Family Intertemporal Fiscal Incidence: A new Methodology for Assessing Public Policies

Polin, Veronica and Sartor, Nicola

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Nicola Sartor
Department of Economics
University of Verona (Italy)
nicola.sartor@univr.it

Veronica Polin
Department of Economics
University of Verona (Italy)
veronica.polin@univr.it

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Abstract

A correct assessment of public policies requires the analysis of deliberate and involuntary redistribution. Redistributive policies have an interpersonal as well as an intrapersonal dimension. To assess the latter, the entire lifetime of individuals and families has to be taken into consideration. Traditionally, redistribution is analysed with static tax-benefit microsimulation models or on stylised individuals/households. Such tools are inadequate to estimate intrapersonal redistribution.

The paper proposes a new methodology for evaluating the lifetime incidence of budgetary policy on families. To do so, the definition of a "family unit" proposed by Ermish and Overton (1985) is used. By explicitly considering jointly all tax and spending programs, including in kind transfers and the supply of public services, the new methodology allows to estimate the overall redistribution of the public budget. Moreover, this approach provides an essential tool for examining in detail how the existing tax-benefit system influences the net fiscal position of different family kinds along their lifecycle.

As a first application, the new methodology is applied to Italy to investigate lifetime public support to dependants. Empirical results show that public support is not negligible, representing on average 10 percent of family expenditures. However, support is mainly geared to "old" family types - characterised by an absence of major economic problems and by low female labour market participation. The second part of the research explores the hypothesis that the current low demographic scenario can be characterised by "demographic free-riding". Conclusions are such that the free-riding hypothesis is accepted. However, the scenario resembles the "positive externality" case more than that of "pure public good".

JEL: H2, H23, I38, J18.

Keywords: Lifetime fiscal incidence; Child support and fertility

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1. Introduction

In all countries, industrialised or developing, public intervention affects income distribution and provides insurance against some negative shocks that characterize individual life. It is widely recognised (see, for example, Boadway and Keen, 1998; Sandmo, 1999) that public policies cause both intrapersonal and interpersonal redistribution. Deliberate interpersonal redistribution is mainly aimed at achieving equity targets by transferring resources among economic agents at a given point in time. Involuntary interpersonal redistribution may also occur as a side-product of allocative policies. Deliberate intrapersonal redistribution, justified by efficiency targets (i.e the absence of insurance markets) or by the existence of merit goods, is aimed at transferring income from a period to another or from a given state of nature to another for a given economic agent. Involuntary intrapersonal redistribution may also occur as a side-effect of interpersonal redistribution or of macroeconomic stabilisation policies.

From an empirical viewpoint, a correct assessment of redistribution requires sufficiently detailed information to allow estimation of the impact of all tax and spending programs on different individuals, according to their age and family status. Required information includes administrative one and needs to be supplemented by institutional details. As such information is rarely available, the economic literature has developed tools for indirectly assessing the redistributive impact of public policies: tax-benefit microsimulation models and "generational accounting" are two examples.

Tax-benefit microsimulation models, developed following the seminal contribution by Orcutt (1957), are used to reproduce, given a number of assumptions, the impact of public programs involving both tax and expenditure programs on economic agents at the individual level (see, for example, Bourguignon and Spadaro, 2006; Harding and Gupta, 2007). The data typically come either from administrative sources or surveys. This approach provides both a description of the net fiscal position of the base unit (individual or family) and the opportunity to simulate the effect of changes in the current tax-benefit system. A key property of these models is the ability to take into account a large number of individual characteristics and agents behavioural responses. On the other hand, alternative models working on stylised individuals/households (see, for example, OECD, 2005) have the advantage of simplicity. They fail to account for the complexity of real life situations and for the role of behavioural responses.

A number of different tax benefit microsimulation models have been proposed. These differences have an impact on the information one can obtain on redistributive effects. The first relevant dimension is the time horizon. Models are either static or dynamic.

Static models aim at the analysis of the current tax-benefit system or of the effect of specific reforms, at a given point in time. It is assumed that the number of units and their characteristics are fixed (see, for example, Immervoll *et al*., 2005). Dynamic models are employed when the objective is the long-term analysis of redistribution. The level of complexity is greater for these models. However they enable the analysis of the evolution through the time of the socio-economic characteristics of the population. These models, where either the cohort or the population may be dynamic, can be used to obtain an estimate of the interpersonal and intrapersonal redistributive impact of policies with long-term effects (see, for example, Zaidi and Rake, 2001; Ando and Nicoletti Altimari, 2004). Tax-benefit microsimulation models can also account for behavioural responses. If this is the case, the ability to estimate substitution effects enables to perform analyses of policies (reforms) based on their impact on some measure of welfare (changes) (see, for example, Immervoll *et al*., 2007).

Generational accounting, developed following the seminal paper by Auerbach *et al*. (1991), is an important instrument to assess the long-term sustainability of public budgetary policies and the implications in terms of equity among different generations. The methodology allows a detailed computation for all of the public interventions that play a role in determining the net fiscal balance for each individual. The output of "generational accounting" is an estimate of the present value of transfers and taxes the representative member of each of the living cohorts expects to receive/pay to the public sector during his/her lifetime.

Empirical analyses based on both approaches show some limitations. Most of the tax-benefit microsimulation models do not assess the overall redistributive effect of the entire public budget. Until now, far greater attention has been paid to the analysis of direct taxation and monetary transfers, whereas indirect taxation and in kind services have been somewhat neglected. Moreover, tax-benefit microsimulation models often raise problems of consistency between the simulation results and data coming from other sources (in particular national accounts). Finally, they typically focus on single periods. As such, they cannot assess the intertemporal dimension of redistribution, which plays a key role when major social or economic changes are taking place (Bovenberg, 2008)[1]. On the other hand, "generational accounting" studies the effects of public policies in a life cycle perspective focussing on the analysis of income effects rather than substitution effects. A

[1] Some studies have recently investigated the efficiency of intrapersonal redistribution as the result of public intervention (Gomes *et al*., 2008).

further limitation of this approach is that individuals are usually characterized according to age and sex only.

The paper proposes a new approach, family intertemporal fiscal incidence (henceforth FIFI), aimed at evaluating the lifetime incidence of budgetary policy on families. By explicitly considering all tax and primary spending programs, including in kind transfers and the supply of public services, FIFI allows to estimate the overall redistributive effects of budgetary policy across different family types and different periods of families' life. This approach provides an essential tool for examining in detail how the existing tax-benefit system influences the net fiscal position *vis-à-vis* the public sector of different family types. FIFI has two main aims. The first one is to go beyond the individual dimension in "generational accounting" and move to a family dimension, emphasizing the role of variables related to the family structure in the financial relationship with government. The other one is to ensure that, at an aggregate level (i.e. national accounts), the estimated amounts of each programme of spending and taxation included in the analysis are consistent, with those in the public sector budget, partly overcoming tax-benefit microsimulation models' validation problem.

The paper is organised as follows. The next paragraph details the methodology proposed for assessing lifetime fiscal incidence on families. Paragraph 3 applies the methodology to the Italian case, focussing on the net public subsidy paid to families with dependants. The dreary Italian demographic scenario, summarised by steady birth decline and old-age dependency ratio increase, and the persistence of poverty among families with dependants have stimulated a policy debate on the desirability of an increase of social protection of households with young dependants. Paragraph 4, by comparing public subsidies to private costs of children, explores the hypothesis that the overall situation may be depicted as a demographic free-riding scenario. Some conclusions follow. Finally, an Appendix details the data used to estimate the relevant parameters and variables that characterise the Italian situation.

2. Assessing Family Intertemporal Fiscal Incidence

In order to estimate lifetime fiscal incidence on family budgets, the first problems to be dealt with are the choice of the unit (family or household) and the definition of the time horizon[2].

[2] As compared to individuals, whose life is precisely identified by a date of birth and a date of death, for families and households there is no unique way to define a start and an end. According to infinite time-horizon models and dynastic models, a household may be seen as a never ending social institution.

For the purpose of the present paper, the analysis has been focussed on families[3]. While it is acknowledged that households are better suited to deal with some economic and financial relationships[4], the analysis of families allows to better determine the birth and the dissolution of this institution.

The paper borrows the notion of the "Minimal Household Unit (MHU)" proposed by Ermisch and Overton (1985). According to Ermisch (1988, p. 24), "Analysis is easier if the units are such that demographic influences on household formation and composition can be separated from economic influences. In particular, it would be helpful to separate instances of family formation and dissolution from household formation and dissolution. […] A minimal household unit is the smallest group of persons within a household that can be considered to constitute a demographically definable entity. It is definable in purely demographic terms in the sense that an individual, over his lifetime, moves from one type of MHU to another by means of a simple demographic transition or event"[5].

Similarly, a "Minimal Family Unit (MFU)" has been defined as a single or a couple of adults who are financially independent of their parents, regardless whether they still live in their parents' house. During their life span, the couple/single may decide to have children, which will be part of the family as long as they are financially dependent from their parents. The family ceases to exist when all the adults have passed away.

As for the family formation process, the frequency distribution of the probability of the following events, conditional upon the age, have been estimated:

1. being financially independent of their parents;
2. being married or cohabitants[6];
3. (for women) delivering a child of n-th order, conditional upon having a certain level of education.

[3] By "family" it is meant a group of individuals linked by marriage (or any equivalent social arrangement) or parenthood. Thus a family is represented by parents and children. A "household" is a family line or a dynasty; it is used to indicate a group of individuals sharing the same house. Therefore a household is made up by two or more families.

[4] For example, households share some fixed costs, such as housing expenses.

[5] The four basic MHU types identified by Ermisch and Overton (1985) are:

1. childless, non-married adults;
2. lone parents with their dependent children;
3. childless married couples;
4. married couples with dependent children.

[6] As for couple formation, the model considers the age at which one of the adults joins the other (conventionally, the male) and the average age difference of the couple, conditional upon the age at which the couple starts its life.

The probabilities have been applied to the entire population, therefore assuming that social lifestyles and the structure of the labour market are cohorts-independent[7].

The estimation of the lifetime fiscal incidence follows a static approach: a certain number of different MFU has been identified and all the financially-independent adults living in a certain year belong to one family type, and will belong to the same type for the entire lifetime[8].

The following characteristics have been taken into account in order to define the different types of families:

1. the number of children (0, 1, 2, 3+);
2. the level of education of each adult (with or without university degree);
3. the occupation of each adult (dependent worker, self-employed, not employed).

Formally, for each of the *k* different family types, FIFI is determined as the sum of the net present value of the different π programs for the entire lifetime (spanning T years):

$$FIFI_k = \sum_{j=1}^{\pi} \sum_{i=0}^{T} FFI_{i,j,k} * \left(\frac{1}{1+\rho} \right)^i \qquad [1]$$

where ρ is the discount factor. $FFI_{i,j,k}$ (Family Fiscal Incidence) is the sum of the individual annual fiscal incidence (*IFI*), namely the annual value of taxes paid/ subsidies received by each adult member (male or female) and by each child belonging to MFU *k*:

$$FFI_{i,j,k} = IFI_{i,j,m,k} + IFI_{i,j,f,k} + IFI_{i,j,c,k} \qquad [2]$$

Where *m, f* and *c* stand respectively for adult male, female and child(ren).

$$IFI_{i,j,m,k} = \Pi_{i,m} \cdot \Omega_{i,m} \cdot \Psi_{i,m,k} \cdot PRO_{i,j,m,k} \qquad [3]$$

$$IFI_{i,j,f,k} = \Pi_{i,f} \cdot \Omega_{i,f} \cdot \Psi_{i,f,k} \cdot PRO_{i,j,f,k}$$

$$IFI_{i,j,c,k} = \sum_{nc=1}^{nck} \Pi_{i-g_{nc.sc},c} \cdot (1-\Omega_{i-g_{nc,sc}}) \cdot PRO_{i-g_{nc,sc},j,c,k}$$

[7] A more realistic approach would require to estimate the probabilities separately for each of the living cohorts. This, in turn, would require the availability of longitudinal data.

[8] Therefore, a widow as such is not considered as a "single", but a member of a "married couple", being the last survivor of that particular type of family. The next step will bring some dynamics into the model, in order to allow individuals to switch from one family type to another (for example, from "married with children" to "single with children"), on the basis of a transition matrix. Some preliminary results are reported in Polin *et al*. (2008).

Where:

$\Pi_{i,m}$, $\Pi_{i,f}$ and $\Pi_{i-g_{nc,sc},c}$ being respectively male, female and child(ren) surviving rates at age i;

$\Omega_{i,m}$ and $\Omega_{i,f}$ are the cumulated frequencies of male and female financial independence;

$\Psi_{i,m,k}$ and $\Psi_{i,f,k}$ represent respectively the male and female marriage cumulated frequencies by age;

$PRO_{i,j,m,k}$, $PRO_{i,j,f,k}$ and $PRO_{i-g_{nc,sc},j,c,k}$ denote the estimated monetary value of each of the *j* tax and spending programs imputed respectively to the male, the female component of the couple and to each child belonging to family type *k*.

For variables referring to child(ren) belonging to a family of age *i*, the age of each child is $i\text{-}g_{nc,sc}$, where $g_{nc,sc}$ represents the average age at birth of woman with *sc* level of education delivering a child of order *nc*.

The estimate of variables *PRO* is subject to the constraint that, for each of the different π programs, the sum of *PRO*s across the population equals the aggregate value reported in the general government appropriation account.

The estimation of families' lifetime budgets resembles some similarities with "generational accounting". It is worth stressing that individual fiscal accounts relevant to MFUs substantially differ from generational accounts. Both are calculated by summing up the net present value of the different tax and spending programs, whose algebraic sum gives the net tax that is expected to be paid in the remaining lifetime. However, while generational accounts consider the entire lifetime, each individual fiscal account relevant for any MFU considers only the part of the life which is spent by the individual as member of a family of a certain type[9]. FIFI shares with "generational accounting" the focus on income effects as they both neglect any relationship between changes in tax-spending programs and individual/family behavioural changes. For the purpose of the present analysis, aimed at assessing the *status quo*, the above feature does not appear to limit the outcome.

[9] For example, an individual spends the first 20 years as a member of a family made up by a couple and three children. From age 21 onwards, that individual may become a member of a childless couple.

3. An application of FIFI: estimating the lifetime marginal net subsidy to Italian families with children

The structure of Italian MFUs has been derived from the survey on households' expenditures run by ISTAT (the National Institute for Statistics). The survey covers the expenditure level and structure, the level of income and the individual characteristics of more than 22,000 households sampled out of 21.5 million. Combining all the different characteristics, 174 different MFUs have been identified: 144 couples, 24 single women and 6 single men[10]. More than one MFU may be derived from one household, as the expenditure survey interviews all individuals sharing the same house.

The structure of MFUs and the frequency distribution of the relevant events before mentioned are summarised in Table 1 and Figures 1-3. The probabilities are based on the sub-sample of cohorts aged 36-55[11].

The demographic issue is at the centre of the debate about the adequacy of the fiscal and welfare system. Italy is experiencing one of the lowest fertility rates in the world. Total fertility is below replacement since the late seventies and has reached in 1995 its lowest value (1.18). Currently, total fertility rate has recovered to 1.35, mainly due to high fertility of migrant women. Completed cohort fertility rates show a steady decline from 2.1 for women born in 1944 to 1.6 for the 1963 cohort. At the same time, life expectancy at birth has increased by 22-24 years over the last 75 years[12].

The Italian welfare system is a mixture of the most recent approach based on universal programs and the legacy of some of the old categorical schemes based on profession. As for families with dependants, the current system is mainly based on the public provision of health care and education, the role of cash transfers and tax allowance being minor. Public transfers are supported by a rather generous regulation in favour of employed mothers. In the most recent years, the benefits have been gradually extended to fathers.

According to the number of children, the modal type of MFU is represented by a couple with 2 dependants (Tab. 1). When looking at each of the 174 different MFUs, the

[10] Only single men without children have been considered, as sample data show that no single man appears to have dependent children at the third decimal level. Moreover, the scarcity of single men with children prevented to further desegregate data among different family types.

[11] The reason for choosing this age interval is twofold. On one hand, empirical investigation based on the sample survey shows that at the age of 36 all individuals are financially independent. On the other, at the age of 55 all women have delivered their children and most adults are still working (only a small fraction of public employees enjoyed, before 1993, the possibility of an early retirement scheme based on seniority – See Sartor, 2001 on this point).

[12] From 54 in 1930 to 78 in 2004 for men, and from 56 to 84 for women.

modal family appears to be made up by two undergraduate adults (a male dependent worker and a non-working female) with 2 children (14.7 per cent of all Italian families), followed by a similar family characterised by both adults being employees (9.0 per cent) and by a family similar to the modal type, but with one child only (6.9 per cent). In general, sample data confirm the irrelevance of out-of-wedlock births and living arrangements different from marriage as pointed out by previous demographic studies[13].

As for family formation (Fig. 1), non zero frequencies are observed in the 15-35[14] range of age. 50 per cent of individuals become independent by the age of 24 and 75 per cent by the age of 28. Marriage occurs in the 20-43 range of age (Fig. 2). 50 per cent of married men get married by the age of 29, and 75 per cent by the age of 32. The average difference of age between men and women monotonically increases with the age of marriage from –2 to +4 years, being equal to +1 and +2 respectively at the age of 29 and 32.

Figures 3a-f report the age at which females deliver their children, separate for graduate and non-graduate women. Overall, the average age ranges from 25 (relative to the first child for undergraduate women with two or three dependants) to 33 (the third child for graduate women). As one would expect, the age at which graduate women deliver their babies is higher than non-graduates, the difference ranging from a minimum of one year (the third child for women with three dependants) to a maximum of four years (the first child for women with two children). The higher volatility of frequency distributions for graduate women depends on the smaller size of the sub-sample, as 90 per cent of women do not hold a university degree[15] [16].

For each of the 174 MFUs FIFI has been calculated by summing up the present value of taxes paid and subsidies received by each family member[17]. The general government

[13] See, for example, Palomba (1995).

[14] The relatively high age at which some Italians become financially independent is the counterpart of unemployment mostly affecting first-job seekers and the irrelevance of unemployment compensation to the latter category.

[15] The hypothesis that the two fertility sample distributions are generated by the same population distribution was tested. The null hypothesis was rejected at the 5 per cent confidence interval using a Chi-square test.

[16] It is worth noting that the proportion of graduate men is lower than women.

[17] A 3 per cent discount rate has been used.

appropriation account has been divided into 84 different tax and primary spending (i.e. excluding interest payments) programs (Tab. 2)[18].

Table 3 reports the main components determining the net lifetime fiscal incidence for the four "average" family types, each characterised by a different number of dependants. The variability of net taxes is substantial. It ranges from a minimum of 9,300 euros (or 1.9 percent of net present value of lifetime labour earnings) for the average 3+ child family to a maximum of 168,000 euros (33.6 percent of the net present value of lifetime labour earnings) for the average childless couple.

Variability is even larger if elementary data were examined, as public benefits exceed tax payments for many MFUs, so that on balance, a net subsidy is received. The percentage of families[19] paying no lifetime taxes or receiving net benefits increases with the number of children. 12.5 percent of childless couples pay no taxes. The percentage raises to 16.7, 35.4 and 43.8 respectively for families with 1, 2, 3+ children.

As for three-child MFUs (Table 4[20]), the absolute size of the net benefit reaches the largest value (ranging from 140,000 euros to 152,000 euros) for a couple of unemployed. For the "modal" family type (a one-earner non-graduate couple, representing 28.5 percent of families) the presence of 3 children ensures a net benefit of 58,000 euros, corresponding to a subsidy equal to 15.7 percent of net present value of lifetime labour earnings.

As one would expect, families which, for a given demographic structure, receive a net benefit are represented by the unemployed, the singles and single earner couples. At the other extreme of the spectrum (MFUs paying net taxes), we find all two-earners MFUs. Among the latter, a couple of employees pays the highest amount (322,000 euros, 35 percent of net present value of labour earnings)**,** despite the fact that the Italian welfare system provides a higher coverage to this category of workers. This is largely explained by the higher incomes reported, on average, by dependant workers to the tax authority.

Along with the net tax paid, the value of the "Marginal Net Subsidy" (henceforth MNS) has been calculated. The MNS represents the difference between the net taxes paid by a MFU of type *k* with *nc* dependants (let's define it $MNS_{k,nc}$) and the net taxes paid by a MFU of the same type with one less dependant ($MNS_{k,nc-1}$). From a financial point of

[18] See the Appendix for methodological details.

[19] The result is obtained by weighting MFU with the percentages reported in Table 1.

[20] Tables reporting the breakdown of lifetime net fiscal incidence for families with a different number of dependants can be obtained from the authors upon request.

view, a $MNS_{k,nc}$ indicates the amount of money that should be transferred to a MFU of type k at the beginning of its life in order to compensate it against a hypothetical situation in which all tax and transfer programs related to the "marginal" dependant are abolished. Note that the value of the MNS reflects not only transfer programs, public services and tax allowances directly aimed at dependants, but also tax payments that indirectly relate to the existence of an extra dependant because of any change of adults' income and spending arrangements.

Figure 4 reports the value of the MNS for four different family-types: i) the "modal" family; ii) the "average" family; iii) a family with both adults being employees and graduate and iv) single women. In each case the amount of MNS is presented according to the number of children (from 1 to 3).

No regular patterns emerge. For the "average" family and the single women, the MNS decreases with the number of children, although at different rates. For the "modal" MFU the value of the MNS first slightly increases, then decreases. The opposite can be observed when both adults are graduate employees.

Table 5 reports the value of MNS for all MFUs. It varies between a minimum of 33,000 euros to a maximum of 67,000 euros. When evaluated as a percentage of the net present value of labour earnings, the MNS is far from negligible: on average, it stands at 11 percent, but can reach as much as 30 percent of net present value labour earnings for certain family types. The coefficient of variation of the MNS is lower when the subsidy is expressed in absolute terms (0.14) as compared to its calculation as a ratio of lifetime earnings (0.70). This is fully explained by the low correlation between family income and the MNS.

MNS can be split into two components: *a)* tax and spending programs directly aimed at dependants and *b)* the before mentioned indirect effects caused by the change in family income and spending patterns due to the presence of dependants. As for *a)*, the direct programs represent the largest source of subsidy. For the modal family, its net present value amounts to 37,800 euros, 43,000 euros and 34,500 euros respectively for the first, the second and the third child. The value is largely independent of family type, as most of public programs are provided on a citizenship basis[21]. Some differences exist among families with most of income represented by wages and salaries, on one side, and the

[21] Despite the universality of programs, take-up ratios for university education and medical services appear to correlate with the level of education. The correlation is positive for university education; moreover, take-up ratios are larger when both spouses work (79 percent of young people enroll at university when at least one parent holds a university degree and both parents work; the ratio declines to 45 percent when neither parent holds a degree and the mother does not participate in the labour market). The correlation is negative for public health programs.

remaining family types, on the other, reflecting the residual categorical component of the Italian welfare system. Maternity and family allowances are more generous when the share of wages and salaries into family income exceeds 70 per cent.

As for *b)*, the indirect effects on MNS are mainly driven by the changes in spending patterns. Different spending patterns imply a different amount of indirect taxes paid to the government, other things being equal. Two points are worth to be stressed on this issue. First, the change in spending level and structure when families have children is such that for many MFUs indirect taxes paid to the government are lower as compared to childless MFUs of the same type (Tab. 5). This is not, however, the case for the modal MFU. For this family type indirect taxes increase but by a smaller amount as compared to the increase in cash transfers (tax credits, maternity and family allowances). Therefore the presence of one child gives raise to a net cash benefit (1,800 euros). It is worth noting that when both parents are graduate, indirect taxes decrease with the presence of one child as a result of their different spending pattern. Overall, this type of MFU receives a net cash benefit of 9,000 euros.

Second, there are some MFUs receiving a negative net cash transfer (i.e. the increase in indirect taxes exceeds the amount of cash transfers). This phenomenon mainly occurs when the share of wages and salaries into family income is less than 70 per cent. In other words, not only the cash subsidy is negative, but the burden is larger for families where the major source of income is from self-employment or non labour. This implies that the risk of poverty is higher for some families than others.

In most of the cases the amount of the indirect taxes paid reduces when the number of children exceeds one, reflecting the existence of economies of scale in spending. For example, during its entire lifetime the "modal" family with two children pays indirect taxes equal to about 7,8 thousands euros at present value more than one-child family, whereas the additional burden amounts to less than 3,6 thousands euros for the third son.

The annual pattern of the MNS has been analysed with reference to the modal family (Fig. 5). The absolute MNS value is negligible and declining during the first three years of the child's life. It increases between years 3 and 12, reflecting the relative importance of public school services and declines thereafter. If measured as a ratio of parents' earnings, the value of the direct component of the MNS is constant at around 15 percent (at around 22 percent for the overall amount of the MNS).

Finally, Table 6 reports the annual value of public programs directly benefited by family with dependants. Both the annual values and the net present values show that the

largest program for children aged 1+[22] is represented by education (52 per cent of the net MNS enjoyed by the "modal" family), followed by health care and by cash transfers - as far as family characterised by a large incidence of wages and salaries are concerned. Given the low likelihood to incur into health problems when young, the universal public health care system plays an insurance role rather than being a source of subsidy for the family with children, as it represents less than 9 per cent of the MNS for the "modal" family. As for money transfers, a one-child family yearly receives direct cash benefits whose magnitude declines with age.

All in all, the Italian welfare system conveys the largest proportion of the subsidies aimed at children by the public provision of education. This perspective increases the relevance of the issues on the efficiency of public education, as well as its coverage of the population - particularly for higher levels (secondary school and university) which are still benefited by too small a proportion of the young. The role of monetary transfers is limited in size and scope, as this instrument is still characterised by a categorical scheme that favours dependent workers. There is ample scope for increasing the role of cash transfers as an effective way of fighting poverty among families whose adults are not employees. The major obstacle to the transformation of the current categorical system into an effective universal one is represented by tax evasion and erosion, which still affects non salary incomes very much. Under high differences in tax avoidance, reference to a standard income threshold for granting cash transfers may increase inequalities.

4. Rational men, irrational society? Exploring the "demographic free riding" hypothesis

So far, the analysis has focused on public subsidies. Public benefits accruing to the society as a whole from individuals' fertility decisions has been neglected. Public benefits range from broad concepts such as the survival of the society (with its set of values and culture) to more narrow economic and financial benefits (such as economic growth and the sustainability of public pension programmes). This section deals with the estimation of collective financial benefits. It explores the possibility that the combination of private costs and benefits, on the one hand, and collective financial benefits on the other, may lead to a scenario similar to the one characterised by public goods.

In Western countries, the progressive development of capital markets - where individuals' savings generated by the widespread increase in incomes can be safely invested - is an age-old feature of economic growth. It allows individuals to maintain

[22] For age 0 the largest program is represented by health.

consumption plans during old age irrespective of the existence of dependants taking care of them when earning capacity diminishes. Under these circumstances fertility decisions are not determined by budget constraints and become a matter of individual preferences[23]. However, individual freedom of choice depends on the existence of some families generating new cohorts. In other words, even if the link between old-age survival and the existence of dependants has dissolved at the individual level, it still exists at the aggregate level[24].

The possibility of dominant strategies in individuals' reproductive decisions, such as those characterising the well-known prisoners' dilemma, will be explored by developing a simple state-contingent framework in which the consequences for a couple arising from the decision to have an extra dependant are compared to two different states of the world concerning collective behaviours. In the first scenario the remaining n-1 couples decide to have an additional baby; in the second scenario the remaining couples do not.

Following Hakim (2003), we will classify couples into two categories. According to the Preference Theory, women are heterogeneous in their preferences and priorities vis-à-vis the conflict between family and employment. The first category of couples (Type A in Tab. 7) is characterized by the presence of "work-centred women". For these couples, family life is fitted around work and most of them remain childless. The second category (Type B in Tab. 7) is characterized by the presence of "home-centred or family-centred women". Having children is a value per-se.

When examining individual consequences under the two different scenarios, public financial benefits will be added to private costs (and benefits, for Type B).

Empirical estimates of private marginal costs for Italian families show a negative correlation with child rank, with one exception (Perali, 1999). Estimates vary from a maximum of 36 percent of family expenditure (De Santis and Maltagliati, 2001) for the first child to a minimum of 6 percent for the third child (Polin, 2004). Empirical estimates of average costs display a lower variability - between 10 and 36 percent, with an average value of 19.7 per cent. The latter is very close to the OECD estimates (20 per cent) but

[23] Obviously, apart from economic considerations, an increase in the freedom of choice depends on the availability of contraception and on the decline in the role of community values and norms. On this latter point see, for example, Kuijsten (1996) and Lesthaeghe and Surkyn (1988). As for economic motivations, the possibility of building private long-term saving plans seems a more general and powerful explanation for the declining long-term fertility trend than arguments based on the development of public PAYG pension plans (see, for example, Cigno 1995).

[24] The link has also been weakened at the aggregate level by the integration of financial markets. The investment of private savings is no longer limited to national capital market in an increasing number of countries. The effects of a relative shortage of private savings (likely to occur in an ageing population) are likely to be diluted by the breadth of international capital markets.

smaller than the value adopted for calculating equivalency scales in Italian public welfare programmes (30 percent). For the purpose of the present analysis, the "average" value of 20 percent of family expenditure has been used as a proxy for the marginal cost of having an additional dependant, thus estimating a net present value of 13 to 17 thousand euros of extra private cost for the first 18 years of life of the additional dependant.

As for the collective effects of a change in the fertility rate, the estimate has been derived by simulating a generational accounting model (Cardarelli and Sartor, 2000). Collective effects are represented by the impact on public finances of the changes in both the size and composition of the population caused by a unitary increase in the fertility rate. Generational accounting has shown that a reduction in the average age of the population of a given size yields long-term benefits to public finances as: i) it causes relevant declines in public expenditures, as many public programmes (such as health care and pensions) are enjoyed by old individuals and ii) it increases public revenues, which mainly accrue from direct taxes and social security contributions paid by the labour force. Moreover, a moderate increase[25] in the absolute size of the population of a given age structure leads to an improvement in public finances as some expenditures for public infrastructure, as well as public debt servicing are fixed in amount.

A simultaneous decrease in the average age and an increase in the absolute size of the population caused by a unitary increase in the fertility rate therefore allow a reduction in the overall tax rate required for financing fixed expenditures and ensures public debt sustainability. This scenario leads to a decrease in the net present value of taxes paid by each member of future cohorts equal to 36 thousand euros at a 3 percent real interest rate. If benefits are spread to current living generations, it can be estimated that the overall tax rate can be reduced by 3.7 percentage points, allowing a generalised decrease in tax payments of 200 euros per couple per year (corresponding to a 6,500 euros reduction of the net present value of lifetime taxes for each of the existing and future couples)[26].

The above estimates of private costs and collective benefits have been used to generate two contingency tables. Both tables have been prepared using the most favourable hypotheses for the "demographic free-riding" scenario: the minimum level of

[25] On the contrary, a significant increase in population size requires an expansion of public infrastructure and may cause negative externalities such as congestion costs.

[26] Note, however, that the beneficial effects appear in the medium term (approximately after 18 years) as the initial increase in the number of off springs yields no extra revenue while requiring additional public expenditures (for education and, to a much smaller extent, health care programmes). From an empirical point of view, it can be estimated that the net present value of public benefits received by a couple with an extra dependant varies between 21 and 25 thousand euros.

private costs (those whose net present value during the first 18 years of life amounts to 13,000 euros according to Polin, 2004) and the maximum (e.g. the long-run) level of collective benefits. The first part of Table 7 considers only private costs and collective benefits, thus ignoring any private benefit arising from parenthood. It therefore seems appropriate to describe the payoffs to couples unwilling to have an additional child (type A couples). The second part considers private benefits from parenthood as well, assuming that the subjective evaluation of private benefits must be at least equal to private costs (otherwise the couple would not have decided to become parents). Values reported in the second part of Table 7 have been obtained by assuming that private benefits exceed private costs by 1,000 euros. The hypothesis, though arbitrary, seems to be appropriate to describe the qualitative scenario faced by couples who attribute a value to parenthood (type B couples).

From an analysis of the two scenarios depicted in Table 7 it emerges that there is always a dominant strategy: however, it is the reverse in each case. For type A couples, considering private costs only, it would seem that it is always advantageous not to have an extra dependant, even when collective benefits are taken into consideration. The maximum individual benefit, however, is obtained when all the remaining couples have an extra child (a typical free-riding scenario). For type B couples (private benefits associated with parenthood) the dominant strategy is that of having an additional child. As in the previous case, the maximum benefit is obtained when all couples decide to have an extra baby. Results seem to be stable, as both an increase in private costs and/or an increase in private benefits would reinforce results.

From the above analysis at least some of the causes of low fertility can be ascribed to a demographic free-riding scenario. However, from a policy perspective, significant differences emerge with respect to the standard public good problem. Even if a change in the fertility decision induced by public policies were feasible (from both a technical and ethical point of view), the outcome would be very different from that of standard public goods. While in the standard case, public coordination leading to public goods provision yields a generalised advantage to all participants (though of lesser magnitude compared to those benefits accruing to free-riders), a generalised increase in fertility would decrease welfare for all type A couples. Therefore the demographic scenario under scrutiny resembles more closely the generalised positive externality case. It is the very existence of type B families that ensures the existence of new cohorts. A couple deciding to increase the number of dependants generates benefits not only to itself but also generates positive financial externality to all other members of the society.

Conclusions

The paper has proposed a new methodology for assessing the effects of public policies on different family types along their life cycle. The methodology allows several detailed analyses based on the intertemporal incidence of any public tax and spending program.

Some empirical findings have been illustrated with reference to Italy. The first empirical application of FIFI has shown the relevance of Italian public support to dependants. Its order of magnitude can be compared to private costs. A precise comparison cannot be easily made, as the cost of child rearing depends on the alternative definitions of "cost" and by the estimation method used. Empirical estimates of private costs vary between 9 and 30 percent of overall family expenditures. If an average value of 20 percent can be accepted as an initial approximation, then the situation is such that 2/3 of the overall costs are born by families and 1/3 by society (via net public transfers). Obviously, childless families subsidise families with dependants (recall from the previous analysis that 43.8 percent of families with 3+ children receive a net subsidy, as compared to 12.5 percent of childless families). However the degree of dispersion of public support is significant. Some benefits remain contingent on the professional conditions of adults. For certain family types, public subsidies (reaching 30 percent of family incomes) exceed private costs. The above results are largely unexpected, as most of the literature focuses on private costs only or, when dealing with social policies, refers to aggregate data only.

Within public subsidies, the direct component represented by the public provision of education and health care dominates, a necessary condition to let young citizens enjoy life's opportunities, irrespective of the economic conditions of their families. This feature makes the subsidy highly progressive. The role of monetary transfers is limited in size and scope, as this instrument is still characterised by a categorical scheme which favours dependant workers. The irrelevance of cash transfers emerges when comparing this subsidy with the increase in indirect taxes paid by many families with dependants: with reference to the "modal" family, it can be said that the public sector takes back with one hand almost all what was given by the other. There is ample scope for increasing the role of cash transfers as an effective way of fighting poverty among families whose adults are not dependant workers. It is worth recalling that the likelihood of lying below the poverty line is much higher when the number of dependants is large (in year 2007 27 percent of families with 3+ children are poor, 16 percentage points more than families with 1 child). The major obstacle to the transformation of the current categorical system into an effective universal one is represented by tax evasion and erosion, which still greatly

affects non salary incomes. With high differences in tax avoidance, reference to a standard income threshold for granting cash transfers may increase inequalities.

Public support is minimal during pre-school age. It is during this phase of their children's life that Italian parents - women especially, face difficulties in reconciling work and family responsibilities. Current public support therefore seems suited to those families - still numerous but bound to decrease in number - characterised by the absence of major economic problems and by low female labour market participation (the so-called bourgeois family). If public objectives include the reversal of low fertility, new policy instruments able to remove those obstacles that still prevent many women from reconciling maternity and work have to be added.

A much more controversial issue is that of pursuing demographic policies, e.g. policies aimed at changing family preferences (as compared to policies aimed at removing obstacles so that families can realise their preferences). The second part of the paper has attempted to offer some economic (as compared to ethical) arguments by exploring the hypothesis that the current low fertility scenario can be characterised by "demographic free-riding". Conclusions are such that the free-riding hypothesis cannot be rejected. However, the scenario resembles more closely the "generalised positive externality" case than that of the "pure public good". On one hand the analysis presents new concerns about the opportunity of pursuing demographic policies; on the other, it offers new arguments in favour of the use of public money to remove barriers which prevent couples from having the desired number of children.

APPENDIX

The value of benefits received and taxes paid by each type of family members is estimated according to the methodology outlined in this Appendix. The estimate is subject to the constraint that in the base year, for each of the 84 different tax and primary spending (i.e. excluding interest payments) programs, the sum of values imputed to each individual across the population equals the aggregate value reported in the general government appropriation account (ISTAT, 2001).

The estimate of $PRO_{i,j,m,k}$, $PRO_{i,j,f,k}$ and $PRO_{i,j,c,k}$ is determined according to:

1. marital status: either single or married, the latter including divorced and unmarried couples;
2. education: graduate or undergraduate;
3. working status: worker or non-worker. In particular, a distinction is drawn between employed, unemployed, retirees with pensions from past working activity, on one hand, and retirees receiving "non-contributory" pensions, non-job-seekers (like housewives), and job-seekers or non-dependant students, on the other;
4. profession: employee or self-employed;
5. number of children: 0, 1, 2, 3+.

In many cases, the legal arrangement is such that transfers benefiting a specific family member (e.g. the spouse or the child) are paid to the head of household (or to a working family member). Similarly, taxes are originated (at least partially) by family members different from those who actually pay the tax due. As a general rule, taxes paid or benefits received have been imputed to the family component causing them, even if he/she differs from the payer/receiver.

Children's values have been calculated on the basis of their mothers' attributes, the only exception being represented by the cases (such as family allowances) in which the fathers' characteristics may be relevant for the transfer/tax attribution to children.

In all cases where the many relevant characteristics cause a fragmentation of the reference population into very small sub-groups[27], due to the sample size, aggregations were made referring to the less relevant characteristics. In these cases a standard value was applied to all sub-group members.

The following sections describe the methodology followed to estimate the most relevant tax-benefit programs (in terms of overall financial effects on the public budget).

Direct taxes and social security contributions

The ISAE static micro-simulation model (Itaxmod) was used for computing direct taxes, social security contributions and monetary benefits by applying current legal arrangements to the 1998 Bank of Italy Survey on Households' Income and Wealth. The survey covers 7,147 families for a total of 20,901 individuals and includes detailed information on the main demographic and professional characteristics of the individuals, as well as their incomes, savings and wealth.

[27] By considering 2 modalities for gender, 2 for the civil status, 2 for education, 3 for the working and professional status and 4 for the number of children, 96 population sub-groups emerge.

As for the imputation criterion, the direct taxation burden and social security contribution ares attributed to taxpayers, an exception being represented by taxes on residence home, which are split between parents and children.

Indirect taxes

Estimates have been derived from ISAE's "Ivamod" micro-simulation model, based on ISTAT (The Italian Institute for Statistics) Survey on Households' Consumption for the year 1997. The ISTAT sample surveys more than 22,000 families (about 64,000 individuals). The variables relevant for the analysis are approx. 500, 300 of which refer to expenditure items. This allows to take account of detailed information on households' consumption and their demographic and social-economic characteristics.

In estimating indirect taxes, all family members of any age or working status have been assumed to give rise to some consumption of goods and are responsible for a share of the indirect taxes paid by the family. A set of the so-called "OECD modified equivalence scales" was used for the purpose. According to this approach, families of different sizes and compositions are transformed into "equivalent individuals". The scale-composing coefficients indicate the larger or smaller amount of expenditure (or income) which is necessary for two households of different size and/or social-economic status to have the same wellbeing, under the simplified hypothesis that disposable income and expenditures on consumption goods determine family welfare.

Letting σ^k be the scale coefficient for the kth family, C^k total consumption and CEQ^k the equivalent consumption,

[1] $$CEQ^k = \frac{C^k}{\sigma^k}.$$

The so-called "OECD modified scale" proves particularly suitable to the present purposes, as it attaches a different weight to individuals according to their age. In particular, it is expressed by

[2] $$\sigma^k = 1 + 0{,}5\left(NAD^k - 1\right) + 0{,}3NC^k,$$

where *NAD* and *NC* denote respectively the number of adults and minors (up to 17 years of age) living in the kth family.

According to the OECD approach, dependants are ascribed the larger consumption share for which they are responsible: their share on total consumption may be computed by comparing the total family expenditure with the expenditure the family should bear to maintain the same level of wellbeing, in the absence of dependants. The estimate is obtained by taking the ratio of the equivalence coefficients σ^k.

Finally, to correctly compute the V.A.T. imputed to each member of the family, some expenditure items have been split into sub-groups, according to the different V.A.T. rates applied, using the official weighting coefficients relevant to the consumer price index.

Social expenditure, education and health

Health care expenditure is further divided into expenditure for hospitals care, drugs and other health services, while education is split into expenditures relative to the schooling system and universities. Both are assumed to depend on age and gender as well as parents' working status and level of education.

Most expenditure values are computed on the basis of administrative data provided by ISTAT and INPS (the National Institute for Social Security).

Non-administrative data sources are used for family allowances (computed through the Itaxmod model), and indemnity allowances covering professional risks (estimated on the basis of the Bank of Italy survey

data). Old age and seniority pension values are derived from an ad-hoc simulation model developed by Cardarelli and Sartor (2000) that allows to take into account the future effects of the pension reforms enacted in the nineties.

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Table 1. **Italian Family Composition**

Childless	**Couples**							**Single**	
	FEMALE	Non graduate			Graduate			MALE	FEMALE
MALE		Non working	Employee	Self employed	Non working	Employee	Self employed		
Non graduate	Non working	0.12	0.09	0.02	0.00	0.01	0.00	0.48	0.83
	Employee	1.67	1.69	0.18	0.04	0.20	0.01	3.44	2.39
	Self employed	0.52	0.40	0.41	0.05	0.07	0.05	1.36	0.45
Graduate	Non working	0.00	0.02	0.00	0.00	0.00	0.00	0.07	0.01
	Employee	0.11	0.13	0.00	0.01	0.35	0.01	0.58	0.63
	Self employed	0.02	0.07	0.05	0.01	0.11	0.01	0.24	0.11

1 Child	**Couples**							**Single**	
	FEMALE	Non graduate			Graduate			MALE	FEMALE
MALE		Non working	Employee	Self employed	Non working	Employee	Self employed		
Non graduate	Non working	0.61	0.25	0.13	0.01	0.02	0.01	0.00	0.72
	Employee	6.88	6.35	0.82	0.18	0.46	0.11	0.00	1.62
	Self employed	2.19	1.29	1.16	0.06	0.15	0.04	0.00	0.30
Graduate	Non working	0.05	0.02	0.00	0.00	0.01	0.00	0.00	0.01
	Employee	0.47	0.56	0.08	0.09	0.65	0.05	0.00	0.32
	Self employed	0.12	0.11	0.05	0.06	0.08	0.08	0.00	0.07

2 Children	**Couples**							**Single**	
	FEMALE	Non graduate			Graduate			MALE	FEMALE
MALE		Non working	Employee	Self employed	Non working	Employee	Self employed		
Non graduate	Non working	1.35	0.50	0.07	0.01	0.00	0.00	0.00	0.87
	Employee	14.75	9.02	1.12	0.13	0.92	0.04	0.00	1.08
	Self employed	4.48	1.73	2.01	0.06	0.31	0.05	0.00	0.20
Graduate	Non working	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01
	Employee	0.74	0.77	0.07	0.18	1.15	0.13	0.00	0.18
	Self employed	0.33	0.20	0.07	0.11	0.22	0.24	0.00	0.01

Table 1 (continued). **Italian Family Composition**

3+ Children	**Couples**							**Single**	
	FEMALE	Non graduate			Graduate			MALE	FEMALE
MALE		Non working	Employee	Self employed	Non working	Employee	Self employed		
Non graduate	Non working	0.69	0.08	0.07	0.00	0.01	0.00	0.00	0.53
	Employee	5.18	1.94	0.17	0.05	0.18	0.01	0.00	0.30
	Self employed	2.09	0.34	0.70	0.01	0.08	0.04	0.00	0.12
Graduate	Non working	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	Employee	0.21	0.19	0.01	0.06	0.26	0.01	0.00	0.06
	Self employed	0.05	0.04	0.04	0.04	0.06	0.04	0.00	0.01

Source: Our elaborations on Istat (1997) data.

Table 2. **Revenues and Expenditure of the Public Sector in Italy**

Revenues	Expenditure
1. Net operating surplus	1. Compensation of employees
2. Direct taxes	Social security
2.1 Taxes on labour	Health
IRPEF on labour income (net of tax	Assistance
allowances)	Education
Tax allowances	School
As spouse	University
As children	Other labor income
2.2 Taxes on real capital	2. Intermediate consumption
2.2.1 Equity and stocks	2.1 Social benefits in kind
Irpef on capital	Health
Irpeg	Hospital care
Tax on dividends	Other health serv.
Tax on net wealth of firms	Drugs
2.2.2 Real estate	Assistance
Irpef on real estate	2.2 Other intermediate consumption
Invim	Social security
ICI on building sites	Health
2.3 Taxes on financial capital	Assistance
Tax on income from financial capital	Education
2.4 ILOR	School
2.5 Vehicle tax on families	University
2.6 Other direct taxes	Other
3. Indirect taxes	3.Revenues from sales of goods and serv.
(net of those paid by public sector)	Litter tax
VAT	4. Contribution to production
IRAP on labour income	5. Social expenditure
IRAP on income from capital	5. 1 Social security
ICI (local tax on real estate)	5.1.1 Retirement pensions
Stamp duties	Old age and seniority
Hydrocarbons oil tax	Employees
Petroleum and gas tax	Self employed
Electric energy	Survival
Tobacco	Employees
Betting, gaming and lottery	Self employed
Concessions	Invalidity
Vehicle tax on families	Employees
Other indirect taxes	Self employed
4. Social contributions	5.1.2 Labor market and family
4.1 Workers	Unemployment and mobility benefit
Employee	Income support for the unemployed
Self employed	Sickness and injuries allowance
4.2 Employers	Maternity allowance
5. Other transfers	Industrial injuries rent
6. International transfers	Severance pay
7. Other current revenues	Family benefits
8. Capital tax	Other
Inheritance tax	5.2 Assistance
Other capital tax	Social pensions
9. Contributions to investment	Disability pensions
10. Other capital revenues	War pensions
	Other
	6. Transfers to non profit institutions
	7. International transfers
	8. Other transfers
	9. Other current expenditure
	10. Investments
	Social security and assistance
	Health
	Housing
	Education
	Other
	11. Contribution to investments
	12. Other capital account transfers
Total Revenues	**Total Primary Expenditure**

Table 3 **Intertemporal fiscal incidence for representative Italian families** (thousand euro and % labor earnings)

	REVENUES					EXPENDITURES								
	Direct taxes		**Indirect taxes**	**Social contrib.**	**Other**	**Health**	**Education**	**Pensions**	**Tax credits**	**Family allowances**	**Unemployment benefits and poverty relief**	**Maternity allowances**	**Other**	**NET TAXES**
Family types	Labor tax	Capital tax												
thousands euro														
Childless	82,0	34,0	108,7	111,0	21,0	-28,0	0,0	-70,5	-3,0	-1,1	-4,0	0,0	-82,6	**167,6**
1 child	82,0	34,2	110,4	111,0	24,6	-32,9	-28,6	-70,8	-3,9	-3,4	-4,0	-1,0	-105,7	**112,0**
2 children	82,0	34,2	118,6	111,0	29,4	-38,2	-59,8	-71,2	-5,3	-6,0	-4,0	-2,0	-130,1	**58,5**
3+ children	82,0	34,2	123,2	111,0	33,5	-43,0	-87,9	-71,5	-6,6	-6,6	-4,0	-3,0	-152,1	**9,3**
Mean	**82,0**	**34,2**	**115,4**	**111,0**	**27,3**	**-35,7**	**-45,3**	**-71,0**	**-4,7**	**-4,6**	**-4,0**	**-1,5**	**-118,6**	**84,4**
% labor earnings														
Childless	16,4	6,8	21,8	22,2	4,2	-5,6	0,0	-14,1	-0,6	-0,2	-0,8	0,0	-16,5	**33,6**
1 child	16,4	6,9	22,1	22,2	4,9	-6,6	-5,7	-14,2	-0,8	-0,7	-0,8	-0,2	-21,2	**22,4**
2 children	16,4	6,9	23,8	22,2	5,9	-7,7	-12,0	-14,3	-1,1	-1,2	-0,8	-0,4	-26,1	**11,7**
3+ children	16,4	6,9	24,7	22,2	6,7	-8,6	-17,6	-14,3	-1,3	-1,3	-0,8	-0,6	-30,5	**1,9**
Mean	**16,4**	**6,8**	**23,1**	**22,2**	**5,5**	**-7,2**	**-9,1**	**-14,2**	**-0,9**	**-0,9**	**-0,8**	**-0,3**	**-23,8**	**16,9**

Table 4 **Family Intertemporal Fiscal Incidence for MFUs with 3+ children (euros)**

	REVENUES					EXPENDITURES									
	DIRECT TAXES		INDIRECT TAXES	SOCIAL CONTRIBUTIONS	OTHER	HEALTH	EDUCATION	PENSIONS	TAX CREDITS	FAMILY ALLOWANCES	UNEMPLOYMENT BENEFITS AND POVERTY RELIEF	MATERNITY ALLOWANCES	OTHER		NET TAXES
Family Types	Labour Tax	Capital Tax													
FNGNWMMNGNWM3	0	20,479	105,392	0	33,683	-45,418	-87,753	-13,074	0	0	-2,572	0	-162,957		-152,221
FNGEMMNGNWM3	47,882	29,364	124,067	81,181	34,364	-45,418	-88,322	-54,008	-7,990	-14,369	-2,237	-7,449	-162,046		-64,981
FNGSEMMNGNWM3	31,533	31,027	124,975	23,731	35,162	-45,418	-88,312	-23,740	-8,462	0	-1,095	0	-158,932		-79,532
FGNWMMNGNWM3	0	20,475	103,279	0	32,888	-37,958	-83,731	-13,405	0	0	-2,572	0	-158,867		-139,890
FGEMMNGNWM3	76,318	32,186	136,823	115,129	33,522	-37,958	-86,406	-54,570	-3,984	-13,771	-2,237	-6,979	-161,729		26,344
FGSEMMNGNWM3	25,014	31,003	124,882	23,731	34,260	-37,958	-83,910	-23,587	-4,008	0	-1,095	0	-154,073		-65,741
FNGNWMMNGEM3	62,484	25,671	115,695	96,897	34,034	-45,418	-87,753	-74,454	-9,698	-11,403	-5,836	0	-158,296		-58,076
FNGEMMNGEM3	110,366	34,557	134,371	178,077	34,715	-45,418	-88,322	-115,387	-4,506	-5,241	-5,502	-7,449	-157,385		62,875
FNGSEMMNGEM3	94,017	36,220	135,278	120,628	35,513	-45,418	-88,312	-85,119	-4,979	-5,026	-4,360	0	-154,271		34,171
FGNWMMNGEM3	62,484	25,668	113,583	96,897	33,239	-37,958	-83,731	-74,784	-9,460	-10,799	-5,836	0	-154,206		-44,904
FGEMMNGEM3	138,803	37,378	147,127	212,026	33,873	-37,958	-86,406	-115,950	-4,270	-5,037	-5,502	-6,979	-157,068		150,037
FGSEMMNGEM3	87,498	36,195	135,186	120,628	34,611	-37,958	-83,910	-84,967	-4,716	-4,740	-4,360	0	-149,412		44,056
FNGNWMMNGSEM3	54,739	48,542	117,002	28,608	34,814	-45,418	-87,753	-30,844	-9,699	0	-1,477	0	-151,028		-42,514
FNGEMMNGSEM3	102,621	57,428	135,678	109,789	35,495	-45,418	-88,322	-71,778	-4,508	-5,755	-1,142	-7,449	-150,117		66,521
FNGSEMMNGSEM3	86,272	59,091	136,585	52,340	36,293	-45,418	-88,312	-41,510	-4,980	0	0	0	-147,003		43,357
FGNWMMNGSEM3	54,739	48,538	114,890	28,608	34,019	-37,958	-83,731	-31,175	-9,462	0	-1,477	0	-146,938		-29,945
FGEMMNGSEM3	131,057	60,249	148,433	143,738	34,653	-37,958	-86,406	-72,340	-4,272	-5,516	-1,142	-6,979	-149,800		153,718
FGSEMMNGSEM3	79,753	59,066	136,493	52,340	35,391	-37,958	-83,910	-41,358	-4,717	0	0	0	-142,145		52,956
FNGNWMMGNWM3	0	20,479	105,392	0	33,683	-38,822	-88,985	-13,074	0	0	-2,572	0	-162,957		-146,857
FNGEMMGNWM3	47,882	29,364	124,067	81,181	34,364	-38,822	-91,827	-54,008	-7,990	-14,369	-2,237	-7,449	-162,046		-61,891
FNGSEMMGNWM3	31,533	31,027	124,975	23,731	35,162	-38,822	-89,174	-23,740	-8,462	0	-1,095	0	-158,932		-73,798
FGNWMMGNWM3	0	20,475	103,279	0	32,888	-37,958	-83,731	-13,405	0	0	-2,572	0	-158,867		-139,890
FGEMMGNWM3	76,318	32,186	136,823	115,129	33,522	-37,958	-86,406	-54,570	-7,754	-13,771	-2,237	-6,979	-161,729		22,574
FGSEMMGNWM3	25,014	31,003	124,882	23,731	34,260	-37,958	-83,910	-23,587	-8,199	0	-1,095	0	-154,073		-69,932
FNGNWMMGEM3	136,967	30,047	127,114	186,161	33,821	-38,822	-88,985	-74,454	-9,698	-13,031	-5,836	0	-166,149		117,136
FNGEMMGEM3	184,848	38,933	145,789	267,342	34,502	-38,822	-91,827	-115,387	-4,506	-6,448	-5,502	-7,449	-165,238		236,234
FNGSEMMGEM3	168,500	40,596	146,697	209,892	35,301	-38,822	-89,174	-85,119	-4,979	-6,715	-4,360	0	-162,124		209,691
FGNWMMGEM3	136,967	30,044	125,001	186,161	33,026	-37,958	-83,731	-74,784	-9,460	-8,856	-5,836	0	-162,059		128,515
FGEMMGEM3	213,285	41,754	158,545	301,290	33,661	-37,958	-86,406	-115,950	-4,270	-5,037	-5,502	-6,979	-164,921		321,513
FGSEMMGEM3	161,981	40,571	146,604	209,892	34,399	-37,958	-83,910	-84,967	-4,716	-4,740	-4,360	0	-157,266		215,532
FNGNWMMGSEM3	97,380	53,831	129,188	52,177	34,780	-38,822	-88,985	-30,844	-9,699	0	-1,477	0	-156,813		40,716
FNGEMMGSEM3	145,261	62,717	147,864	133,358	35,461	-38,822	-91,827	-71,778	-4,508	-9,004	-1,142	-7,449	-155,902		144,227
FNGSEMMGSEM3	128,913	64,355	146,269	75,908	35,430	-37,958	-83,910	-41,279	-4,717	0	0	0	-148,651		134,360
FGNWMMGSEM3	97,380	53,828	127,076	52,177	33,985	-37,958	-83,731	-31,175	-9,462	0	-1,477	0	-152,723		47,920
FGEMMGSEM3	173,698	65,538	160,620	167,306	34,619	-37,958	-86,406	-72,340	-4,272	-7,347	-1,142	-6,979	-155,585		229,753
FGSEMMGSEM3	122,394	64,355	148,679	75,908	35,357	-37,958	-83,910	-41,358	-4,717	0	0	0	-147,930		130,822
FNGNWS3	0	13,364	103,166	0	25,337	-32,876	-87,753	-1,220	0	0	-1,477	0	-119,050		-100,509
FNGES3	63,578	22,404	101,522	91,796	26,150	-32,876	-88,322	-43,789	-4,747	-11,363	-1,192	-7,449	-118,378		-2,665
FNGSES3	18,804	24,087	74,928	17,196	27,105	-32,876	-88,312	-21,102	-4,747	0	0	0	-115,061		-99,978
FGNWS3	0	13,361	99,521	0	24,542	-27,831	-83,731	-1,200	0	0	-1,477	0	-114,960		-91,775
FGES3	92,148	23,391	100,528	122,285	25,339	-27,831	-86,406	-43,777	-4,466	-10,787	-1,192	-6,979	-116,422		65,833
FGSES3	18,804	24,062	73,529	17,196	26,276	-27,831	-83,910	-20,877	-4,466	0	0	0	-110,105		-87,323

Legend: see Table 5.

Table 5 **Marginal Net Subsidy (euros)**

	1° Child			2° Child			3° Child		
Family Type		as a % of Labor Earnings	of which: Indirect Taxes		as a % of Labor Earnings	of which: Indirect Taxes		as a % of Labor Earnings	of which: Indirect Taxes
FNGNWMMNGNWM	-45,937	0.0	6,710	-46,362	0.0	10,682	-47,397	0.0	3,428
FNGEMMNGNWM	-49,984	-17.8	9,770	-57,524	-20.5	8,618	-48,316	-17.2	8,311
FNGSEMMNGNWM	-51,011	-19.8	5,205	-47,134	-18.3	12,765	-44,744	-17.4	8,348
FGNWMMNGNWM	-43,974	0.0	5,924	-41,676	0.0	9,175	-47,173	0.0	3,609
FGEMMNGNWM	-48,306	-13.0	7,048	-49,353	-13.3	9,069	-48,066	-12.9	8,388
FGSEMMNGNWM	-36,860	-12.8	14,368	-32,870	-11.4	18,613	-60,121	-20.8	-8,128
FNGNWMMNGEM	-54,624	-14.8	2,510	-55,598	-15.1	7,750	-50,609	-13.7	2,092
FNGEMMNGEM	-53,807	-8.3	5,570	-57,471	-8.9	5,686	-47,864	-7.4	6,975
FNGSEMMNGEM	-57,048	-9.1	1,005	-52,459	-8.4	9,833	-46,385	-7.4	7,011
FGNWMMNGEM	-52,391	-14.2	1,724	-50,245	-13.6	6,242	-50,480	-13.7	2,272
FGEMMNGEM	-53,438	-7.2	2,847	-50,830	-6.9	6,136	-48,939	-6.6	7,051
FGSEMMNGEM	-44,016	-6.7	10,168	-39,680	-6.0	15,681	-63,062	-9.6	-9,464
FNGNWMMNGSEM	-59,896	-12.6	-5,968	-49,537	-10.4	8,936	-51,890	-10.9	350
FNGEMMNGSEM	-62,952	-8.3	-2,908	-56,684	-7.5	6,872	-49,437	-6.5	5,233
FNGSEMMNGSEM	-64,208	-8.8	-7,473	-48,977	-6.7	11,019	-47,866	-6.5	5,269
FGNWMMNGSEM	-57,857	-12.2	-6,754	-44,698	-9.4	7,429	-51,658	-10.9	530
FGEMMNGSEM	-62,565	-7.4	-5,631	-50,005	-5.9	7,323	-50,532	-6.0	5,309
FGSEMMNGSEM	-51,267	-6.7	1,690	-36,439	-4.8	16,867	-64,496	-8.4	-11,206
FNGNWMMGNWM	-46,177	0.0	6,710	-46,624	0.0	10,682	-47,630	0.0	3,428
FNGEMMGNWM	-50,964	-18.1	9,770	-58,599	-20.9	8,618	-49,271	-17.5	8,311
FNGSEMMGNWM	-51,130	-19.8	5,205	-47,265	-18.3	12,765	-44,860	-17.4	8,348
FGNWMMGNWM	-43,974	0.0	5,924	-41,676	0.0	9,175	-47,173	0.0	3,609
FGEMMGNWM	-49,465	-13.3	7,048	-50,554	-13.6	9,069	-49,476	-13.3	8,388
FGSEMMGNWM	-38,070	-13.2	14,368	-34,597	-12.0	18,613	-61,375	-21.2	-8,128
FNGNWMMGEM	-61,522	-11.0	-4,274	-56,051	-10.1	7,550	-57,981	-10.4	-1,444
FNGEMMGEM	-61,550	-7.3	-1,214	-58,768	-7.0	5,486	-53,688	-6.4	3,439
FNGSEMMGEM	-63,930	-7.8	-5,778	-52,812	-6.5	9,633	-51,853	-6.4	3,475
FGNWMMGEM	-59,050	-10.6	-5,059	-50,436	-9.0	6,043	-54,048	-9.7	-1,263
FGEMMGEM	-60,201	-6.5	-3,936	-51,053	-5.5	5,937	-52,602	-5.7	3,515
FGSEMMGEM	-50,779	-6.0	3,385	-39,903	-4.7	15,481	-66,725	-7.9	-13,000
FNGNWMMGSEM	-47,969	-5.5	6,024	-58,957	-6.7	-185	-49,058	-5.6	3,371
FNGEMMGSEM	-49,696	-4.3	9,085	-67,008	-5.8	-2,250	-48,851	-4.2	8,254
FNGSEMMGSEM	-49,953	-4.4	3,599	-53,220	-4.7	157	-44,765	-3.9	8,449
FGNWMMGSEM	-45,690	-5.2	5,239	-53,855	-6.1	-1,693	-48,594	-5.5	3,552
FGEMMGSEM	-48,330	-3.9	6,362	-59,254	-4.7	-1,799	-47,573	-3.8	8,331
FGSEMMGSEM	-39,100	-3.3	13,683	-45,597	-3.9	7,746	-61,432	-5.3	-8,185
FNGNWS	-37,673	0.0	15,000	-37,787	0.0	19,019	-33,978	0.0	16,635
FNGES	-59,490	-21.1	2,782	-51,251	-18.2	13,330	-46,529	-16.5	10,978
FNGSES	-66,954	-32.2	-10,583	-52,376	-25.2	7,270	-49,465	-23.8	3,791
FGNWS	-35,646	0.0	14,338	-33,992	0.0	16,636	-34,427	0.0	16,414
FGES	-57,471	-17.5	1,951	-46,639	-14.2	11,602	-49,961	-15.3	8,461
FGSES	-63,279	-30.4	-10,631	-46,820	-22.5	6,188	-49,431	-23.8	3,932

Legend for Tables 4 and 5:

In the following order:

Gender: M=Male, F=Female

Education: NG =Non Graduate; G=Graduate

Occupation: NW=Non Working, E=Employee, SE= Self-Employed

Marital Status: S=Single, M=Married

E.g. FNGNWMMGEM1 = Female Non Graduate Non Working Married Men Graduate Employee with 1 child

Table 6. **Public Programs for Families with Children - Annual Values** (euros)

Age	Health	Education		Tax credit	Family Allowances	Maternity Allowances	Total
		School	University		(1)	(2)	
0	-1,412	0	0	-214	-308	-376	-2,310
5	-636	-4,482	0	-165	-307	0	-5,590
10	-377	-6,295	0	-148	-247	0	-7,066
15	-425	-5,496	0	-153	-206	0	-6,281
20	-596	-1,891	-2,276	-160	-119	0	-5,042
25	-834	-56	-930	-167	-67	0	-2,052

(1) When the share of wages on family income exceeds 70 per cent.

(2) For employed women only.

Table 7 **Private costs and collective benefits from an additional child** (,000 euros*)

Type A couple: no private benefits from parenthood

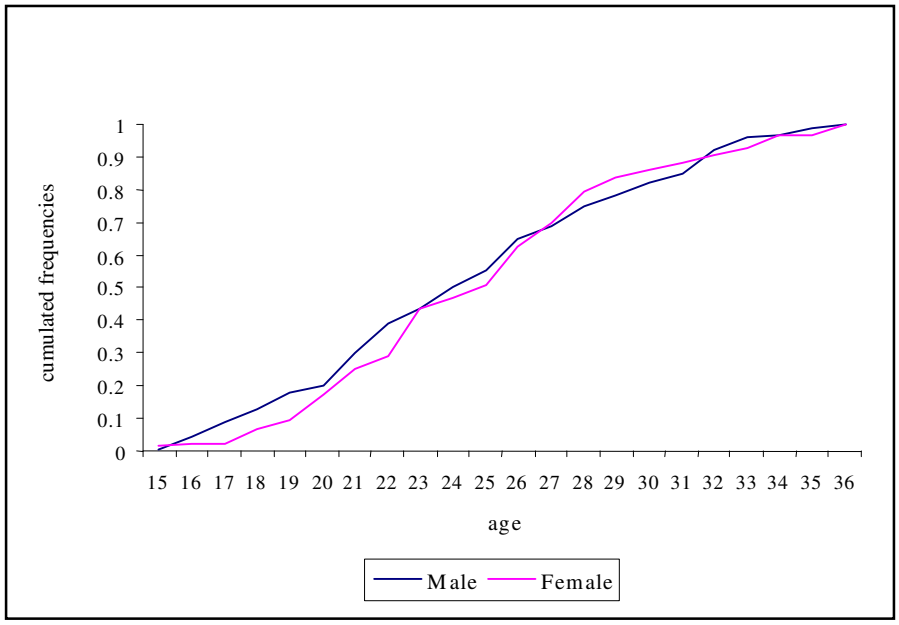
		Remaining couples	
		No	Yes
One couple	No	0.0	6.6
	Yes	-13.2	-6.6

Type B couple: private benefits from parenthood equal to private costs

		Remaining couples	
		No	Yes
One couple	No	0.0	6.6
	Yes	1.0	7.6

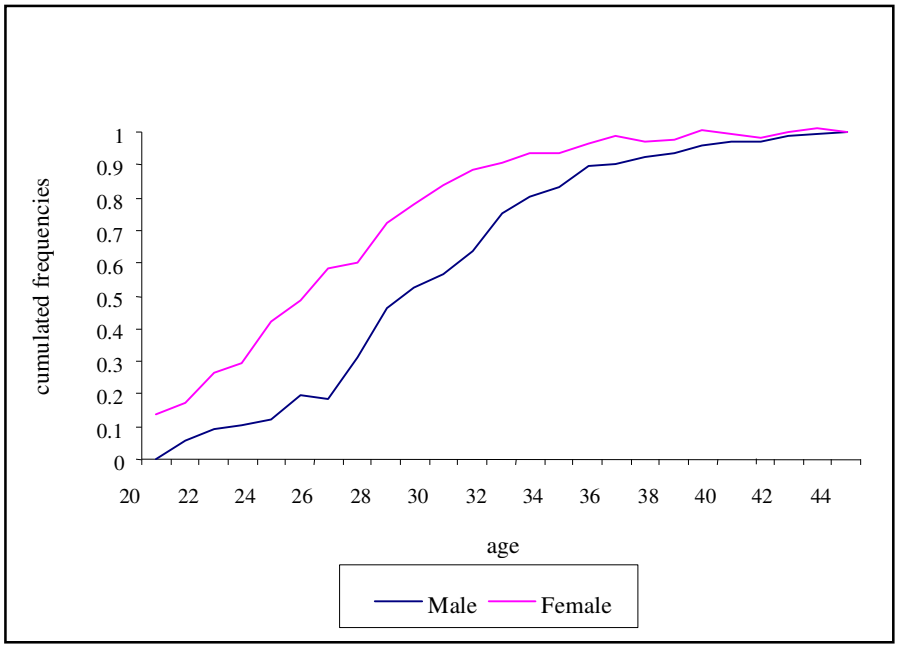
* Private costs refer to years 0-18 of child life.
Collective benefits arise from a reduction of the NPV of lifetime taxes (3 percent real discount rate).
A minus sign implies a net burden.

Figure 1. **Family Formation** (Financial Independence)



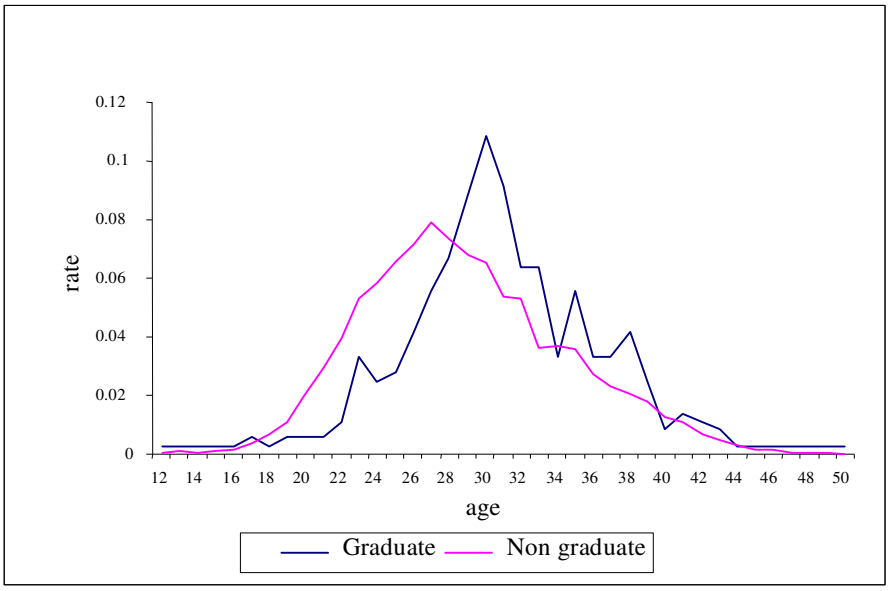
Source: Our elaborations on ISTAT (1997) data.

Figure 2. **Marriage**



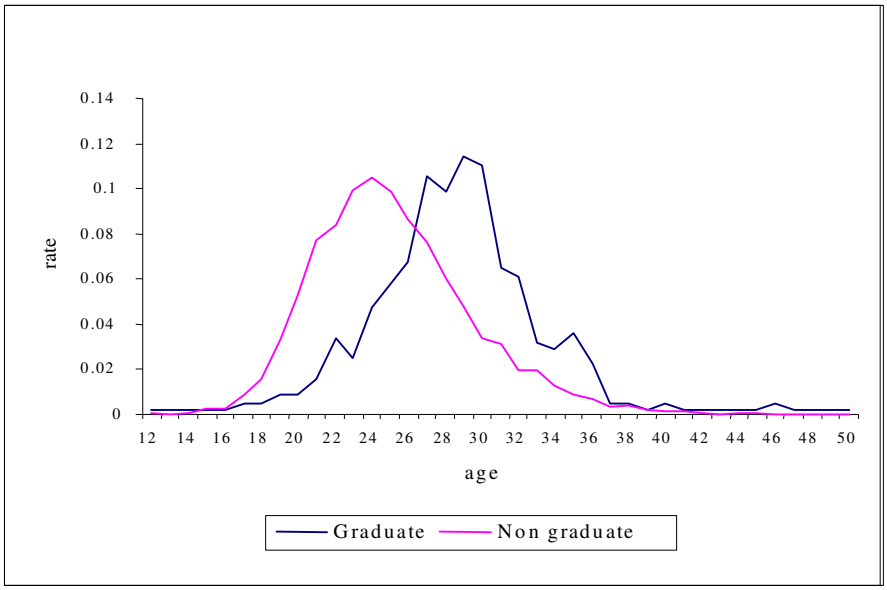
Source: Our elaborations on ISTAT (1997) data.

Figure 3a. **Fertility Rate – One Child**



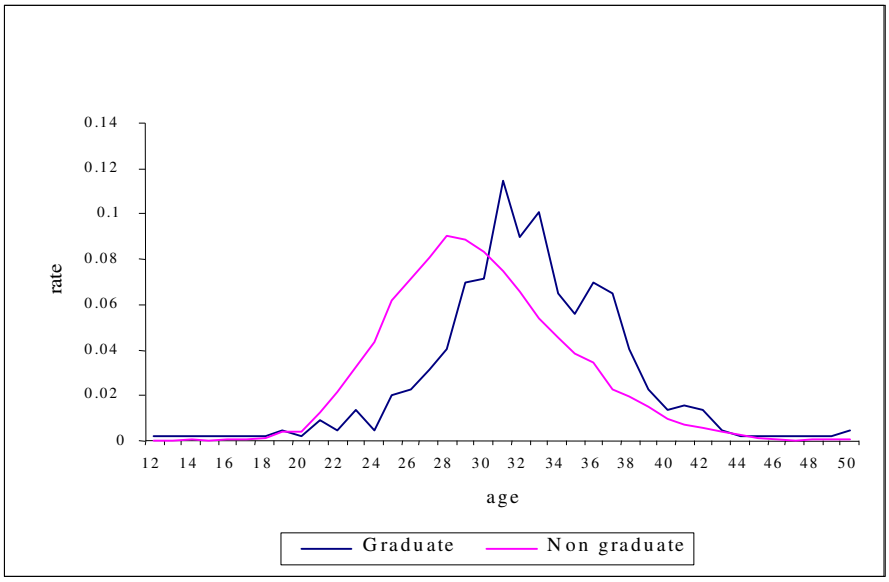
Source: Our elaborations on Istat (1997) data.

Figure 3b. **Fertility Rate – Two Children** (first child)



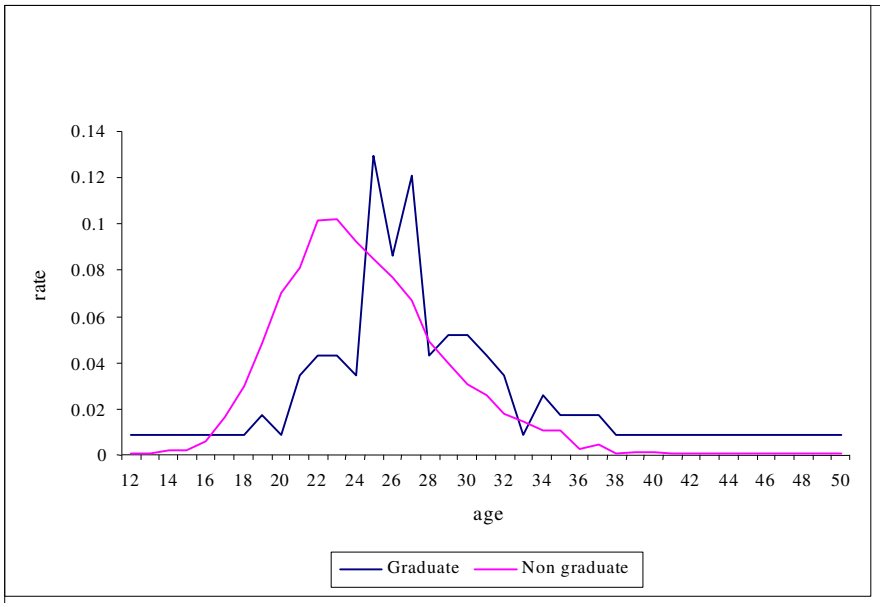
Source: Our elaborations on Istat (1997) data.

Figure 3c. **Fertility Rate – Two Children** (second child)



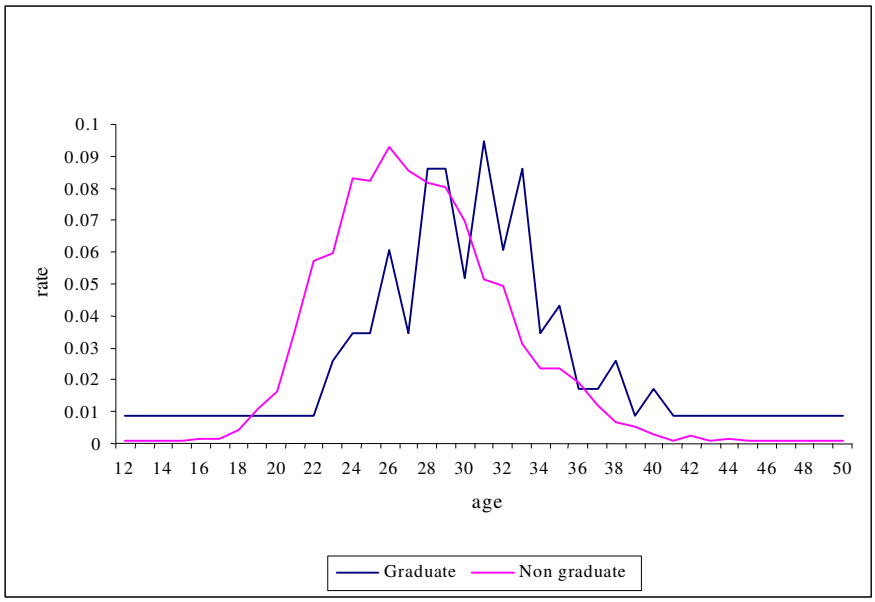
Source: Our elaborations on Istat (1997) data.

Figure 3d. **Fertility Rate – Three Children** (first child)



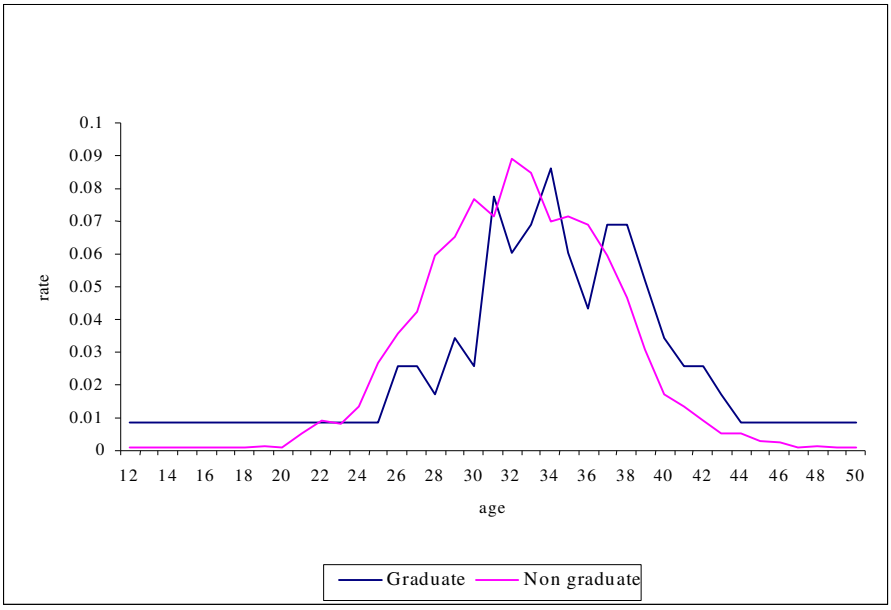
Source: Our elaborations on Istat (1997) data.

Figure 3e. **Fertility Rate – Three Children** (second child)



Source: Our elaborations on Istat (1997) data.

Figure 3f. **Fertility Rate – Three Children** (third child)



Source: Our elaborations on Istat (1997) data.

Figure 4. **Marginal Net Subsidy**

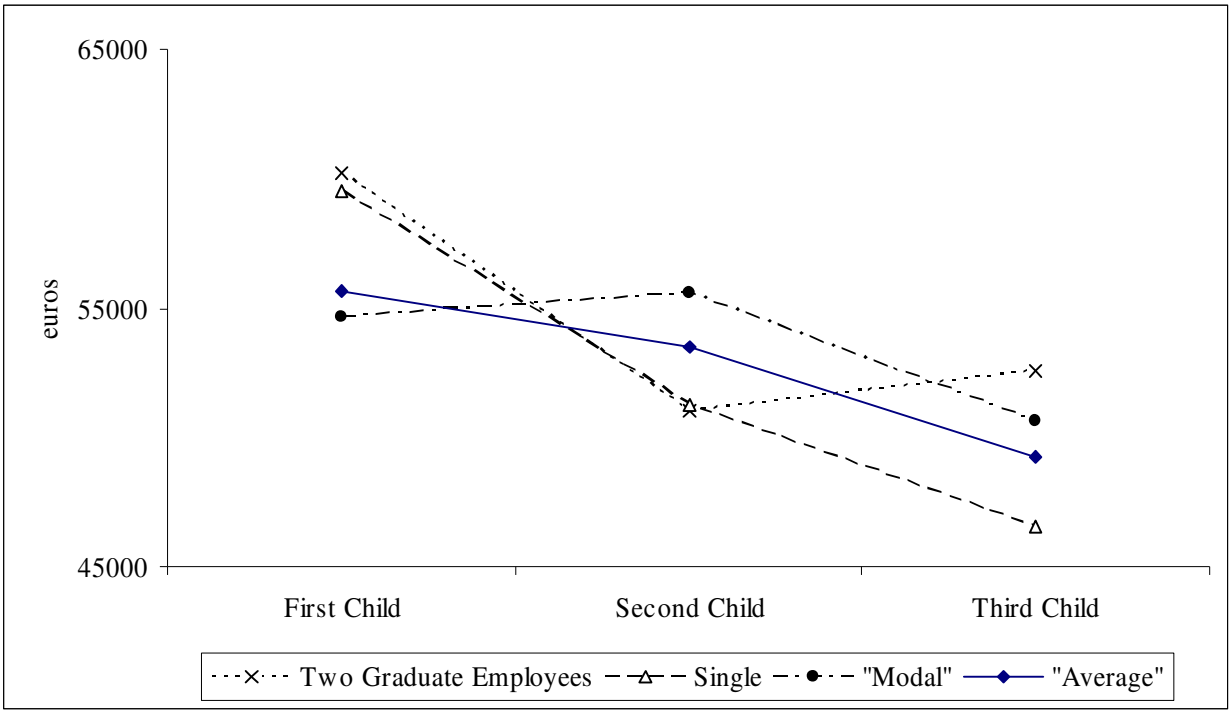


Figure 5a **Age Profile of the Marginal Net Subsidy (absolute values)**

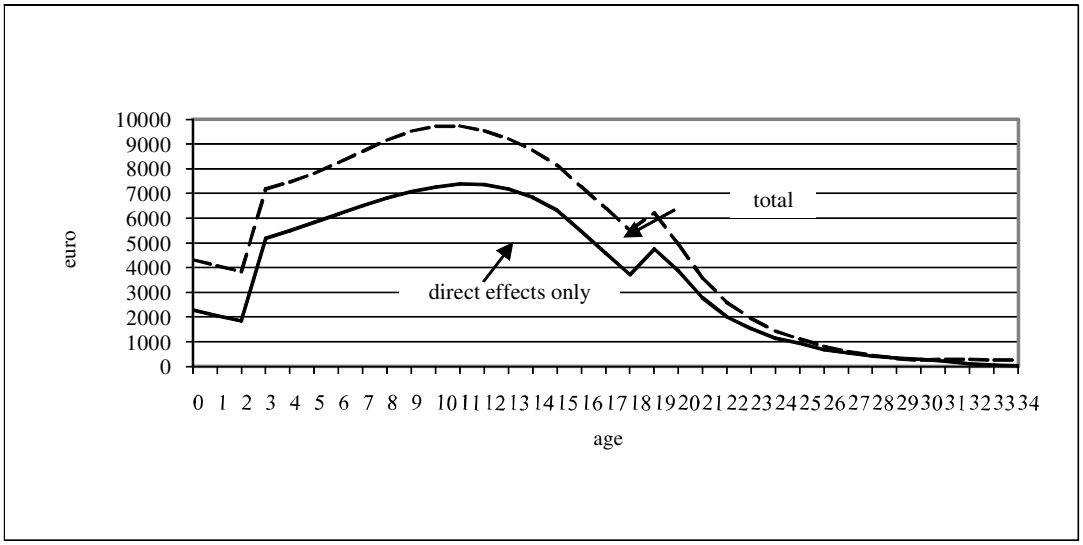


Figure 5b **Age Profile of the Marginal Net Subsidy (% labor earnings)**