Family Splitting versus Joint Taxation: a case-study

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1 Introduction

Economists tend to believe that, in general, individual-based taxation is welfare superior to family-based tax systems. This result depends mainly on the disincentive-to-work that family based tax systems usually generate on individuals with lower incomes. However, in the public debate the issue of the choice of the tax unit is still very important. In Italy, for example, the tax system was originally family-based and then it was turned to an individual-based one after a ruling by the Italian Constitutional Court.[1] Nevertheless, an important part of the Italian public opinion is unsatisfied with the tax treatment of families, which is felt to be unequal. In France, the family quotient has been negatively judged by Piketty et al (2013). At same time, in Germany the possibility to replace the joint taxation system with the French one has been widely discussed (Baclet et al, 2005).

When the tax unit is the family, two main systems can be compared: the joint-taxation system and the family-splitting one. A prominent example of the joint taxation system is the German tax system, while the most famous application of family-splitting is the French family quotient. In the German system, incomes of the parents are added up and divided by two. Then, gross tax liability is calculated by applying to this average income the appropriate tax rate and multiplying the product by two. Finally, net tax liability is obtained by subtracting the highest between the universal child benefit and the child tax allowance. In the French system, total income of the family is divided by a coefficient which depends on the number of family members. Once computed the family quotient, the equivalent tax liability is calculated with reference to such a quotient, and then the gross family tax liability is calculated multiplying the equivalent tax liability by the appropriate coefficient. Although the French system also grants income-tested additional child benefits applied from the second child onwards, the main difference between the two tax systems is the tax treatment of children, which is delegated to tax allowances in the German system while it is embodied in a specific equivalence scale within the French one.

The comparison between these two systems involves both efficiency and equity considerations. On the efficiency side, both systems tend to generate higher marginal tax rates on secondary earners than individual-based tax systems. The traditional literature on the choice of tax unit (Boskin and Sheshinski, 1983) holds that the optimal tax rates on secondary workers in the family

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[1] Originally, the principle of *compulsory summation* of wife's income to husband's was introduced within IRPEF, the Italian personal tax on income. Thus, wife's income was simply added up to husband's taxable income, and husband's gross tax liability was equal to that of the family in a pure family-based tax system where the (very) progressive scale of IRPEF tax rates and brackets was applied. In 1976, following a reform of the Italian civil code which implemented the principle of equal rights between husband and wife, the Italian Constitutional Court abolished the principle of compulsory summation and restored that of individual taxation. Among the arguments brought about by the Court, there was also the excessive tax burden on (married) families generated by the principle of compulsory summation of taxable incomes.

are much lower than those on primary earners since the labour supply of the former tends to be more elastic. This result is less obvious when household production functions are considered (Apps and Rees, 1999) and it has been recently challenged (Cremer et al, 2012). However, this literature focuses on inter-household income distribution (see also Spahn et al (1992)) and it tends to ignore that of general, i.e. intra-household, inequality.

The latter has re-emerged in the literature comparing the French and the German tax systems. Beblo et al (2004) use microsimulation models to impose the French family splitting on the German tax base and tax schedule and analyze the effects on income distribution and work incentives. They find, however, that such a reform would only lead to minor effects with respect to both, income distribution as well as work incentives. Results obtained by Baclet et al (2005) are in the same vein. They use data-sets from both countries and, in addition to the comparison of tax schedules and the treatment of children, also analyze the different definitions and distributions of taxable income, so they are able to draw conclusions about the profiles of effective average tax rates in both countries. Their main finding is that the French system results in lower average tax rates than the German one (over a large range of incomes) only for families with three children. Finally, Steiner and Wrohlich (2008) analyze the effects of three different proposals to introduce a family tax-splitting system in Germany. Their empirical analysis is based on a behavioral microsimulation model, and their results show that, under each reform, the lion's share of the reduction in taxes would accrue to families in the upper part of the income distribution, and that labor-supply effects are small. If budgetary balance were financed by a reduction of the child benefit, their results suggest that none of the reforms would be welfare-improving.

Our primary objective is to compare these two systems as possible ways to introduce family-based taxation in Lombardy. Thus, we depart from this literature in several aspects. First, rather than taking into account all of the features of the two tax systems, we focus on the main difference in the treatment of children, children allowances versus family quotient, and we abstract away from other details of the two systems. Second, we use pre-tax data of an Italian Region (Lombardy) and we use tax rates and children allowances as defined within the Italian tax system. Third, we evaluate efficiency and equity *jointly* by using a welfare abbreviated social function in the space of both nominal and equivalent incomes, taking into account revenue neutrality, labour supply effects and different degrees of inequality-aversion by the social planner. By doing so, we are able to evaluate in a rather simple way the impact that these reforms would have if applied in Lombardy. Our exercise is realistic since, by keeping brackets, rates and allowances as they are actually defined in Italy, both reforms are implementable at rather low administrative and political costs.

However, we believe our results have a more general validity. Namely, ours is a case study where children allowances and the family quotient can be evaluated in the context of a classical equity-efficiency trade off. The distinguishing feature of children allowances in the Italian system is that they are decreasing-

in-income. Moreover, when we apply these allowances along with joint taxation to our data, thus implementing what we define as the German-like taxation system, we find 'static' post-tax average incomes which are very close to those obtained by using the French-like family quotient. By 'static' average incomes we mean incomes calculated ignoring labour supply effects. Thus, this initial similarity paves the way to compare the efficiency and equity of the two systems we design. On the efficiency side, at a family level, the marginal tax rate of the French system tends to be lower than the marginal tax rate of the German-like system (as we define it here) since the quotient does not vary with income while children allowances are decreasing-in-income. By the same token, these allowances are more equitable than the French quotient.

Thus, the comparison we build is an interesting example of an equity-efficiency trade off in the design of a family-based tax system. The abbreviated social welfare function provides a money metric measure of this trade off. Using such a function, efficiency is measured by mean post-tax incomes calculated taking into account labour supply differences. Equity is measured by the extended Gini coefficient. Our comparisons yield an unambiguous result, i.e. the welfare superiority of the German-like system provided that the social planner is, to some extent, inequality averse.

2 Three tax systems

The Italian tax system is individual-based with a number of family-related tax allowances. Gross income is calculated, for every individual, by summing up incomes obtained from labour and (in some limited cases) from capital. Taxable income is obtained by subtracting deductions most of which are non family-related. A piecewise linear progressive tax schedule is then applied, with brackets and applicable tax rates as specified in Table 1.

There are two main types of tax allowances: family-related, i.e. the children and the dependent spouse allowances, and others, among which the most important ones are related with the magnitude and type of labour income. The children allowance is calculated in two steps. First, the potential allowance is equal to 800 euros per children (900 for children having less than 3 years) to be divided among parents. In principle, a 50 % rule is adopted, so that the potential allowance equals 400 euros per children per parent in most cases. Second, the actual allowance is obtained by multiplying the potential allowance by a scaling factor, which is equal to 1 minus the ratio between the individual taxable income and a threshold. This threshold, in turn, is equal to 95,000 euros plus 15,000 euros for every children, except the first. For example, in a family with two children and two parents both with a taxable income of 27,500 euros, the children allowance for every parent will be equal to $400 \times [1 - 27,500/(95,000 + 15,000)] = 300$ euros. The dependent spouse allowance (*detrazione per coniuge a carico*) is, in fact, granted when the taxable income of the spouse does not exceed 2,800 euros. The allowance amounts to 800 euros scaled by a factor which is decreasing in income and equals zero

when the individual taxable income reaches 80,000 euros. Thus, family-related allowances in the Italian system are income-related, and this accords with the idea that the burden of additional needs is decreasing in income. To allow for a meaningful comparison, we shall ignore in this paper non-family related allowances and deductions. We label this amended version of the Italian system as the *actual* system, which can be summarized as for a family f as

$$T_f^A = \sum_{j \in f} t(y_j) - FA_f \tag{1}$$

where FA_f is the amount of family-related allowances calculated as explained above, which, in turn, is the summation of family-related allowances granted to each income-earner.

The German system applies, in principle, joint taxation but it uses deductions from the tax-base and allowances from the gross tax. However, in this paper we shall analyze a simplified version of the German system, where tax rates, brackets as well as family-related allowances are taken from the Italian system. This allows us to focus on the impact of the adoption of joint taxation *per se*. Thus, in this paper by German-like tax liability of the family we mean the following

$$T_f^G = m_f t(Y_f/m_f) - FA_f, Y_f = \sum_{j \in f} y_j \tag{2}$$

where m_f is the number of income earners (in general, m is equal either to 1 or to 2), $t(.)$ is the tax liability calculated using the Italian brackets and marginal rates as specified above. Clearly, the latter is *not* an accurate replication of the actual German tax system, but, rather, its adaptation to the Italian one.

The French system is the best known example of family splitting. As in the German system, the gross tax liability of the couple with no children is obtained by summing up the incomes of the spouses, dividing it by 2, applying the relevant tax rate(s) and then multiplying the obtained amount again by 2. However, differently from the German system, within the French system the same logic applies whenever there are children in the family, by simply modifying the coefficient to reflect additional needs and economies of scale. Some limits to the benefit obtained for every children apply. Again, in the paper we want to focus on the impact of family splitting, thus we calculate the French-like tax liability of the family as

$$T_f^F = \sigma_f t\left(\frac{Y_f}{\sigma_f}\right), Y_f = \sum_{j \in f} y_j \tag{3}$$

where σ_f is equal to the sum of the number of income earners plus 0.5 for every children and an additional 0.5 for every children from the third. Note that we do not allow for any additional family-related allowances.

3 Data and analytical tools

Our dataset is based on confidential administrative data[2]. It includes information on approximately 9 millions of individuals, of whom 6.7 millions of taxpayers (income-earners) and 2.1 millions of children and dependent spouses. They are aggregated in 5.3 millions of families for tax purposes. The primary sources of this information are tax declarations, in various forms: Unico, 730 and 770. They all refer to tax year 2010. Namely, we estimate some missing information for certain types of income earners whose declarations do not report all the desirable family-related information by means of developing different algorithms. The estimation effort was especially focussed on classifying both taxpayer's type and size of family (i.e. one- or double-income families, with or without dependents).

We applied both parametric and non-parametric matching models in order to estimate the missing family sizes and typologies performed with the SAS macro language. In addition to classical parametric matching models (e.g. propensity score matching), we apply a recent non-parametric technique called Coarsened Exact Matching (Iacus et al, 2011), that matches individual units with equivalent profiles according to their observable variables (within a coarsening bandwidth set by the researcher on each covariate).

This technique has the advantage of maintaining the multidimensional nature of the data space without reducing it to a univariate score (as in the case of propensity score matching). We employ our experimental application using CEM on the database (Verzillo et al, 2013). This process allowed us to estimate missing data on individual characteristics by ascribing to individuals with incomplete records real values based on their profile similarity with individuals of a second population of citizens (assumed to be similar on the distributions of the observables) from an important provincial administrative dataset within the same region with completed records.

We now describe some of the most relevant features of our dataset. First, the dataset has information about pre-tax incomes as they are defined in the actual individual-based tax system. In our dataset, there are approximately 6.7 millions of taxpayers: some descriptive statistics about their pre and post-tax incomes as well as tax liabilities are provided in Table 2. Second, the dataset contains information about the family to whom every taxpayer belongs. In our dataset, every individual belongs to a specific family and it is possible to map entirely the composition and size of every family. There are approximately 5.3 millions of families for tax purposes, which are exactly matched with a total of approximately 9 millions of individuals (6.7 millions of taxpayers plus 2.1 millions of non-income earners). Some descriptives[3] on families are provided in

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[2] Data are analyzed in collaboration with CRISP - Inter-university Research Centre on Public Services at the University of Milan-Bicocca - under the framework of a preliminary research program with the Tax and Income Department of the Lombardy Region.

[3] Descriptives are influenced by the presence of few outliers.

Tables 3 and 4.[4] As mentioned above, the Italian tax system grants a number of family and non-family related tax allowances. Their relative importance in our dataset emerges from Table 5.

Our goal is to take into account both efficiency and inequality at an intra-household level. To do so, we use as our guidance criterion the abbreviated social welfare function (ABS) as proposed by Sen (Sen, 1974) which we rewrite as

$$ABS^{s|v} = \mu_s(1 - G_{s|v}), s = A, G, F, \tag{4}$$

where μ_s is average family income and $G(s|v)$ is the extended Gini index proposed by Yitzhaki (1983). This provides a neat interpretation of ABS as the expected value of the minimum income in a random sample of v incomes drawn from the (post-tax) income distribution (Lambert, 2001). We use two notions of family's income: nominal and equivalent. By nominal income, we mean simply the total income of the family, which corresponds to the summation of the taxable incomes of income earners. By equivalent income, we mean nominal income as divided by a coefficient which is equal to the sum of the number of income earners plus 0.5 for every children. Since we are conscious of the arbitrariness of this choice, we will test robustness of our results using the Atkinson-Bourguignon sequential dominance criterion.

4 A static comparison

We start by comparing welfare under the systems described under three simplifying assumptions. First, we initially ignore (small) tax revenues differences across them. Second, we do not allow for behavioral responses in labour supply. Third, we assume $v = 2$ in (4). Using either nominal or equivalent incomes, the French-like system generates least welfare, since the mean post-tax income is lower and is distributed more unequally. The performance of the German-like and of the actual tax system are similar, although the German is slightly less unequal in the space of equivalent income while the opposite holds in the space of nominal income. However, since the mean post-tax income is higher under the actual system, on average welfare is (slightly) higher under the actual system (Tables 6 and 7).

Our interest, from this point onwards, is in the comparison between the two family-based tax systems, i.e. the German-like and the French-like. Thus, we ignore the actual system although it performs (slightly) better in welfare terms. This is due to our interest in the search of a family-based system, for reasons illustrated in the Introduction.[5] It is interesting to note that the

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[4] Note that high frequencies of families with 1 component in Table 2 are due to the fact that we are focussing on fiscal families instead of civil families.

[5] In practice, the difference between joint and individual taxation can be appreciated when couples (with no children) are considered. The German system tends to reduce the tax burden of couples and this advantage tends to be larger, for a fixed income of the richer spouse, the income of the poorer decreases, i.e. as the polarization of income within the couple increases. Thus, when a pro-family reform is investigated, the choice to focus on the

welfare superiority of the German-like tax system over the French one is robust: i) to the choice of the equivalence scale and ii) to the choice of the group of families. To illustrate point i), we check our results by adopting the Atkinson and Bourguignon sequential generalized dominance procedure, which offers the advantage to be based only on a ranking criterion rather than on a specific equivalence scale (see Lambert (2001) for an illustration). We rank families according to the total number of components, labelling families with at least 5 members as the most needy and families with only one member as the least needy. Then, we compare generalized Lorenz curves of net income under the two tax systems (the German and the French) first for the most needy group, then for the first two neediest groups and so on until all families are aggregated. Generalized Lorenz dominance of the German-like tax system is confirmed, especially for the neediest groups (Figures 1 and 2).

To illustrate point ii), we look at differences between groups of families, distinguished on the basis of the number and type of their components (Table 8). Since the German-like and the French-like systems should treat families without children (i.e. couples) in the same way, we look only at families with children and with (or without) a dependent spouse. By comparing German-like

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German-like tax system, rather than on the individual-based one, can be justified by this subsidy that the former grants to couples. To state it alternatively, German-like system is a viable option to reintroduce the family-based taxation in accordance with the decision of the Constitutional Court in 1976. Consider, however, that the net tax liability of family can be lower under the actual tax system because of the denial of negative income taxes: a lower gross tax liability can prevent the family from using fully the family-related allowance.
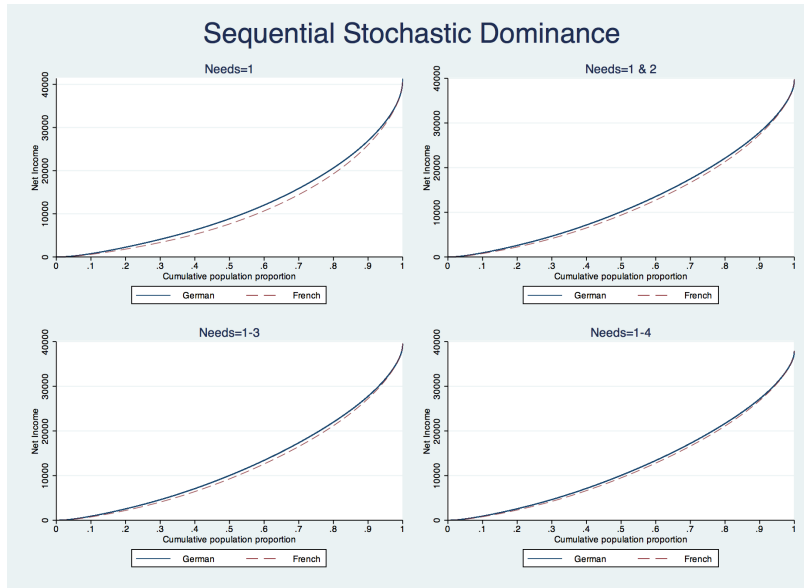
Fig. 1 Sequential generalized dominance. Clusters: Needs=1 to Needs=1-4
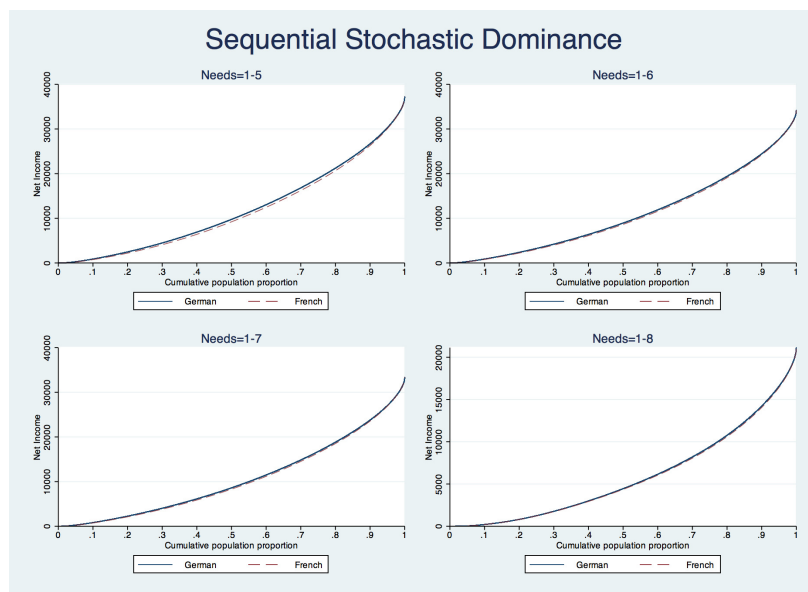
Fig. 2 Sequential generalized dominance. Clusters: Needs=1-5 to Needs=1-8

with French-like system we are basically evaluating a joint taxation system, with children and dependent spouse allowances[6] as designed in the actual IR-PEF, against a system which uses family splitting but concedes no allowances. Thus, we are actually evaluating the additional (with respect to joint taxation) impact of allowances against that of the family quotient. Results, expressed in the space of equivalent income[7] can be summarized as follows (see Table 9).

1. differences in mean incomes are rather small; except for the case where there are more than 3 children and only one income-earner (with or without dependent spouse), where the French-like system generates a higher mean income;
2. the German-like system is less unequal, when inequality is measured using the standard Gini index, within all subgroups, with a difference in inequality increasing in the number of children;
3. according to the Sen measure, welfare in the German-like system is higher within all of the groups considered here.

Results 1 and 2 were, to some extent, expected. The favorable impact of the French quotient for families with at least three children already emerges in previous literature. On the other hand, the German-like system is less unequal since, within every group, it grants a tax reduction which is decreasing

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[6] We include them to differentiate families with only one income earner from families where each parent earns some taxable income.

[7] Notice that the choice of equivalent rather than nominal income is relevant only for the groups with 3 or more children since within the remaining ones the equivalence scale operates simply as a scaling factor of nominal incomes.

in nominal income, and thus *progressive* within every family type, while the French-like system is based on the *proportional* subsidy generated by the family quotient. The welfare superiority of the German-like system, i.e Result 3, can be expressed by the following inequality

$$\frac{(1 - G_G)}{(1 - G_F)} > \frac{\mu_F}{\mu_G} \tag{5}$$

which is just saying that the distance from complete post-tax inequality of the German system (as expressed by the ratio on the left-hand side) is *relatively larger* than the distance of the average incomes (as expressed by the ratio on the right-hand side). This inequality is verified within all of the groups, and it becomes more and more valid as the number of children increases (see Table 10).

As argued in the Introduction, Result 1 makes our case study of general interest, since it reveals that, given the shape of pre-tax income distribution and the features of the Italian tax system, the French quotient and the German-like tax system generate very similar mean post-tax incomes *within virtually all groups of families* if labour supply effects are ignored. This is an ideal starting point to test the equity of decreasing-in-income children allowances against the (relative) efficiency of the family quotient.

5 A complete comparison

In this Section, we pursue further the comparison between the French-like and the German-like system by relaxing previous assumptions, i.e. by

– allowing for revenue-neutrality;
– including labour supply effects;
– considering different values of the distributional parameter v.

From Table 6 it can be seen that the German system is (slightly) more generous than the French one, i.e that it generates lower tax revenues. Then, the question arises whether allowing for an additional tax reduction within the French system, such that the budget constraint is the same for the two tax systems, would change the result. To do this in a meaningful way, we have to modify one of the parameters we use to define the French-like tax system. The most natural candidate is σ_f for families with children. By an iterative process, we find that changing the weight of the first and the second child from 0.5 to 0.65198 would generate a mean post-tax income which is exactly equal to that generated by the German-like system. [8]

Coming to the evaluation of labour supply effects, it is well known that moving from an individual based tax system, such as the one actually applied

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[8] We are conscious of the fact that, by increasing the *fixed* coefficient applied to the first two children we are emphasizing the in-built inequality of the French quotient. However, in our context there are virtually no alternatives to generate revenue neutrality in a meaningful way, i.e. changing the family-related features of the tax system.

in Italy, to a family-based one tends to increase marginal tax rates for second earners, thus decreasing their incentives to work. This is a particularly negative feature of the reform, especially in Italy where females' participation rates in the job market are comparatively low. Now, the question is whether such a negative effect would be of a larger magnitude adopting the German-like rather than the French-like tax system. The after-tax hourly wage can be written as

$$w(1 - MRT_s), s = A, G, F \qquad (6)$$

where s denotes the tax system. Denoting by LS_s the labour supply (in hours) under tax system s, the proportional change in labour supply induced by a reform introducing the German or the French system can be approximated[9] as

$$\frac{\Delta LS_{j,A}}{LS_A} = \frac{LS_j - LS_A}{LS_A} = E\left[\frac{MRT_A - MRT_j}{1 - MRT_A}\right], j = G, F \qquad (7)$$

where E is labour supply elasticity to net wage. Then we can write

$$\frac{\Delta LS_{G,A} - \Delta LS_{F,A}}{LS_A} = \frac{LS_G - LS_F}{LS_A} = E\left[\frac{MRT_F - MRT_G}{1 - MRT_A}\right] \qquad (8)$$

which is the difference in labour supply between the German-like and the French-like tax system. We measure the latter by adopting, from previous literature (Aaberge et al, 1999), average values of E by family income deciles, differentiated between female and males. Second, we measure initial labour supply and marginal tax rates from our data. As expected, it turns out that the French-like tax system tends to generate lower marginal tax rates than the German one (see Table 15).

This result can be expressed by saying that, under revenue neutrality, French-like system is less inefficient than German-like one.

Finally, we allow for different values of v in the (extended) Gini index formulation. As it is well known, by varying the v-parameter (Lambert, 2001) it is possible to evaluate welfare when inequality aversion (by the social planner) changes. More precisely, as v increases it increases the size of the random sample of families over which the minimum income is drawn and the expected value of such minimum income changes accordingly. At the limit, as v tends to infinity the welfare criterion approaches the Rawlsian maximin and, more in general, a larger value of v denotes a higher degree of inequality aversion.

Results of the comparisons are reported in Tables 11 and 12 and described by Figures 3 and 4. Two main results emerge.

First, by looking at Figures 3 *welfare is higher under the German system provided that the social planner is to some extent inequality averse*. To put it alternatively, the French system is welfare-superior only if $v = 1$ i.e if welfare

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[9] Suppose to introduce MRT_j to replace MRT_A so that $\Delta MRT = MRT_j - MRT_A$. Denoting initial post-tax wage as $w^n = w^0(1 - MRT_A)$ its absolute change can be approximated as $\Delta w^n = -w^0 (MRT_j - MRT_A)$ so that the proportional change in post-tax wage can be written as $\Delta w^n / w^n = (MRT_A - MRT_j) / (1 - MRT_A)$.
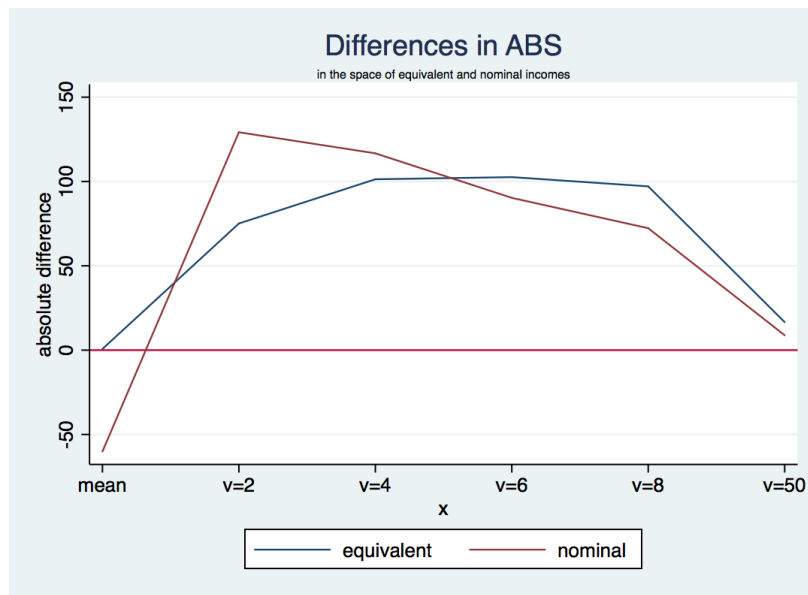
Fig. 3 Differences between welfare under the German and the French system (absolute values)
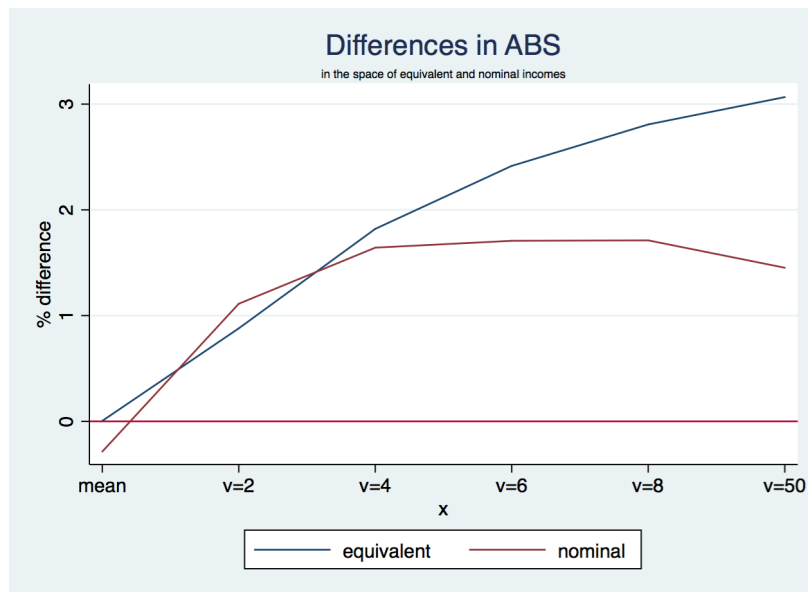
Fig. 4 Differences between welfare under the German and the French system (% values)

is equated to mean income. On the one hand, this result is clearly associated to the fact that the French system is more efficient (less inefficient) than the German system, i.e. that average marginal rates are lower. On the other hand, this result confirms that the French system tends to be more unequal. Note that it holds regardless whether nominal or equivalent income is used as the money metric measure, so that it does not depend on the choice of a given equivalence scale. The welfare superiority of the income distribution generated by the German-like tax system can be seen also by using again the Atkinson-Bourguignon generalized-dominance sequential criterion. We apply it aggregating groups of families from the neediest to the least needy according to the ranking indicated in Table 8. Although dominance over the entire range cannot be found, generalized Lorenz curves corresponding to the German system do display dominance up to the 9th decile of income distribution (see Table 13). This suggests that the result we obtain does not depend on the specific equivalence scale we have chosen.

Second, *welfare superiority of the German system tends to increase as inequality aversion increases when differences in needs are accounted for*, i.e. when equivalent income is used as the relevant money metric measure. This can be seen from Figure 4, where the additional welfare generated by the German system increases from 0.9 % when $v = 2$ to 3.1% when $v = 50$ in the range of 1-1.5 % for all values of v. In the space of nominal income, on the contrary, this difference is almost constantly in the range of 1-1.5 % for all values of v. Again, when we disaggregate across different groups for different values of v we find that welfare superiority of the German system is confirmed virtually everywhere.

6 Concluding remarks

According to Meier and Wrede (2013) on efficiency grounds individual taxation is superior to family splitting which, in turn, is preferable to joint taxation. This result is primarily driven by the fact that marginal tax rates are usually lower under individual taxation and higher under joint taxation, especially when the latter includes, as in the German-like system we design here, decreasing-in-income children allowances. In turn, lower marginal tax rates generate an increase in labour supply and in consumption. In this paper, we limit the attention to the comparison between family splitting and joint taxation but we expand the analysis taking into account intra-household inequality. We use data coming from an (actually, the most important) Italian Region (Lombardy), and brackets and tax rates as defined by the (nationwide) Italian tax system. By doing so, the previous result is reverted, since, although the family quotient is still superior on pure efficiency grounds, even a mildly inequality-averse social planner would tend to prefer joint taxation to family splitting. Interestingly, such a difference tends to increase, in the space of equivalent income, as inequality aversion increases.

A first interpretation of our results is that, if Lombardy is to use the room of manoeuvre now allowed by the national legislation to design, at a regional level, a system of "tax allowances in favor of the family" [10], the simple increase of existing (nation-wide) decreasing-in-income children allowances may be a viable option. Moreover, the importance, in both economic and population terms, of Lombardy is such that the results obtained here could serve as a starting point to guide the reform of the national tax system. In particular, they tend to confirm that the French system should not be regarded as a good benchmark for a pro-family reform. To be sure, even the adoption of the German-like tax system to replace the actual one, which our results suggest may enhance equality at a family level, should be tested against the inefficiency of higher marginal rates for secondary earners.

More in general, our results show that, if it is possible, given the shape of pre-tax income distribution, to design decreasing-in-income children allowances that, coupled with joint taxation, generate aggregate tax revenues equal to those arising from the application of the family quotient, then any inequality averse social planner would probably prefer the former tax system to the latter.

Finally, we should note that in the paper we have ignored the issue of fertility. Historically, in virtually all developed economies, there seems to be clear evidence of an inverse relationship between female labour supply and fertility. In our context, this would imply that, as higher marginal tax rates reduce labour supply, fertility should be higher under the German-like joint taxation system. However, particularly in the last decade or so, the relationship across countries has been positive: for example, countries like Germany, Italy and Spain, with the lowest fertility rates, also have the lowest female participation rates. These cross-country differences, however, cannot be explained by heterogeneities across tax systems, such as individual versus family-based ones. It has been conjectured Apps and Rees (2004) that these trends could be reversed by replacing child payments with in-kind child care facilities, an issue which is clearly beyond the scope of this paper.

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[10] See art. 6, 5 decree 68/2011.

Table 1 Tax bracket system

Income Tax Brackets	Applicable Tax Rates
< 15000	23%
15000 - 28000	27%
28000 - 55000	38%
55000 - 75000	41%
> 75000	43%

Note: Italian tax bracket system for income earned in 2010

Table 2 Individual Descriptive Statistics

	Age	Pre-tax y	Deductions	Taxable y	Gross tax	Allowances	Net-tax
Avg	50.8	22,948	863.3	22,104.6	6,155.1	1,430.3	4,830.5
Median	49	18,008	127	17,493	4,123	1,380	2,541
Min	0	0	0	0	0	0	0

Source: Our calculations using individual tax declarations (2010)

Table 3 Number of families

Family type	Family size				
	1	2	3	4	5 +
Taxpayers	4,097,517	1,402,538	0	0	0
Components	3,419,314	1,138,167	495,878	363,238	83,463
Children	582,452	396,163	68,661	13,489	1,219
Dependent spouses	505,983	0	0	0	0

Source: Our calculations using individual tax declarations referred to tax year 2010

Table 4 Families Descriptive Statistics

	Pre-tax income	Gross tax	Net income	Allowances	Net-tax
Avg	28,781	7,719.7	22,756.7	1,800.8	6,024.6
Median	20,240	4,696	17,214	1,551	2,968
Min	0	0	0	0	0

Source: Our calculations using individual tax declarations (2010)

Table 5 Allowances at Family Level

Type of allowances	Frequency	Average
Total	5,092,818	1,893.9
Family related	1,602,140	966.7
Non-family related	4,951,591	1,635.1
Labor	4,859,269	1,365.5

Source: Our calculations using individual tax declarations (2010)

Table 6 Welfare comparisons in the space of nominal income-static framework

	Gini	Mean y	ABS
Pre-tax	46.9%	28,781	15,271
Post-tax: actual	44.1%	21,245	11,876
Post-tax: French-like	44.9%	21,108	11,630.5
Post-tax: German like	44.2%	21,137	11,794.4

Source: Our calculations using individual tax declarations (2010)

Table 7 Welfare comparisons in the space of equivalent income-static framework

	Gini	Mean y	ABS
Pre-tax	40.6%	18,838	11,194
Post-tax: actual	37.6%	13,948	8,703.6
Post-tax: French-like	38.1%	13,833	8,562.6
Post-tax: German like	37.5%	13,871	8,669.4

Source: Our calculations using individual tax declarations (2010)

Table 8 Types of families

Family type	Description
2Y1C	2 income-earners and 1 child
2Y2C	2 income-earners and 2 children
2Y3+C	2 income-earners and at least 3 children
1Y1C	1 adult (income-earner) and 1 child
1Y2C	1 adult (income-earner) and 2 children
1Y3+C	1 adult (income-earner) and at least 3 children
1Y1DS	1 income earner and 1 dependent spouse
1Y1DS1C	1 income earner, 1 dependent spouse and 1 child
1Y1DS2C	1 income earner, 1 dependent spouse and 2 children
1Y1DS3+C	1 income earner, 1 dependent spouse and at least 3 children

Table 9 German-like vs French-like system, by family types-static framework

Family type	German-like			French-like		
	Mean y	G ($v=2$)	ABS	Mean y	G ($v=2$)	ABS
2Y1C	16,327.4	29.55%	11,502.9	16,348.4	30.71%	11,328.1
2Y2C	14,926.5	31.51%	10,222.5	14,972.2	33.54%	9,950.5
2Y3+C	14,837.8	38.72%	9,092.2	15,071.4	41.94%	8,750.4
1Y1C	13,485.2	36.68%	8,539.4	13,531.4	38.56%	8,314.2
1Y2C	11,409.1	40.24%	6,817.6	11,478.5	43.47%	6,489.4
1Y3+C	9,238.2	44.14%	5,160.9	9,192.6	49.49%	4,643.4
1Y1DS	10,321.3	33.69%	6,844.6	10,451.3	36.17%	6,671.0
1Y1DS1C	9,051.8	35.56%	5,833.3	9,102.6	39.45%	5,511.6
1Y1DS2C	8,418.3	38.69%	5,161.2	8,420.9	43.71%	4,740.5
1Y1DS3+C	7,007.1	41.31%	4,112.3	6,802.4	48.36%	3,512.5

Source: Our calculations using individual tax declarations (2010)

Table 10 Distance from complete inequality vs difference in average incomes, by family types-static framework

Family type	$(1-G_G)/(1-G_F)-1$	μ_F/μ_G-1	Δ ABS (G-F)
2Y1C	1.7%	0.1%	174.9
2Y2C	3.0%	0.3%	272.0
2Y3+C	5.5%	1.6%	341.8
1Y1C	3.1%	0.3%	225.3
1Y2C	5.7%	0.6%	328.2
1Y3+C	10.6%	-0.5%	517.5
1Y1DS	3.9%	1.3%	173.6
1Y1DS1C	6.4%	0.6%	321.8
1Y1DS2C	8.9%	0.0%	420.7
1Y1DS3+C	13.7%	-2.9%	599.8

Source: Our calculations using individual tax declarations (2010)

Table 11 ABS values in the space of nominal income-complete framework

	v=1	v=2	v=4	v=6	v=8	v=50
Post-tax: French-like	21136.9	11619.0	7108.4	5290.6	4223.2	606.6
Post-tax: German like	21076.8	11748.2	7225.1	5380.9	4295.5	615
Diff: G-F (abs)	-60.1	129.2	116.8	90.3	72.3	8.8
Diff: G-F(%)	-0.3%	1.1%	1.6%	1.7%	1.7%	1.4%

Source: Our calculations using individual tax declarations (2010)

Table 12 ABS values in the space of equivalent income-complete framework

	v=1	v=2	v=4	v=6	v=8	v=50
Post-tax: French-like	13843.9	8547.2	5568.0	4250.1	3458.2	542.7
Post-tax: German like	13844.6	8622.4	5669.4	4352.7	3555.3	559.3
Diff: G-F (abs)	0.7	75.2	101.4	102.7	97.1	16.6
Diff: G-F(%)	0.0%	0.9%	1.8%	2.4%	2.7%	3.0%

Source: Our calculations using individual tax declarations (2010)

Table 13 Sequential generalized dominance comparisons in the space of nominal income-complete framework

Least needy group included	Highest percentile for which GLD is verified
1st	97%
2nd	94%
3rd	94%
4th	93%
5th	92.5%
6th	92.5%
7th	92%
8th (all groups included)	98%

Source: Our calculations using individual tax declarations (2010)

Table 14 German-like vs French-like system, by family types-complete framework

| Family type | G-F, nominal | | | G-F, equivalent |
	ABS| $v=2$	ABS| $v=4$	ABS| $v=2$	ABS| $v=4$
2Y1C	245.9	524.5	97.1	210.0
2Y2+C	499.0	993.2	167.1	330.3
2Y3+C	902.0	1767.4	248.3	497.1
1Y1C	3.4	265.3	-1.1	174.7
1Y2C	197.0	572.3	96.8	284.5
1Y3+C	933.2	1135.5	362,3	447,5
1Y1DS	241,0	426.7	118.4	213,4
1Y1DS1C	636.2	815.9	250.1	357,2
1Y1DS2C	1071.8	1343.3	353.4	445.0
1Y1DS3+C	2041.2	2005.8	560.0	555,9

Source: Our calculations using individual tax declarations (2010)

Table 15 German-like vs French-like Marginal Tax Rates

Decile of Pre-tax Income	MRT_G	MRT_F	Diff.
1st	0,2308	0,2300	0,0008
2nd	0,2310	0,2300	0,0010
3rd	0,2316	0,2300	0,0016
4th	0,2577	0,2522	0,0055
5th	0,2676	0,2596	0,0080
6th	0,2652	0,2568	0,0084
7th	0,2780	0,2659	0,0121
8th	0,3281	0,2994	0,0288
9th	0,3103	0,2905	0,0198
10th	0,4016	0,3652	0,0365
Total	0,2802	0,2679	0,0122

Source: Our calculations using individual tax declarations (2010)

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