 23% and 33%.

Baldini et al. (2002) do it and it obtains higher certainty (whether the case studies will be real at the end of transition process), avoiding the larger range of choices compatible with 3rd article explicit statements. Some points are still open to discussions and give no absolute confidence to conclusions.

However, now only one case study is defined.

To summarize, by Falsitta's relation the income tax continues to be personal and **two** kinds of **deductions** work.

The *abatement* (d_1), with purposes of vertical equity, may be considered equal for all income sources[27] and decreasing along the income line (note that this exemption is *not* scaled down according to the economies of scale existing usually in a household[28]).

The second (d_2), coming from old tax credits, is equal to $c_i / 23\%$ where the c_i's are of two types, the first, (c_{i1}) fully operating for family with more than one individual (according to the family size) and not relating with the income level, the second,   ($c_{i2} = x_i * 19\%$)   for individual expenditures or donations and so on.

Until that time the family size matter was considered by using the tax credits: now they are substituted by equivalent deductions, with similar impact on the individual tax liability. Thus the change could be considered only formal, being $d_2 = c_i / 23\%$[29].

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[27] - By the fact that the Executive case studies do not specify the income source of family type.
[28] - If two workers are in a family, without any children, the scale coefficient simply doubles. No applied equivalence scale in any country has so high coefficient.
[29] - To check if this interpretation is correct, it may proceed by using the case studies presented by the Executive, by following   **taxable income (= x_T) = (pre tax income – d_1 – c_i / 23%**); **tax liability = x_T * marginal rate**
  e.g. for the *first* case study (the values are in old millions of £):
  (35– 9.48– 2.057519 / 0.23) = 16.5742668 (*taxable income*); 16.5742668 * 0.23 = 3.812081 (*tax liability*). This tax liability amount is exactly the amount indicated by the 1st case study. To find the exemption level d_1 see the next footnote.

A little misunderstanding remains about the c_{i2} term because no clear indications are given in Falsitta's case study. Hence the treatment is assumed equal for both c_{in} (n = 1, 2).

The explicit formula is obtained, following Baldini et al.(2002), by using two examples.

With a simple proportion

$$tax\ liability : marginal\ rate = x_T : 100$$

I derive the taxable income (= x_T) and subtracting this from the pre tax income it can infer the exemption amount[30]. Making it for two levels of incomes and using two resulting exemption amount (together with the two pre tax incomes) it may identify the negative slope of the corner of the decreasing linear function d_1. To derive the two intercepts, it can use the pre tax income, the magnitude and the obtained tax-free quota for the *y* line intercept and the consequent formula for the income level where exemption is 0.

Finally it can find the income level below which the tax liability is 0, by the cross between the derived line and the 45° line. Thus (the values are in old millions £):

$$d_1 = x \qquad\qquad\qquad if\ x \leq 12.214$$
$$d_1 = 13.680 - 0,12 * x \qquad if\ 12.214 < x \leq 114$$
$$d_1 = 0 \qquad\qquad\qquad if\ x > 114$$

The resulting form of d_1
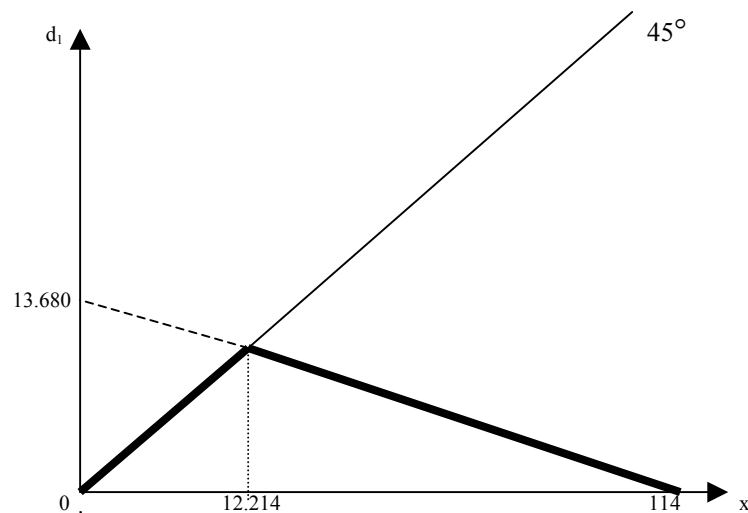
Thus tax liability (T_i) should be (the values are in old millions of £):

$$T_i = 0 \qquad\qquad if\ x \leq 12.214$$

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[30] - e.g. for the *first* case study (the values are in old millions of £Lire)
  5,8696: 23 = x_T : 100 ; x_T = 25.2;
  35 (*gross pre tax income*) – 25.2 (*taxable income*) = 9.48 = *exemption quota*.

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$$T_i = 0.23 \, (x - d_1 - d_2) \qquad \text{if } 12.214 < x \leq 114$$
$$T_i = 0.23 \, (x - d_2) \qquad \text{if } 114 < x \leq 193.627$$
$$T_i = 0.23 \, (193.627 - d_2) + 0.33 \, (x - 193.627) \qquad \text{if } x > 193.627$$

From the result of Baldini et al. the total tax burden loss is 30.47 billion of Euro (approximately 100% more than the Executive estimates).

Already looking at the charts **3** and **4** by means of the *equivalent* household post tax income notion, it notes that all population shares gain by the fall in the tax liabilities and the average tax rates behavior along the income parade continues to depart from proportionality, but in a different way, probably becoming structurally less progressive (post tax income gains higher for the top deciles).

This is confirmed by the Reynolds-Smolensky index.

	Gini pre	- Gini post	$= \Pi^{RS}$	$= \Pi^{K}$	$* \, g/(1-g)$	- R
Old Tax	0.3777	0.3403	0.0374	0.2171	0.1801	0.001699
Tax Ref.	0.3777	0.3530	0.0247	0.1992	0.1283	0.000857

Sources: Bosi et al. 2002

These results show a fall in Π^{RS} index according to the decrease of g (total tax ratio) and Π^{K}. The lower reranking effect is not sufficient to overcome these reductions.

In conclusion even if the Executive objective is to pay more attention to the low and middle-income group, the researchers affirm that 55% of the total tax burden loss goes to incomes higher than 50000 Euro (not more than 5% of the total population). Together with the negative variation of Π^{RS} index, this allows to affirm that the redistribution continues to go from the richer group to the poorer, but with a reduction of intensity[31].

Clearly, any analysis based on redistributive indexes may be accepted according to a *given* F(x), that is a given distribution of pre tax (*equivalent*) incomes.

4 - Non-Progression Neutral Tax Cut: Conclusive Remarks

In the literature, outcomes about the vertical distance between L^1_{X-T} and L^2_{X-T} for all p (where L^2_{X-T} is the Concentration curve for the post reform post tax incomes) and then about

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[31] - According to the fact that this tax reform does not lead to a negative income tax, 20% of poorest families gain only 2% of the total tax burden fall.