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Abstract

The possible implications of using the family as opposed to the individual as the unit of taxation are not clear. This applies both to work incentives and distributional outcomes. In this paper we evaluate the effects of a hypothetical reform for Italian income taxation with respect to labour supply. In particular, we analyze potential labour supply effects by considering a shift from the current system of individual taxation to a system of family taxation similar to the French family splitting approach. The analysis is based on an econometric model of labour supply that is embedded in a tax–benefit model. Using data from the Bank of Italy Survey of Household Income and Wealth, our simulation results show relatively small effects on the total labour supply but a decrease in female labour supply.

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1. Introduction

Low female labour force participation rates across the European Union have been an issue of continued concerns since the Eighties and it was raised as a specific policy-issue in the Lisbon Strategy[1]. There are indeed huge differences across Member States in the share of employed women. It is currently around 40 percent in southern European countries (i.e. Spain, Italy and Greece) and above 65 percent in the Nordic countries (Table 1). The problem is even more astonishing in Italy, where the participation and employment rates are the lowest within the EU-15 members (only Malta has a lower indicator within EU25). The growth in female employment rates in Italy is clearly inadequate as it was only 10 percent between 1995 and 2005. This leaves Italy 15 percentage points below the Lisbon target, and compared to Spain and Ireland, where the growth figures were 20 and 16 percent, respectively, progress has been rather poor.

While there is agreement on the need to increase the female employment rates in Europe, it is not clear how this can be best achieved. Part-time jobs, tax wedges, and childcare facilities are some of the policy instruments that are widely discussed[2]. Substantial differences in the share of part-time jobs can be found among Member States (it ranges from 5% in Greece to 45% in Netherlands) and a similar variation can be found for fertility rates. It is argued that women's labour supply and labour force participation is linked to fertility. In particular, there seems to be a correlation between high labour force participation and labour market policies, on one hand, and high fertility on the other. The Scandinavian countries provide good examples for such patterns (Koegel 2006).

Interestingly, however, within the European Union there is much stronger uniformity in terms of the tax wedge than there is for employment or fertility rates[3]. In light of this, an interesting comparison can be made between the three largest continental European countries: France, Germany and Italy. All three countries have similar average tax rates for labour income (they are considered high tax countries) but France and Germany have a family taxation system whereas Italy applies an individual taxation. Moreover, Italy and Germany are both characterised by low fertility and low female employment rates while France is characterized by relative high levels of both indicators. These differences explain why tax reforms focussing on the treatment of marriage

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[1] In 2000, with the Lisbon Strategy, the European Union introduced a very ambitious goal of raising the employment rate of both men and women by almost 10 percentage points in ten years. Moreover, a specific target for women has been defined: their employment rate should rise to 60 per cent by 2010 (it was below 50% in 1995).

[2] On the positive relation between employment rate, part time jobs diffusion, fertility and childcare facilities see, among others, Boeri et al. (2005).

[3] The explicative role of taxes in the employment differential between US and Europe has been widely debated. For recent contributions see Prescott (2004) and Rogerson (2007)

and children are often proposed as measures that could be used to influence both fertility and work incentives for mothers. In this debate increasing attention has been devoted to the French Family Splitting system[4].

Table 1: Employment rates by gender

| | 1995 | 2000 | 2005 | 1995 | 2000 | 2005 | 1995 | 2000 | 2005 |
		Male			*Female*			*Total*	
EU15	**70,5**	**72,8**	**72,9**	**49,7**	**54,1**	**57,4**	**60,1**	**63,4**	**65,2**
BE	*66,9*	*69,5*	*68,3*	*45,0*	*51,5*	*53,8*	*56,1*	*60,5*	*61,1*
DK	*79,9*	*80,8*	*79,8*	*66,7*	*71,6*	*71,9*	*73,4*	*76,3*	*75,9*
DE	*73,7*	*72,9*	*71,2*	*55,3*	*58,1*	*59,6*	*64,6*	*65,6*	*65,4*
GR	*72,5*	*71,5*	*74,2*	*38,1*	*41,7*	*46,1*	*54,7*	*56,5*	*60,1*
ES	*62,5*	*71,2*	*75,2*	*31,7*	*41,3*	*51,2*	*46,9*	*56,3*	*63,3*
FR	*67,2*	*69,2*	*68,8*	*52,1*	*55,2*	*57,6*	*59,5*	*62,1*	*63,1*
IE	*67,1*	*76,3*	*76,9*	*41,6*	*53,9*	*58,3*	*54,4*	*65,2*	*67,6*
IT	*66,9*	*68,0*	*69,9*	*35,4*	*39,6*	*45,3*	*51,0*	*53,7*	*57,6*
NL	*75,3*	*82,1*	*79,9*	*53,8*	*63,5*	*66,4*	*64,7*	*72,9*	*73,2*
AT	*78,5*	*77,3*	*75,4*	*59,0*	*59,6*	*62,0*	*68,8*	*68,5*	*68,6*
PT	*73,5*	*76,5*	*73,4*	*54,4*	*60,5*	*61,7*	*63,7*	*68,4*	*67,5*
FI	*64,2*	*70,1*	*70,3*	*59,0*	*64,2*	*66,5*	*61,6*	*67,2*	*68,4*
SE	*73,1*	*75,1*	*74,4*	*68,8*	*70,9*	*70,4*	*70,9*	*73,0*	*72,5*
UK	*75,1*	*77,8*	*77,6*	*61,7*	*64,7*	*65,9*	*68,5*	*71,2*	*71,7*
US	**79,5**	**80,6**	**77,6**	**65,8**	**67,8**	**65,6**	**72,5**	**74,1**	**71,5**
JP	**81,9**	**80,9**	**80,4**	**56,4**	**56,7**	**58,1**	**69,2**	**68,9**	**69,3**

Source: Eurostat

The Italian income tax introduced in 1974 (Irpef) was based on family income, but a Constitutional Court's sentence in 1976 compels the adoption of the individual system. From this point onwards the tax unit became the individual and the household charges (the spouse and/or the children) are taken into account by means of tax allowances and tax credits. However, a move away from the family system has been proposed several times[5] and it is still highly topical in the Italian debate, mainly with regard to the possible effects on income distribution for different households, by size and income level[6]. In contrast, the debate in France and Germany seems to be focused on tax reform effects on the female labour participation rate. As an example, Bargain and Moreau (2003) simulate the effect on labour supply from a change in the French tax unit – from

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[4] Most OECD countries employ an individual base of the personal income taxation as Italy, Sweden, Finland, Netherlands, Austria and Great Britain. In Belgium, Ireland and Germany and the United States there are options for a splitting systems, while in France, Portugal and Luxembourg compulsory splitting systems are in force. See Longobardi (2005) and Di Nicola (2006) for further details.

5 Visco (1991) , Marenzi (1995), Oneta (2004), Campiglio and Tartamella (2004), ISAE (2004), Tutino (2005), Di Nicola (2003 e 2006) and Larcinese (2005).

6 In Larcinese (2005), where the labour supply is specifically modelled, the main interest concerns the Lorenz dominance of net incomes.

family to individual, using a collective framework model. In a similar way, Beninger, Laisney and Beblo (2003) compare unitary and collective models of labour supply to test the labour supply effect from changing the tax unit in Germany – again from family to the individual. In a more general perspective, Waghenals (2000) studies the incentive effects of the 2000 German tax reform on female and male labour force participation. A recent contribution of Baclet, Dell and Wrohlinh (2005), simulate the adoption of the French family splitting in Germany: in this case the main issue is the fertility target, as for the female work participation French and German splitting systems are similar.

2. Progressive income tax: individual or family taxpayers?

It is useful to start by reviewing the tax implications of individual versus family (or joint) taxation. In case of the former, income tax is applied to each member of the household and the main characteristics of the household can be considered by means of tax allowances or tax credits. Formally, in a household with only two wage earners, the tax schedule is applied to each personal income and the household average rate is the ratio between the sum of the two individual taxes and the overall income of the couple as follows:

$$t_{mf} = \frac{f_1(y_1,\varepsilon) + f_2(y_2,\varepsilon)}{y_1 + y_2}$$

t_{mf} = household average rate
y_i with $i = 1,2$ = spouses' incomes
f_1, f_2 = function describing the individual tax sxhedule
ε = individual tax allowances and tax credits.

If the unit of taxation is the *family*, the tax schedule is applied to the household income and the household average rate is a function of the overall income of the couple[7]:

$$t_{mf} = f(\sum_{i=1}^{n} y_i, \varepsilon)$$

More precisely, family taxation can be obtained by a simple joint income scheme (called the pure joint taxation) or a splitting system. In the first case, tax schedules are applied to overall income and the average rate is simply a function of the sum of the incomes of the couple; on the

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[7] See Longobardi (2005).

other hand, adopting a splitting scheme, a new tax base is built by summing all incomes and dividing them by a specific divisor (p). In the latter case the average tax rate is a function of the "new" taxable income, as follows:

$$t_{mf} = f(\frac{\sum_{i=1}^{n} y_i}{p}, \varepsilon)$$

There are two main splitting schemes in use in western countries: the traditional splitting system, - implemented in US and Germany – and the French family splitting system. In the former, the income tax of a married couple is calculated by applying the tax function to half of the added incomes of the spouses and this amount is then doubled to determine the tax amount of the couple. In this case the household size, including the number of dependent children, is taken into account by tax credits and tax allowances, as in all the other individual taxation systems.

In France the total family income is divided by a ratio that differs with household size. In other words, the ratio is a sum of different coefficients, one for each member of the household:

$$p = \sum_{i=1}^{n} c_i$$

where c_i is the coefficient applied to each member of the household. As in the splitting scheme, after applying the tax schedules to the "new" family tax base the tax is multiplied by the implied ratio in order to calculate the total amount due for the family. Clearly the tax unit is important and can affect several economic and social dimensions of behaviour. It might for instance have an impact on tax avoidance, and in general it is acknowledged that the individual tax system gives more room for avoidance, mainly due to fictitious income shares among family members. The systems will also have different impact on incentives to legalize unions through marriage. Whereas the individual tax system can be considered neutral, a family taxation system can exhibit either a deterrent or an incentive – depending on the exact details of the systems in place. It will also have an impact on the degree of progressivity: adopting the same marginal rates, progressivity becomes stronger in the individual framework. In contrast, the average tax rate becomes lower in the family taxation system due to the tax base abatement[8]. There is also a difference for families with children. The family taxation offers a more beneficial treatment of large families, due to the lower average tax rate; however, a system of tax credits with a high incentive for children can also be modelled in the individual taxation system.

[8] If family taxation comes as a splitting system and not as a pure joint taxation system.

Finally, incentives for work effort for the secondary earner will matter. Essentially family taxation deters labour supply of additional family members[9]. This very last point is the focus of this paper. The influence on the work effort, or more specifically on the decision to enter the work force, stems from the different marginal effective tax rates that the secondary earner faces in the two tax regimes. This is because the tax due in an individual and progressive taxation system is positively correlated with income concentration: the less egalitarian the income distribution between the two spouses is, the larger the tax burden becomes. Therefore, for a given total family income under an individual taxation framework, the tax is larger for single-earner families than for two-earner households. Under a family taxation system, in contrast, single earner and two-earner families pay the same amount of tax. This is the case in the current French Family splitting.

Figure 1 shows an hypothetical reform of the Italian personal income tax regime from individual to family taxation and shows the implied gain from "splitting" in term of tax liability (the negative sign means a cut in tax liability) for households in which income is fully concentrated while is neutral for households in which income is perfectly shared between the spouses[10]. Figure 1 also shows that the gain is increasing with income but it stabilizes at 8.100 euros for incomes over 150.000 euros. To summing up, the individual taxation supports the work of the secondary earner (the wife in 86,4 per cent of the couples of our sample), while family taxation system implies a disincentive for the secondary earner.

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[9] From an efficiency point of view optimal income taxation theory would favour individuals rather than households as the unit tax. In fact, the traditional Ramsey optimal taxation principle suggests taxing secondary workers at a lower rates with respect to primary workers, because the labour supply elasticity of the secondary workers are higher (for a survey see Blundell and MaCurdy, 1999). Under a progressive individual taxation system, primary earners have higher incomes and higher marginal tax rates, while secondary earners face lower marginal tax rates. On the contrary, in a joint income tax system, tax rates are identical across members of the same family (see Mirrlees (1971) for the seminal contribution at the individual level and Boskin and Sheshinski (1983) for the extension at the family level). The optimal taxation approach do not offer clear-cut prescriptions if differences across families are taken into account or household production function is considered. Moreover under specific hypothesis on household decisions and welfare, joint taxation becomes optimal (see among others Kleven and al. (2006) and Cremer and al. (2007)).

[10] The graph has been built on the Italian tax rates and income brackets in force in 2002, without considering any personal or work-related allowances. This hypothetical splitting gain is the difference between the tax due in a family splitting system (by applying the French coefficients and the Italian tax rates) and in the individual tax system. Therefore a negative splitting gain shows that tax due under family system is lower than tax due in the individual system

Figure 1 French family splitting gain with different income distribution between the two spouses (without children)
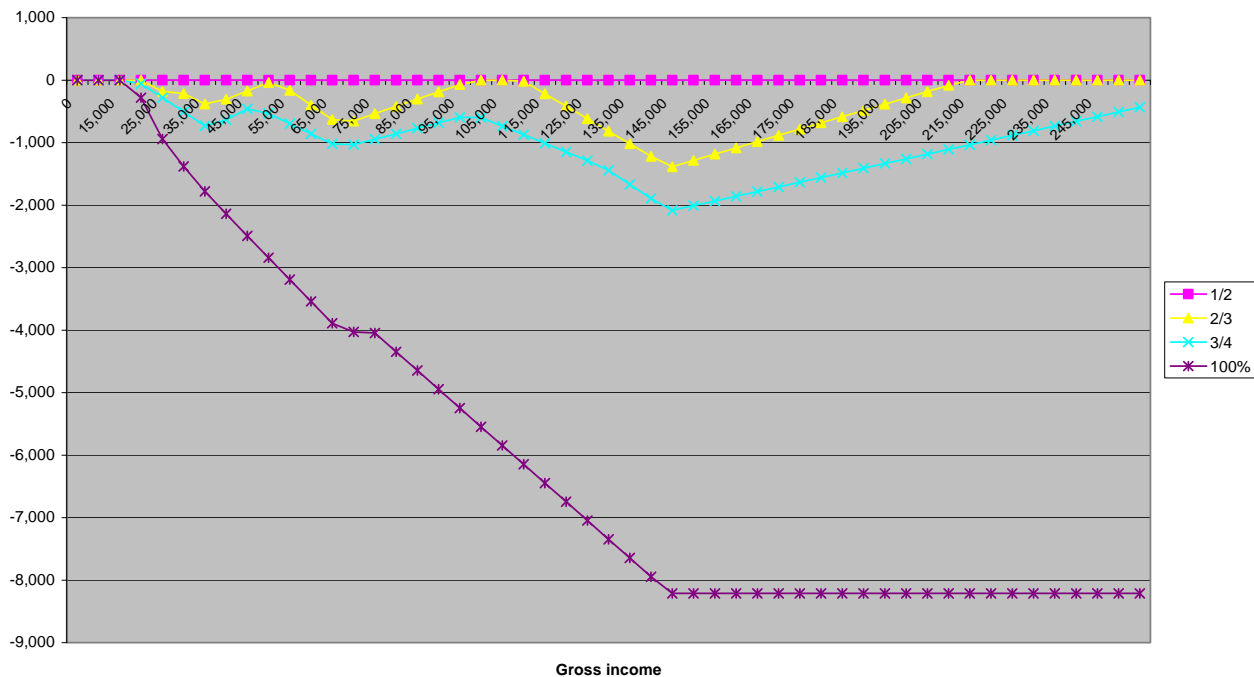
The gain from the hypothetical splitting for a couple with two children[11] is shown by Figure 2. It is clear that switching from an individual to a family system produces a tax increase for households with incomes less than 40,000 euros, while the gain is positive for higher incomes. Given the level of tax allowances for dependent children as of 2002, the individual tax system favours couples with children with less than 45,000 euros and implies a tax increase for higher levels of income. As in the previous case, the gain from splitting is a function of the income concentration within the family and of the level of income. However, in the case of dependent children, the strong reduction in progressivity embedded in the family taxation system gives a tax reduction also to families where the income is perfectly shared between spouses.

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[11] Figure 2 is based on the individual tax system where the child allowances in force in 2002 are used – as opposed to the family coefficients of the French system.

Figure 2: French family splitting gain with different income distribution between the two spouses (with two children)
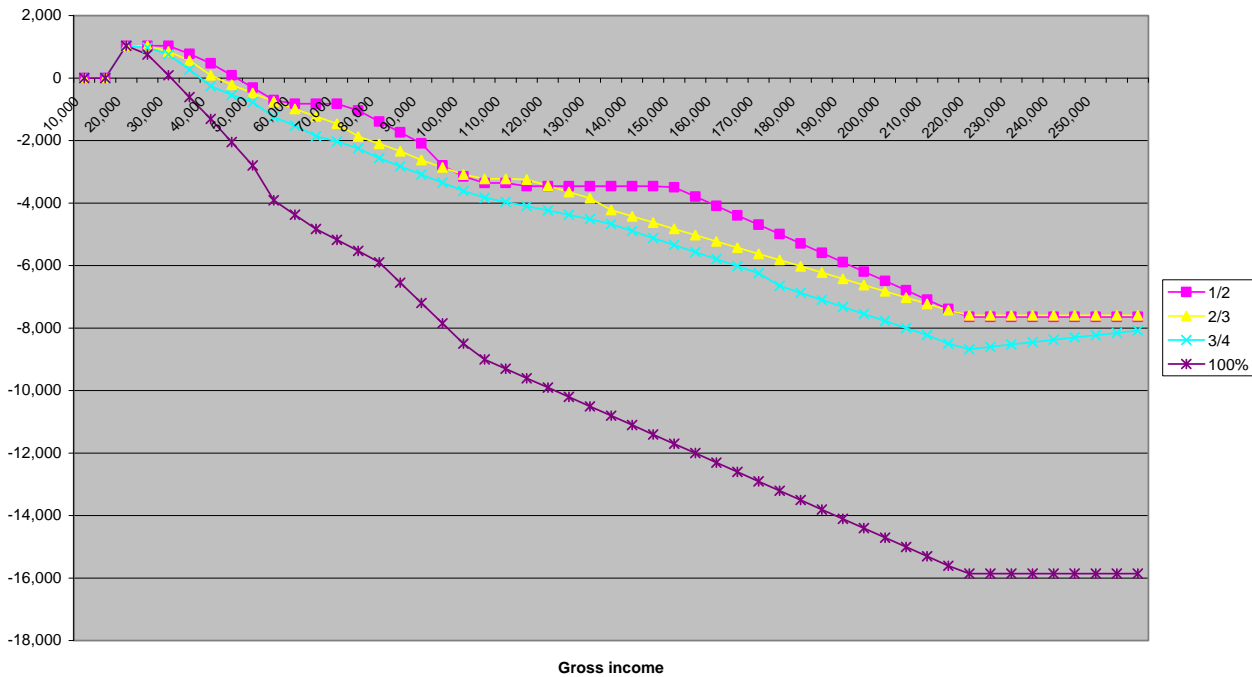
3. The labor supply model

There are two alternative approaches available for modelling labour supply. The first option is to specify a direct utility function and derive the corresponding labour supply responses. The second option is to specify a model of labour supply behaviour, being sure that the corresponding utility function exists[12]. There is a large literature on this issue. One of the key issues is whether labour supply should be modelled in a continuous framework as opposed to specifying a discrete labour supply classification scheme. Clearly using a framework where labour supply is modelled around a continuous measure of hours worked has both computational and analytical problems: with progressive income taxation, the budget constraint becomes highly non-linear and not necessarily convex. The labour supply is then the result of a maximisation procedure in which the budget constraint forms a piecewise function, where the slopes can be either positive or negative, depending the segment of the budget constraint. The discrete labour supply model, in contrast, allows a much more simplified budget constraint[13]. Moreover, the discrete approach enables us to add a random disturbance term to the utility function (as opposed to the traditional labour supply).

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[12] Stern (1986) and Creedy and Dancan (2002).
[13] Creedy and Duncan (2002); Creedy and Kalb (2005); Blundell, Duncan, McCare, Meghir (2000); Haan (2004); Van Soest (1995).

Finally, assuming that the error terms are independently distributed as a Type I extreme value- the discrete choice approach allows easy estimation of the labour supply with the help of the multinomial logit model[14]. In this paper a discrete labour supply model is specified and estimated and, as a first step, we adopt an individual labour supply function, so that the interaction between spouses is not explicitly considered. With the discrete labour supply model individuals are assumed to maximize the following utility function:

$$U_{h(.)} = U\left(h_{(.)}, c_{h(.)}, X\right),$$
$$\text{for } h_{(.)} \in \left\{h^1, h^2, \dots\dots, h^K\right\}$$

where h denotes labour supply defined over k labour supply hours categories, c is the consumption (equal to the disposable income, e.g. the non-labour income plus the wage) and X captures individual characteristics. Assuming a difference between real and measurable utility a stochastic term is added for each h:

$$U^*_{h(.)} = U\left(h_{(.)}, c_{h(.)}; X\right) + \varepsilon_{h(.)}$$

If $\varepsilon_{h(.)}$ are independently distributed as a Type I Extreme Value, the probability of choosing $h_{(.)} = h^j$ is directly associated with an utility level higher than in each other possibilities. In other words:

$$\Pr\left[h_{(.)} = h^j\right] = \Pr\left[U^*_{h^j} > U^*_{h^k} \quad \text{for all } j \neq k, k \in \{1, \dots\dots, K\}\right]$$

$$= \frac{\exp\left[U\left(h^j, c_{h^j}; X\right)\right]}{\sum_{k=1}^{K} \exp\left[U\left(h^k, c_{h^k}; X\right)\right]}$$

In this case the probability distribution of hours of labour supply is dependent on the utility level associated at each class of hours[15].

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[14] Keane and Moffit (1998), Van Soest (1995).
[15] Van Soest (1995)

4. A tax benefit microsimulation model with real data

Our data come from the 2002 Bank of Italy Survey of Household Income and Wealth. Net incomes are converted into gross of tax amounts using a micro-simulation model based on the Italian personal income tax legislation in force in 2002. Though the share of self-employed individuals is substantial in Italy, the available data for their labour supply and earnings are not particularly reliable. We consider therefore a sub-sample of families in which individuals work as employees (if not unemployed). As a result of the selection procedure, the dataset is composed of four categories of families:

1) couples of employees (with or without dependent children and other dependent relatives)
2) couples with one employed and one unemployed (with or without children and other relatives in charge)
3) single-parent families (employed or not employed and with children and possibly other relatives in charge)
4) singles (employee and unemployed).

The dataset, which after selection cannot necessarily be considered representative of the Italian population, has 9066 individuals and 2.919 families, as shown in table 2.

Table 2: Simulation dataset by household types

Two earners couples	991
Couples with a single earner	1011
Single parent, employed	288
Single parent and couples unemployed	227
Singles (employed or not)	402
Total	**2919**

Source: Authors' estimation

Families with relatives recorded as working are included in the sub-sample because they may be important to explain labour supply decisions, although the additional earners in the family are not affected directly by the reform. Even when they live in a family household, their income tax does not change as they are considered as "singles". As for the splitting divisors we use those used in France in 2003, as illustrated in Table 3.

Table 3. The splitting divisors in use in France in 2003

Civil status	Without dependent people	Number of dependent people				
		1	2	3	4	5
Married	2	2.5	3	4	5	6
Widower	1	1.5	2	3	4	5
Single/divorced	1	1.5	2	3	4	5

Source: Codes General des Impots, 2003

The splitting divisor is of interest for at least two reasons. First, the number of wage earners in a couple is not relevant for the tax burden of the family since the divisor is a function of the components of the family (so it is equal to two for couples) whereas it is not linked to the number of earners. Secondly, as for dependent children, a significant tax favour is provided after the second child. Starting from the third child a unitary increase of the divisor is envisaged for each new member being cared for. In other words, from the third child each household member produces a higher reduction of the fiscal burden than that caused by the first two children. This implies that after the third child the economy of scale is ignored and children are considered as adults.

In the arithmetic simulation, the household income, equal to the sum of the spouses' incomes, is divided by the splitting divisors outlined above. The Italian personal income tax schedule for 2002 (Table 4) is applied to this new tax base and as a last step this provisional tax amount is multiplied by the divisor in order to obtain the total household tax.

Table 4. Marginal rates and income brackets of Irpef 2002

Income brackets	Marginal Rates (%)
until 10329 euros	18
From 10329 to 15494 euros	24
From 15494 to 30987 euros	32
From 30987 to 69722 euros	39
More than 69722 euros	45

Source: Italian Ministry of Finance

Finally, to calculate the net tax amount we consider tax allowances related to the work status of the taxpayer, while tax allowances for dependent children and spouse are eliminated. In fact, we consider the family splitting as a tool for the personalization of the income tax alternative to the imputation system of tax allowances in force in the Italian system. In practice, besides the family splitting, the French income tax system provides tax allowances for dependent children

mainly justified by redistributive concerns. Summing up, we keep the Italian tax schedule and all work tax allowances during the simulation procedure because we want to highlight the effect of the transition from an individual to a family income taxation system, without altering the progressivity rate in force in Italy. More precisely, since the transition from the individual to a family taxation system automatically reduces the tax progression[16], we want to measure this effect without altering the original tax schedule.

5. The arithmetic simulation and the behavioural model.

The arithmetical model simply applies the change in the budget constraint that households face because of a fiscal reform without taking into account any behavioural change. Starting from survey data and socio-demographic characteristics of households, these models arithmetically derive disposable incomes and net tax payments given the official rules for the computation of taxes and benefits in the policy being analysed. By using this kind of models the analysis can be at least threefold. Fist of all, it is possible to calculate the effect of the reform on revenues. Secondly, the fiscal policies can be evaluated for several typologies of households, with the objective to assess the winners and the losers after the reform. Finally, arithmetic models allow us to compare different taxation system or, generally speaking, the impact of reforms with regard to income distribution. Independently from the household type, this kind of evaluation is done by comparing different net income distributions by means of inequality indices and taking the household gross income distribution as the starting point. In all these analysis, the behavioural responses are ignored and the results can be considered as "ex-ante" evaluations, in the sense that the reaction of economic agents to each policy is not taken into account. The behavioural models overcome this limitation and include a detailed representation of the behavioural response of individuals and households to changes in their budget constraint. The type of behaviour taken into account differs across models, even though consumption, labour supply and portfolio choices are the most frequent focuses of interest. Here we focus on individuals' and households' labour supply reactions to the simulated reform (without taking into account the fertility effect), obviously assuming no rigidities in the labour demand.

5.1. Results of the arithmetical micro simulation of the reform

The arithmetic simulation of the fiscal reform shows a loss in total income tax revenue, at same time as there are clear winners and losers among the Italian households. More precisely, the

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[16] To see the demonstration of so called "Gain from splitting" see Richter and Hampe (1984) or Lambert (1993).

loss in income tax revenue is about -5.1 percent for individuals involved directly in the simulated tax reform[17]. This result confirms other empirical evidence from Italy[18]. Generally speaking, the simulated reform shows a reduction in the tax liability for male taxpayers and an increase for female taxpayers. Considering the average splitting gain for households, Figure 3 shows that the splitting gain for a couple with two earners (the first category) is the highest, but also positive for one-wage earner households (second category). In contrast, single parent households (third category) exhibit a splitting loss, in the sense that their tax liabilities are bigger in the simulated reform than in the present Italian income taxation. Also households in which parents (the single parent or the couple) are unemployed exhibit a splitting loss with the simulated reform. The effect for unemployed individuals is driven by their very low income level[19]. As expected, Figure 3 shows a zero splitting gain for singles (fifth category), employed or unemployed. This is simply because they have not been affected by the simulated reform as their tax base is divided by one.

Figure 3. Splitting gain by household type
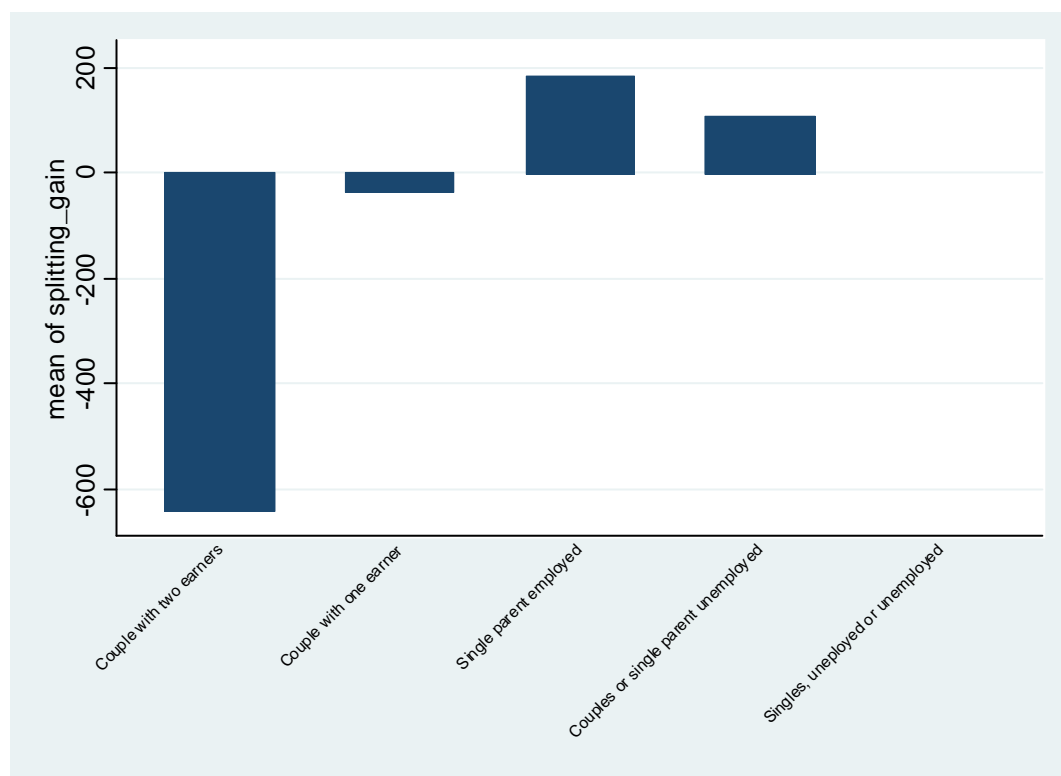
Source: Authors' estimation

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[17] The revenue loss decreases to 3,6 per cent if all income tax is considered, including individuals not directly involved in the simulation (as, for istance, singles).
[18] See Marenzi (1991), Ministery of Finance (1992), Declich and Polin (2004), Rapallini (2005), Tutino (2005).
[19] In this sample people who declare to be unemployed at the time of the interview usually worked only for a few months of the year

Comparing the splitting gain for one and two wage earners couples, our results seem conflicting with the analysis illustrated in the first section. As previously discussed, we would expect that the splitting gain is higher the higher the income concentration and, as a consequence, we would have expected a higher splitting gain for one earner households. However, as showed by Figures 1 and 2 the absolute value of the splitting gain is largely determined by the level of gross income and in Italy the gross average income for the two wages earners households is significantly higher than that of the one wage earner type.

As shown by Figure 4, the splitting gain in the simulation increases with gross income; the effect of a higher gross income of the two-earner families has completely offset the advantage of the concentration income effect of the single earner households.

Figure 4. Splitting gain by deciles of household income
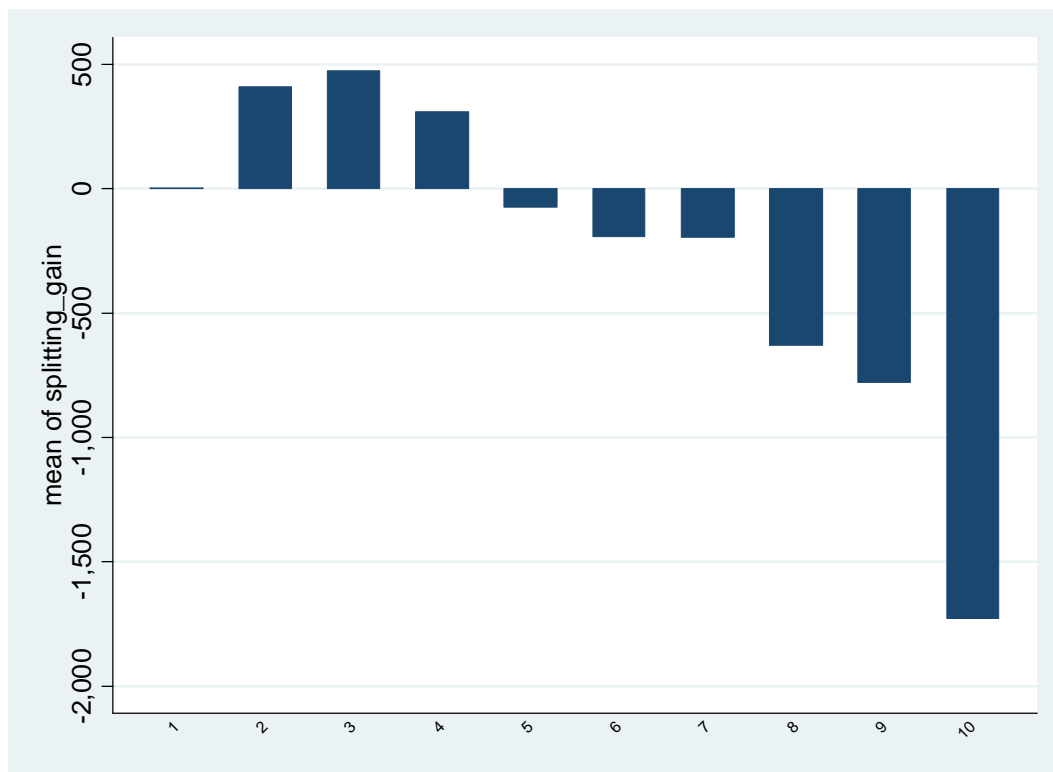
Source: Authors' estimation

As for the income distribution the empirical result is consistent with the analysis carried out in the first section: the splitting gain is positive for those households positioned after the fifth deciles, while there is an increase of the tax due for households located in the first four deciles. This effect on income distribution is confirmed by the Gini index trend. In fact, the gross income index is 0.6750, while the pre-reform net income index is 0.6538 and the post reform net income index is 0.6591, showing the expected increase.

Figure 5. Splitting gain by households with different number of children in charge
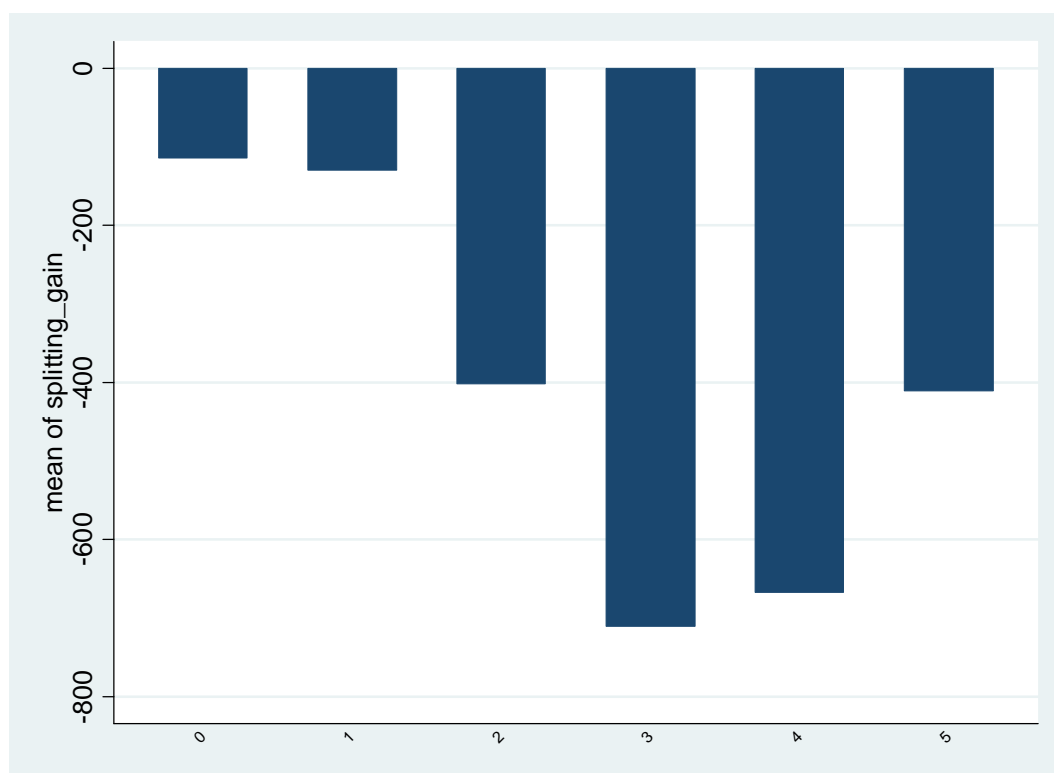
Source: Authors' estimation

As regard the relation between splitting gain and family size, the arithmetical simulation shows that the reform is more advantageous for households with three and four dependent children, while households with more than four dependent children seems to be penalized by this policy. This apparently illogical result is, again, strictly related to the income distribution. Considering that in Italy households with more than four dependent children are mainly located in the first deciles of the income distribution, the gain of the French family splitting due to the large number of children is offset by the effect of income level. As showed in Figure 2, the ex ante evaluation of the reform foresee a positive splitting gain after 40.000 euros of household income, as

the level of tax allowances in force for dependent children in the individual system makes the family reform profitable after that level of income[20].

6. Estimation results: wage and labour supply

In this section we estimate labour supply functions for men and women. As in other countries, a sizeable proportion of Italian women are out of the labour market. Table 5 shows the participation rates for different regions of Italy separately by gender.

Table 5 Employment rates in the simulation sample and official statistics (15-64 years - 2002)

		non working	working	
Men	North	7,9	92,1	100,0
	Centre	11,4	88,6	100,0
	South	24,9	75,1	100,0
	Total	15,4	84,6	100,0
	Total (official figure)	*30,6*	*69,4*	*100,0*
Women	North	28,9	71,1	100,0
	Centre	39,1	60,9	100,0
	South	69,4	30,6	100,0
	Total	47,2	52,8	100,0
	Total (official figure)	*55,3*	*44,7*	*100,0*

Source: Authors' estimation and Istat for official figures

There is of course a large difference in participation rates among men and women. Parts of these differences are explained by women staying at home to care for children. However, it has also been argued that participation rates among women are particularly low in Italy due to lack of part-time public jobs. Interestingly, there are considerable differences between regions, both for men and women. Parts of these differences are explained by the informal economy in the south, which is considerably larger than in the North.

Those not participating in the labour market are naturally coded as having zero wages in the survey. In the labour supply function we are nevertheless interested in having their predicted wage,

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[20] The arithmetical micro simulation and the analysis by household type can also be performed in a "neutral revenue scenario". In this case the introduction of the French family splitting and a change in tax rates are simulate jointly so that total income tax revenue does not decrease. However, infinite changes in tax rates can lead to a revenue neutral reform from individual to family taxation system. To check our results, we simulate a neutral liability progression tax change, following the methodology suggested in Lambert (1993). In other words, in order to compensate the revenue loss implied by the reform, all tax liabilities are increased by a percentage which ensures the same pre reform income tax revenue. As for household type effects the outcomes of the neutral revenue simulation are very close to the simulation reported.

which can be thought of as the reservation wage. Thus, by estimating the wage equation we are able to construct the predicted wages, which can also be assigned for those not working. Women not participating in the labour market may also be due to self-selection. As a result we tried several version of the Heckman selection model. However, selection does not appear significant in our sample. We settle therefore on a simpler wage equation without controlling for selections effects. This is given by:

$$\ln(W_i) = X_i\,\beta + \varepsilon_i$$

where $\ln(W_i)$ is the logarithmic wage and vector X_i contains the set of individual characteristics. Estimations are performed separately for men and women. The results are presented in Table 6. The estimates conform well to what is expected. Age is positively associated with wages, but in a non-linear way. Regions are important – the Centre and the South having significantly lower wages than North. The work statuses are also important for wages. Interestingly, once we control for these background characteristics, the number of children do not have a significant effect on women's labour force participation.

Table 6   Wage regressions by gender

	Women		Men	
	Coefficients	t stat	Coefficients	t stat
Age	0.0580	5.65	0.0491	6.91
Age squared	-0.0005	-4.07	-0.0004	-4.88
Region 2	-0.0616	-1.84	-0.1234	-4.85
Region 3	-0.1684	-5.11	-0.2717	-12.6
Work Status				
- level 2	0.2157	6.02		
- level 3	0.4137	7.58		
- level 4	0.3651	4.2		
- level 5	0.5947	4.75		
Educ. Years	0.0390	7.52	0.0552	21.6
Child			0.0880	3.72
Constant	-0.1605	-0.79	0.1011	0.72

Notes: OLS estimates. Observations include total population between 18
and 66 for men (2582cases)and between 18 and 63 for women (1594).
Region 2 is centre of Italy and Region 3 is the south
Source: Authors' estimation

The labour supply model is estimated by multinomial logistic regression. This means that labour supply is divided into groups, each reflecting a certain level of hours worked per week. The labour supply categories are different for women and men, reflecting the actual labour supply distribution of the samples (see table 7). Four classes were chosen for men: 1) not working; 2) working at least one hour per week but less than 40; 3) working 40 hours (i.e. full-time); 4) working

more than 40 hours. For women we use the following four groups: 1) Not working, 2) Working at least one hour per week but less than 24, 3) working more than 23 hours but less than 40 hours, 4) working 40 hours (i.e. full-time) or more.

Table 7. Hours worked frequency distribution (18-64 years)

	Men			Women	
	Freq.	Perc.		Freq.	Perc.
0	413	13.60	0	1385	46.79
< 40 hours	742	24.41	< 24 hours	298	10.07
40 hours	1175	38.68	24 <hours< 40	609	20.57
> 40 hours	708	23.31	40 hours and more	668	22.57
Total	3038	100.00	Total	2960	100.00

Source: Authors' estimation

The parameter estimates are presented in Table 8. Most of the estimates are as expected. We find that wages are positively associated with labour supply, but in a highly non-linear way. For instance, the marginal effect of the predicted wage for not working (i.e. the first labour supply group) is -1.65, which indicates that women are less likely to stay out of the labour market as wages increase. Moving on to the groups with positive labour supply, we see a positive effect of predicted wages. The strongest effect is for the third group, where the marginal effect is 0.79. The positive effect of wages declines to 0.50 for the last group (i.e. at least 40 hours per week).

There is also a control for the presence of children. This is done by controlling for the presence of children younger than three years of age in the household, and it is confirmed that labour supply is generally lower for women with young children. The regions are also important. As reflected in Table 5, labour supply is clearly lower in the South, and for some groups also lower in the centre. Finally we see that non-labour income and other earners in the household matter. This is especially the case for women not working. Here the marginal effect of non-labour income and other earners is clearly positive and significant; it is negative for all the other groups with positive labour supply.

Table 8: Marginal effects for labour supply for women:

	Not working		Working Part Time (a)		Working Part Time (b)		Working full time or more	
	Marginal Effect	Z stat	Marginal Effect	Z stat	Marginal Effect	Z stat	Marginal Effect	Z stat
Wage	-1.654	-25.39	0.3518	13.63	0.7938	20.48	0.5088	12.15
Age	0.0805	8.48	-0.0102	-1.84	-0.0287	-3.75	-0.0417	-5.61
Age square	-0.0007	-6.09	6.54E-05	0.97	0.0003	2.92	0.0004	4.04
Region 2	0.0135	0.42	0.0185	1.09	0.0213	0.9	-0.0533	-2.54
Region 3	0.1796	6.42	-0.0042	-0.28	0.0285	1.33	-0.2038	-10.3
Non labour income	0.00002	3.15	-2.48E-06	-0.59	-0.00001	-1.85	-1.22E-05	-1.75
Children under 3	0.1505	4.41	0.0036	0.22	-0.0412	-1.56	-0.1129	-3.98
Other earners	6.02E-06	8.48	-5.92E-07	-1.76	-2.60E-07	-5.05	-2.83E-06	-4.96
Predicted outcomes	0.4150		0.1062		0.2177		0.2589	

Source: Authors' estimation

Notes: Part Time (a): less than 24 per week; Part Time (b): between 24 and 36 per week.. Observations include total not student population between 18 and 63 (2960). Region 2 is centre of Italy and Region 3 is the south

We now move onto the labour supply estimation for men. Also here the results are largely in line with our expectations. Before commenting the results, it is worthwhile reminding ourselves that compared women, very few men are out of the labour force. The predicted wage is negatively associated with not working. As for women, the higher the wage, the lower the likelihood of belonging to the first labour supply group. The effect is strong and positive for the next group, which includes all men working less than 40 hours. As we can see this consist of 25 percent of the sample (predicted). In contrast, wage has a negative impact on working fulltime (i.e. exactly 40 hours), which implies that for this groups, a higher wage does no increase the labour supply. These effects reflect the "classic" relationship between wages and labour supply for men: wages has a positive effect on hours worked, but reaches a turning point and becomes negative for very high hours of work. In other words, the substitution effect is stronger than the income effect. For those working more than 40 hours, the effect of wages is insignificant.

The effect of non-labour income is somewhat mixed. It is clear that it lowers supply since the marginal effect in the first group is positive: higher non-labour income increases the likelihood of not working. It is also positive in the second group (i.e. part-time work) for then to have a negative effect on working full-time. In other words, those with lower non-labour income are more likely to work full time. Somewhat surprisingly the effect runs positive again for labour supply that is more than 40 hours per week.

The presence of children has the expected effect. Basically men work more when children are present. The effect is negative for the first group, then becomes positive, and significantly so for the last

two groups with highest labour supply. The regional patterns are similar to that of women. Men in the North work considerably more than men in the Centre and the South, the latter having the lowest labour supply.

Table 9:Marginal effects for labour supply for men

	Not working		Working Part Time		Working full time		Working more than 40	
	Marginal Effect	Z stat	Marginal Effect	Z stat	Marginal Effect	Z stat	Marginal Effect	Z stat
Wage	-0.0966	-3.75	0.3326	8.21	-0.2639	-5.47	0.0280	0.66
Age	-0.0170	-4.88	0.011	1.43	0.0038	0.48	0.0026	0.37
Age square	0.0003	5.13	-0.0001	-1.4	-0.00003	-0.35	-0.0001	-0.7
Region 2	0.0223	1.25	0.1225	4.38	-0.1189	-4.97	-0.0259	-1.17
Region 3	0.1120	6.46	0.2387	9.78	-0.2843	-12.39	-0.0663	-3.11
Non labour income	0.00001	6.61	0.00001	2.92	-0.00003	-4.69	0.00001	3.81
Children dummy	-0.1436	-8.97	0.0020	0.1	0.06405	2.76	0.0776	3.84
Other earners	0.000001	3.02	0.00000	1.52	-0.000001	-0.84	-0.0000001	-1.79
Predict outcomes	0,0902		0,2561		0,4057		0,2479	

Source: Authors' estimation

Notes: Observations include total not student population between 18 and 66 (3038). Region 2 is centre of Italy and Region 3 is the south

Table 10 gives a general idea on model fitting: a comparison between working hours recorded in the survey and working hours predicted by the model highlights that on average, the model seems to overestimate real data, in particular when coping with unemployed. The overestimation for women is particularly evident in households with one single earner and with unemployed parents. As for the unemployed parents, male and female predictions are similar: in both cases there is a consistent overestimation.

Table 10. Working hours by type of families: actual and predicted by the model

	Women		Men	
	Real	Predicted	Real	Predicted
Two earners couples	30.3	24.7	35.6	37.0
Couples with a single earner	2.7	12.4	34.6	34.5
Single parent (employed)	29.5	23.4	26.6	31.0
Unemployed parents	3.6	10.6	12.3	29.0
Singles	33.5	26.9	38.4	35.1
	17.3	18.7	33.1	34.8

Source: Authors' estimation

7. Simulation results: the effect of the simulated reform on labour supply.

Starting from the labour supply estimation, some considerations on the effect of the simulated family splitting reform can be drawn. Linkages between labour supply and family splitting simulation are income-driven, i.e. the behavioural simulation uses only the marginal effects that can be affected by simulation as a short impacts. Fertility effects, for example, is not considered here. The behavioural simulation of the fiscal reform shows a slight increase in total hours worked as a result of the increase in net income (wages and non labour income) implied by tax base abatement of the family splitting. In other words, the marginal effects estimated with labour supply signal a clear substitution effect and, as a consequence, the average increase in net wage leads to an increase in total working hours.

Table 11. The labour supply consequences of the simulated reform

	Women		Men	
	Post-reform	Pre-reform	Post-reform	Pre-reform
Two earners couples	25.19	24.72	37.07	37.02
Couples with a single earner	12.19	12.43	34.53	34.52
Single parent (employed)	22.69	23.37	31.01	31.00
Unemployed parents	10.20	10.57	29.02	29.01
Singles	28.84	26.86	35.10	35.08
	18.72	18.74	34.85	34.82
Differences in % of working hours	-0.11%		0.09%	

Source: Authors' estimation

As expected, the simulated reform has different consequences on female and male labour supply. In fact, the slight increase in total working hours is the result of a female labour supply reduction (about 0.11 in percent) and of an increase in the male labour supply (for about 0.09 percent), which is consistent with the direction of changes in net wages.

Moreover, the increase for men is almost equally spread among household types, while for female labour supply the reduction is concentrated on certain household categories. More precisely, women in couples with a single earner, single parent women and unemployed women reduce their labour supply, while women in couples with two earners and single women increase their effort. As for women in couples with a single earner, the simulated effect of the reform is small but as expected. In fact, as previously discussed, the disincentive for work effort of secondary earner is the main disadvantage of the French family splitting. Moreover, the effect on single parent women is also consistent with ex ante expectations. This result is driven by the relative disincentive of the French family splitting for single parent households: the divisor starts from one (the divisor starts from two in case of couples) and consequently the weight for children becomes less relevant after the third one. In other words, this system equates the single parent with two children household and a couple without children (regardless of the number of earners). As a consequence of the French

family splitting system, tax liability for single parent households is heavier than in an individual taxation system, in which child tax deduction are allowed[21].

8. Conclusion

The main objective of this paper is to verify both the distributional and the labour supply effects of a transition from the current individual tax system to a family tax system in Italy. In recent years, a move away from the individual system has been proposed several times and it is still highly topical in the Italian debate. This debate is mainly focused on the consequences on income distribution for different households (by size and income level), even if this reform has a disincentive on female work effort. In our opinion this aspect is still of key importance considering that the Italian female work participation is the lowest within EU-15[

In order to consider the distributional implication of the hypothetical reform, we implemented an arithmetic simulation, analysing implication for revenue and identifying the possible winners and losers from the reform. We conclude the analysis by considering labour supply responses using behavioural econometric estimations. The paper demonstrate somewhat unexpected effects of the reform when we consider household type. These are linked to the peculiar distribution of pre-tax incomes in Italy, whereas the expected female work disincentive effect is confirmed.

Both approaches show interesting results. The simulation provides evidence of a positive splitting gain for couples, with a higher gain for couples with two earners. The single parent households and the households in which the parents (the single parent or the couple) are unemployed, in contrast, appear as clear losers from the reform.

Generally speaking, these results are mainly influenced by the distribution of gross incomes prevailing in Italy. Even if we would expect that the splitting gain is higher for higher income concentration (as in the case of one earner couple) we verify that the higher gain is for the two earners couples. This result can be explained by the fact that the average income for the two wages earners households is significantly higher than that of the one wage earner type. In other words, the splitting gain in the simulation strictly increases with gross income and this income level effect completely offsets the income concentration effect of the single earner households.

As regard the relation between splitting gain and family size, the arithmetic simulations show that the reform is more advantageous for households with three and four dependent children, while households with more than four children seems to be penalized by this policy. This apparently illogical result is again strictly related to the actual income distribution of our sample. In Italy, households with

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[21] In the neutral revenue simulation total labour supply is almost unchanged; however female labour supply exhibits a minor decrease.

more than four dependent children are mainly located in the first deciles of the income distribution. As a consequence the gain of the French family splitting, due to the large number of children, is offset by the effect of income level since the level of fiscal allowances of the individual tax system outweighs the gain from decrease in tax progressivity for low income levels.

The behavioural simulation shows a substantial invariance (a very slight increase) in total hours worked. This overall effect is the outcome of a female labour supply reduction and a male labour supply increase, linked to a gender differentiated effect of tax simulation on net incomes. Besides, the male labour supply increase is almost equally spread out in all household types, while the female labour supply decrease is concentrated in couples with a single earner, or single parent women, or unemployed women.

The French family splitting effect on labour supply of women in households with a single earner confirms a disincentive for work effort of secondary earners, regarded as the main drawback of this tax system. In our opinion, the effect on female single parents is particularly striking. In fact, this type of households is becoming more widespread in western countries and low income problems, if not poverty, are frequently linked with this household composition[22].

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