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Extended Income and Inequality by Gender in Italy

by

Tindara Addabbo*
Antonella Caiumi**

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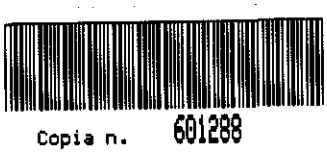


Università degli Studi di Modena e Reggio Emilia
Dipartimento di Economia Politica
Via Berengario, 51
41100 Modena (Italia)
* e-mail:addabbo@unimo.it
** e-mail:caiumi@unimo.it

EXTENDED INCOME AND INEQUALITY BY GENDER IN ITALY[1]

di T. Addabbo e A. Caiumi

Abstract

This paper focuses on time use and distribution of resources including household production across and within Italian households. Household money income is extended to include unpaid household production time evaluated by using different methods: the opportunity cost and the service price method. The research investigates inequality in the distribution of income (money income and extended income) by different household types (double earners and one earner). Equivalent household money and extended incomes have been adjusted by equivalence scales that are consistent with the definition of income used. In particular, we estimate equivalence scales non-parametrically on extended and non-extended consumption in order to account for the presence of different needs amongst household members and economies of scale that take place within the household in relation to the consumption of market and non market goods. Intra-family welfare distribution has also been analysed based on estimation of individual preferences on consumption and time use including the unpaid kind. Since detailed information on household income, consumption and time use are not available on a single data base, we match the Bank of Italy Survey on Household Income and Wealth, ISTAT time budget survey and ISTAT consumption survey.

[1] This is a slightly modified version of a paper presented at the 25th General Conference of The International Association for Research in Income and Wealth, Cambridge, England 23-29 August 1998. We wish to thank Antonella Picchio for her supervision and precious stimulus to our research. We are also grateful to Stephen Jenkins and Joachim Merz for their comments. Financial assistence from CNEL is gratefully acknowledged.

Introduction

The valuation of productive activities that take place within the household without undergoing monetary transaction has received increasing attention in recent years both in relation to measurement issues and theoretical implications of its inclusion in the macroeconomic framework.

Measured in hours of work the magnitude of unrecorded economic activity is, in fourteen industrialized countries, as large as the recorded activity (Goldschmidt-Clermont and Pagnossin-Aligisakis 1996). In other words, neglecting the non-monetary sector means not to account for about one half of human labour. Because of this enormous gap, social national accounting data (SNA) provide distorted figures of the amount of resources available to the households or countries to achieve their standard of living.

If non-market work is included in SNA activities as required by the state commitments taken at international level in the '*Beijing Platform*' signed by all the members countries of the United Nations, the monetary value of home production has to be compatible with measurements of SNA activities. Since there is no market, no market price for goods and services produced or transformed within the household is determined and no salaries are paid. Any estimation of the monetary value of home production has to be computed indirectly. However, there is no international agreement about the valuation method and the outcome can vary considerably with the method used.

The problem of the visibility of domestic work has important implications other than simply broadening the definition of income, in particular on how wages are determined. It is evident that in the absence of household production, money income ought to be increased in order to guarantee the achievement of the same level of welfare provided by the consumption of market and non-market goods.[2] It follows that the inclusion of household production in the analysis on distribution of economic resources could have important implications in terms of redistributive economic policy,

[2] "*Domestic work is hidden because it sustains other types of work, formal and informal, waged and unwaged. The difficulties of measurement are partly related to the problem of placing this work and the whole process of the reproduction of people within the analytical framework of basic economic processes, and within the scheme of the social relationships that link different kinds of work, social subjects and economic processes*" (Picchio 1996, p. 90).

especially in the light of the deep changes recorded in the structure of the family in the last decades.

Since the distribution of household production between groups of the population is likely to vary considerably compared to the distribution of income in relation to gender, household types and composition, age, labour condition, education and local context, it is important to provide a broader valuation of the economic welfare, accounting for extended income.

This paper focuses on time use and aims at evaluating ***extended standard of living*** and inequality by different one-family households, one earners and double earners. To our knowledge this research is the first one on these issues based on Italian data and aims at overcoming some limitations of other studies carried out in other countries. The evaluation of standard of living requires to move from the household unit to the individual. Per capita income provides an inaccurate measurement of well-being between households of different composition. The accepted specification of income in the analysis of well-being is equivalent income (household income divided by the household equivalent scales), a measure which can be interpretated as a real value to the individual of consumption services, to which each household member has access taking into account household economies of scale and different needs. When the definition of income include non monetary components, the adjustment of household extended income (to control for different household composition) with the same equivalence scales usually applied to monetary income can not be accurate (Radner 1997). The possibility that appropriate equivalence scales differ by income definition has not yet been explored (Bonke 1992; Jenkins and O'Leary 1996). In this paper, we provide estimates of equivalence scales that are consistent with the definition of income used. In particular, we apply a non-parametric regression method to estimate equivalence scales on extended and non extended consumption in order to account for the presence of different needs between household members and economies of scale that take place within the household in relation to the consumption of market and non market goods[3].

On the other hand, the assumption underlying the adjustment of income by equivalence scales is that resources are shared within the household according to needs. Evidence on intra-household

[3] Household activities contribute to household consumption by combining market goods and household time into commodities.

inequality shows that patterns of inequality revealed by household level data are somewhat different to those revealed by individual level data (Haddad and Kanbur 1990; Apps and Savage 1989; Thomas 1990). One method of estimating the extent of inequality within the household is based on labour supply data. Chiappori (1992) argues that by observing how leisure is shared between each spouse, it is possible to infer (up to some constant) how resources are shared between spouses and how the household's '*sharing rule*' changes in response to changes in income or prices. Since time spent outside the labour market is not just pure leisure, because it is often spent in household production and domestic work is usually unequally distributed by gender, accounting for household production allows one to avoid misleading results concerning the intra-household resource allocation (Apps and Rees 1996). The model proposed by Apps and Rees has been applied in this study in order to provide some measures of gender inequality in the use of resources.

Since detailed information on household income, consumption and time use are not available on a single data base, we have matched the Bank of Italy Survey on Household Income and Wealth, ISTAT time budget survey and ISTAT consumption survey. Unpaid work is imputed by using different equations to take into account the differences in unpaid work behaviour by gender and by day of the week (Section 1). We use different methods of time evaluation: the opportunity cost method and the service price method (Section 2) to evaluate household production. The impact of the inclusion of household production on the distribution of resouces is assessed in Section 3. Both money and extended income distributions have been analysed for different household types (one-earner, double-earner, with or without children) and according to head of the family's education level. Inequality measures by gender in earnings and in the use of resources are discussed in Section 4. Estimation results on non-parametric equivalence scales are presented in Appendix C.

1. Unpaid work by gender

Unpaid work data in Italy are provided by the 1989 ISTAT time budget survey (TBS) on a daily basis

for each household member, and on a weekly average basis by the ISTAT household survey (this information are only available for respondents).

ISTAT Time Budget Survey (TBS) was conducted in 1989 on a sample of 19,728 families. Time use for weekly and week-end days are available for each individual older than 3 in the family.[4] However the survey does not follow the same person across different days of the week. Therefore we have to estimate weekly unpaid work by using information on time budget by different days of the week.

In order to analyse the allocation of time by gender we have restricted our analysis to couples (married or unmarried) with both partners aged from 18 to 64, in families with or without children aged less than 25, excluding families with other relatives and adult components. This selection provides us a sample of 4,297 families for TBS (descriptive statistics can be found in Appendix A, Tab. A.1).

We have estimated different equations for unpaid work by gender and by day of the week by using TBS data.[5]The reference category are individuals employed full-time in the manufacturing sector, whose families live in the Centre of Italy. *Unpaid work* consists of hours spent during each day in housework, care of family, shopping and house administration. We have regressed the logarithm of total daily unpaid work on a set of variables accounting for the household composition (number of children in different age groups), individual and partner's characteristics (age, education, employment condition) and area where the family lives. Unpaid work behaviour according to the variables introduced in the models changes according to gender and day of the week. *Education* decreases women's unpaid work regardless of the day of the week whereas it increases men's unpaid work on Saturdays. Living in the *South* of Italy increases women's unpaid work during weekdays and on Sundays and decreases men's unpaid work regardless of the day of the week. Being *not in the labour force* increases unpaid work regardless of gender and of day of the week. If the partner is out of the

[4] Capellari (1996) and Palomba and Sabbadini (1994) provide a wider description of this time budget survey and of the unpaid work distribution.
[5] The estimated equations can be found in Appendix B.

labour force one's unpaid work is lower (apart from women's unpaid work on Sundays). Working *part-time* increases unpaid work both for men and for women.[6] But if the partner works part-time, women's unpaid work increases and men's unpaid work decreases. Women employed in *agriculture* perform more unpaid work all over the week, whereas if they work in the *Service sector* their unpaid work is higher during weekdays and lower on Saturdays. The effect of *children* on unpaid work differs by children's age group. The number of children aged less than 3 increases both partners' unpaid work during every day of the week. The effect of children aged from 3 to 5 on their mothers' unpaid work is significant only during the week-end. This is consistent with the system of schooling in Italy: it is easier to get childcare services full-time for children aged from 3 to 5 than for children younger than 3.[7] For children older than 5 school is often supplied part-time whereas working hours are usually full-time. Unpaid work for mothers increases when children are aged from 6 to 17 during weekdays and on Saturdays; whereas men's unpaid work decreases during the week with the number of children in this age group.

We have used different unpaid work equations by gender given the differences in the impact of the explanatory variables on men's and women's unpaid work.

In order to evaluate welfare and time use across Italian families, we had to match TBS data with the Bank of Italy Survey on Household Income and Wealth (SHIW). The latter together with detailed information on income contains information on household structure.[8] Tab.1 below shows the uneven distribution of work inside two different households' types: double earners and one-earner families. Consistently with what is found by other analyses based on time budget survey data,[9] we find that the total working time for women is higher than for men. As we can see, women's total working time is higher for both household types (ranging from 67 hours a week in double earner

[6] We have preferred to introduce amongst the explanatory variables the type of work (part-time) rather then the number of working hours in the market taking into account the estimation problems highlighted by Jenkins and O'Leary (1995)
[7] These results are also consistent with the analysis on married couples labour supply in Italy (Addabbo, 1997).
[8] Refer to Brandolini and Cannari (1995) for a more detailed description of SHIW.
[9] This result is consistent with the descriptive analysis by Sabbadini & Palomba (1994) carried out on the Italian TBS. Similar evidence has been provided by Bruyn -Hundt (1996) on Dutch data and by Hersch & Stratton (1994) on US data. For a survey on unpaid work by gender across countries refer to Bruyn-Hundt (1996) and to

families to 55 hours a week in one-earner families). Men's unpaid work seems to be invariant to household type: 6 to 7 hours a week on average; unpaid work for employed women is lower (33 hours a week) than for women who are not employed (55 hours a week).

Tab. 1 – Allocation of time by gender and household types

Double Earners (obs 1008)	**Mean**	**Std Dev**	**Minimum**	**Maximum**
men's market working time	41.86	8.94	18	70
women's market working time	34.43	9.96	12	70
men's unpaid working time	6.81	1.58	3.23	13.09
women's unpaid working time	32.66	7.19	18.82	69.49
men's total working time	48.66	8.85	22.68	78.28
women's total working time	67.08	8.85	38.07	107.40
One earner (obs 1005)				
men's market working time	43.24	8.69	12	70
women's market working time	0	0	0	0
men's unpaid working time	5.95	1.46	3.10	11.79
women's unpaid working time	54.84	7.84	34.24	92.72
men's total working time	49.19	8.59	16.16	79.43
women's total working time	54.84	7.84	34.24	92.72

***Source**: Our computations on SHIW 1995 data*

2. Evaluating Time use

We now turn to the issue of time evaluation in order to assess its impact on household welfare and on inequality. Two different methods have been proposed in the literature to evaluate unpaid work:

1. the *opportunity cost method*: according to this method the individual chooses how to allocate her time taking into account the marginal net wage that she would receive in paid work. This method has been criticized on the ground that an individual's marginal net wage in paid work may differ from an individual's marginal productivity in unpaid work (Gronau, 1986). Moreover, given the higher specialization in paid work, average productivity in paid work should be higher than

UNDP (1995).

average productivity of unpaid work (Bruyn-Hundt, 1996). Another problem connected with this method of evaluation is how to evaluate unpaid work for unemployed people or people who are out of the labour force whose market wage is unknown.

2. the *service price method*: according to this method one should evaluate unpaid work at its market price. One can use a single market price referred to a general housekeeper (replacement cost) or one can distinguish different types of unpaid work and evaluate each one to the corresponding price of market specialists (service cost).[10] However the latter measure could overestimate unpaid work given the higher productivity of market trained workers, and on the other hand it could be difficult to disaggregate unpaid work in all its different components.

We use both methods of time evaluation and assess the sensitiveness of welfare inequality to different methods of time evaluation. Following the replacement cost method we evaluate unpaid work at the mean bargained wage for a general housekeeper in 1995. We do not distinguish amongst the different types and costs of the unpaid work provided.

Turning to the opportunity cost method of evaluating unpaid work, owing to our sample composition we have to solve the problem of defining a wage for those people who are out of the labour force or unemployed. The opportunity cost is given by:

- the wage that the employed individual earns (SHIW provides this information while ISTAT consumption survey does not provide detailed information on current labour income)
- or the reservation wage.

The latter has been estimated by using Heckman's selection model (Tab. B.2.2 in Appendix B). The right hand side variables that we have included are justified in terms of human capital theory and we have also introduced regional dummies, to take into account the effect of the labour market situation on wages.[11]

[10] Chadeau (1985) and Murphy (1982).

[11] As far as past work experience is concerned we could use different measures:

- a proxy of total work experience obtained by subtracting from individual's current age, the age when he started working. However, this first measure of past work experience can overestimate past work experience for those individuals with discontinuous workprofiles;

The wage equations reported in Appendix B are the result of a wider set of regressions that we have run. The return of education is 8% for women, age has no significant effect on women's wage. Past work experience increases women's wage by 6%. Wages are sensibly lower for women living in the South West (16% less with respect to those living in the North), in the South East (10%) and living in the Centre of Italy (-11%). Heckman's selection term has the positive and significant effect on wages meaning that women who are more likely to work are also more likely to earn higher wages. The return of education is 7% for men and wages increase non linearly with age for men. Wages increase by 8% for each year of past work experience. Wages decrease by 15% if men live in the South and by 4% if they live in the Centre of Italy.

Since the ISTAT Survey on Household Consumption does not contain information on individual wages, we have estimated wages by using the Bank of Italy's Survey of Household Income and Wealth (SHIW). Together with information on income and consumption of the family and its demographic structure, SHIW also collects data on hours of work and occupational status, which allow us to estimate wages by using a set of explanatory variables also available on ISTAT data.

Wage equations have been estimated separately for men and women by using Heckman sample selection model. The return of education in terms of wages is 5% both for women and for men. Age has the expected non-linear effect on wages (though it is significant only for men). Living in the South or in the Centre of Italy significantly reduces women's wages (respectively by 17% and by 10%) and men's wages (men's waged decrease by 21% if they live in the South and by 6% if they live in the Centre of Italy). Being employed in a managerial position increases women's wage less than men's wages (the latter increase by 25% if men are in a managerial position while the former increase 12%). On the other hand white collar wages increase by 18% if women and by 10% if men. Being self-employed or entrepreneur significantly reduces wages (however this may be correlated to

- months of social security contributions paid by workers during their working life. This measure underestimates past work experience in those jobs which are not covered by social contributions. However, since this measure is less exposed than the former to the risk of overestimation of past work experience for interrupted work profile, we have preferred to use it in the wage equations;
- individual's experience in current job. We have not used this measure since we need a measure of wage for

the higher probability of fiscal evasion). Women employed in the Construction sector have lower wages than women employed in other manufacturing sectors. Women and men employed in the Public sector have higher wages than women employed in manufacturing. Men's wages are higher if they are employed in Transport, Credit and Public sector and are lower if they are employed in Building, Trading and Agriculture.The Heckman's correction term is positive but not significant for women's wage equation, while it is significant for men's wages.

3. Distribution of resources including household production

In this Section we present the results of the extension of income to include unpaid work evaluated by following the methods described in the Section above. Household's extended income (*yex*) is defined as the sum of money income plus the evaluation of unpaid work time for each member of the household:

$$yex = y + \gamma_w (UNP2) + \gamma_h (UNP1)$$

y = household net money income,

UNP1= men's unpaid working time,

UNP2= women's unpaid working time,

γ_w = evaluation of wife's unpaid work,

γ_h = evaluation of husband's unpaid work.

This extended income definition has been used amongst others by Bonke (1992), Bryant and Zick (1985) and by Jenkins and O'Leary (1996). In Tab. 2 are presented the descriptive statistics on money and extended income distributions at the level of household, per capita and adult equivalent. Equivalent income corresponds to the adjusted income obtained by using for each definition of income (money and extended) the appropriate estimates of equivalence scales. The cost of children

people who are not working in 1995.

index applied to money (extended) income is 0.22 (0.30) for a baby less than 2 years old, 0.30 (0.20) for a child between 3 and 5 years old, 0.20 (0.18) for a child in the age class 6-17, and 0.34 (0.30) for a dependent adult less than 24 (refer to Appendix C for estimation results).

Tab. 2 - Descriptive Statistics on Money and Extended Income

	Median	Mean	St.Dev.
household money income	3485.917	4027.921	2373.027
extended household income (o.c.)	5301.472	6070.504	2913.722
extended household income (s.p.)	4915.19	5470.094	2194.293
percapita money income	1040.861	1273.618	900.1993
percapita extended income (o.c.)	1617.759	1898.097	1103.97
percapita extended income (s.p.)	1471.834	1713.083	904.9367
equivalent money income	1491.214	1719.914	1043.114
equivalent extended income (o.c.)	2310.201	2617.939	1276.056
equivalent extended income (s.p.)	2121.673	2359.977	982.1832

Note: a) sample: number of observations 2013 (only couples);
b) o.c. = opportunity cost method; s.p.=service price method.
Source:Our elaborations on SHIW data

The average extended income of married couples is around 6,000 thousand lire when evaluated by using the opportunity cost principle and 5,470 thousand lire when evaluated by using the service price principle, whereas average money income is 4,000 thousand lire.

The evaluation of standard of living requires moving from the household unit to the individual one. A measure of the extent of household economies, reflecting efficiency and needs effects, can be obtained by comparing per capita and equivalent density distributions of income by different definitions (fig. 1). The increase observed in the median of the latter to the former is above 40% with non significant difference between different definitions of income, suggesting that household economies do not differ significantly by consumption definitions.

Measured by the equivalent income approach, the extended standard of living increases considerably for one-family households ranging from 42% to 55% according to the evaluation method used for domestic work. Note that the distribution of extended income is more concentrated around

the median when household production is evaluated by using the service price method rather than the opportunity cost method. This has obvious implications in relation to the inequality measures on extended income.

Next we analyse how inequality changes with the inclusion of household production in the definition of income for the whole sample and for significant groups of households.

By using different indicators of income inequality (Gini, Theil and Log of variance), we find that extended income is characterized by a lower inequality than money income and that extended income valued at opportunity cost (*o.c.*) is characterized by higher inequality than extended income valued at service price (*s.p.*) (Tab. 3). This result holds for different types of families: one earner, double earner, childless or with children and for different levels of education of head of the family. The reduction in income inequality is higher in one-earner households than in double earner households. Income distributions for childless households and for households with children are similar, probably due to a similar distribution, inside these groups of families, of one-earner and double-earner households. In general, inequality in the distribution of resources is shortened when we use equivalent income instead of per capita income as a measure of welfare.

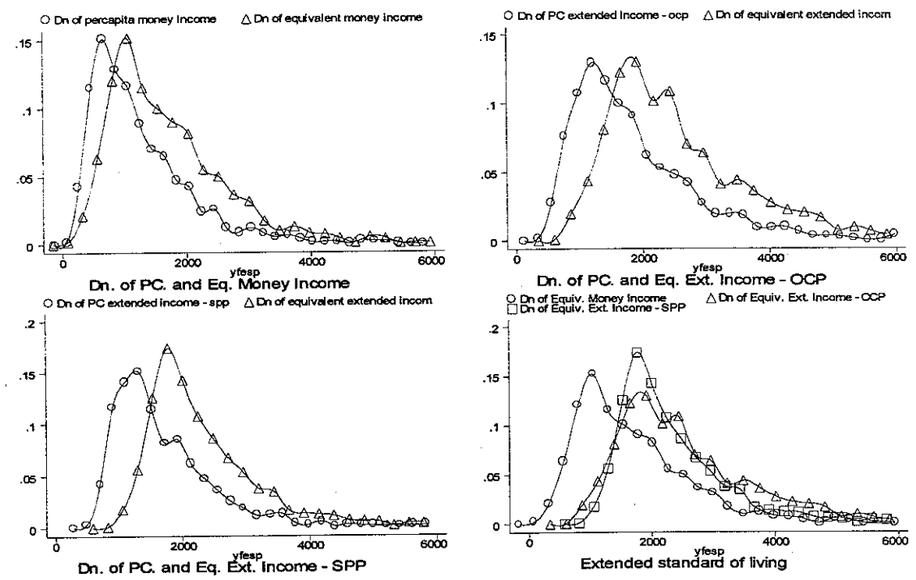


Fig.1 - Extended standard of living

Tab. 3 – Income inequality by household types

	Whole Sample		
	Gini	**Theil**	**Log Var**
household money income	0.2995504	0.149334	0.328618
extended household income (o.c.)	0.2449502	0.099850	0.182796
extended household income (s.p.)	0.1979569	0.068381	0.116612
percapita money income	0.2695412	0.121046	0.226737
equivalent money income	0.307079	0.157047	0.346163
percapita extended income (o.c.)	0.2908467	0.141473	0.264306
equivalent extended income (o.c.)	0.249193	0.103	0.190165
percapita extended income (s.p.)	0.2577793	0.114061	0.196582
equivalent extended income (s.p.)	0.2043198	0.072843	0.123184

	Double Earners			One Earners		
	Gini	**Theil**	**Log Var**	**Gini**	**Theil**	**Log Var**
household money income	0.2291232	0.090098	0.172358	0.275125	0.142149	0.2856548
extended household income (o.c.)	0.2159419	0.077390	0.150297	0.201636	0.076581	0.1244466
extended household income (s.p.)	0.1842279	0.058801	0.104511	0.163564	0.053794	0.083314
percapita money income	0.271915	0.126946	0.236904	0.327504	0.201193	0.373297
equivalent money income	0.2308181	0.092042	0.175487	0.282319	0.150581	0.2963238
percapita extended income (o.c.)	0.2475625	0.103126	0.193847	0.263749	0.126174	0.2047098
equivalent extended income (o.c.)	0.2124775	0.07532	0.145475	0.207741	0.081288	0.1304934
percapita extended income (s.p.)	0.2332022	0.093167	0.164093	0.232145	0.100483	0.1549035
equivalent extended income (s.p.)	0.1848214	0.059861	0.104866	0.168048	0.057549	0.0864056
obs	1008			1005		

	No children			With Children		
	Gini	**Theil**	**Log Var**	**Gini**	**Theil**	**Log Var**
household money income	0.3101568	0.161098	0.361052	0.297088	0.146868	0.321183
extended household income (o.c.)	0.2533381	0.107482	0.200629	0.242737	0.098094	0.1778572
extended household income (s.p.)	0.2176011	0.082031	0.141038	0.193162	0.065425	0.110454
percapita money income	0.3101568	0.161098	0.361052	0.320100	0.171578	0.3805067
equivalent money income	0.3101568	0.161098	0.361052	0.302257	0.151967	0.3362218
percapita extended income (o.c.)	0.2533381	0.107482	0.200629	0.265304	0.116451	0.2214565
equivalent extended income (o.c.)	0.2533381	0.107482	0.200629	0.246323	0.100508	0.1852209
percapita extended income (s.p.)	0.2176011	0.082031	0.141038	0.223127	0.085678	0.1497227
equivalent extended income (s.p.)	0.2176011	0.082031	0.141038	0.198169	0.068642	0.1161162
obs	370			1643		

Source:Our elaborations on SHIW data

(Tab. 3)

	Years of Education <8			Years of Education 8-13		
	Gini	**Theil**	**Log Var**	**Gini**	**Theil**	**Log Var**
household money income	0.262121	0.114006	0.277988	0.257220	0.109529	0.23517
extended household income (o.c.)	0.195923	0.065855	0.121628	0.214090	0.075122	0.141480
extended household income (s.p.)	0.147538	0.03797	0.068764	0.184771	0.057899	0.104611
percapita money income	0.418090	0.298156	0.731129	0.322699	0.174744	0.388577
equivalent money income	0.274360	0.124568	0.298147	0.267644	0.12008	0.252763
percapita extended income (o.c.)	0.259556	0.113105	0.210237	0.270717	0.125377	0.222715
equivalent extended income (o.c.)	0.204236	0.070546	0.131317	0.21984	0.080109	0.148217
percapita extended income (s.p.)	0.223370	0.084093	0.149102	0.253633	0.112809	0.190645
equivalent extended income (s.p.)	0.156105	0.042325	0.075211	0.193203	0.064464	0.112994
obs	973			795		

	Years of Education 13-18		
	Gini	**Theil**	**Log Var**
household money income	0.243007	0.099746	0.193435
extended household income (o.c.)	0.208787	0.071871	0.141842
extended household income (s.p.)	0.203411	0.070784	0.128042
percapita money income	0.317160	0.173970	0.341397
equivalent money income	0.241906	0.099339	0.186707
percapita extended income (o.c.)	0.230300	0.086845	0.166344
equivalent extended income (o.c.)	0.204596	0.069348	0.133227
percapita extended income (s.p.)	0.235058	0.092156	0.165743
equivalent extended income (s.p.)	0.202339	0.070379	0.123298
obs	238		

Source:Our elaborations on SHIW data

The decrease in income inequality that we obtain by widening income definition to include unpaid work is found for different household types and with different inequality indicators. This equalisation result is consistent with Jenkins and O'Leary's (1996) analysis on UK data and in contrast with the mixed evidence provided by other studies like the one by Bonke (1992) and the one by Bryant and Zick (1985).[12] Jenkins and O'Leary (1996) analysis is based on personal equivalent

[12] Bonke (1992) finds that the result on equalisation depends on the type of inequality index and on the type of household analysed whereas Bryant and Zick (1985) by using US data found that income inequality decreased

income rather than on household income as most of the previous literature on this topic. We find that equalisation in extended income distribution does not depend on the unit of analysis, since it holds for household income, percapita and equivalent income.

Note that the inequality measures for the whole sample are higher than within group inequality in the case of households distinguished by economic status (for instance the Theil index for extended income evaluated at opportunity cost is 7.5% for double earners and 8.1% for one-earner families, whereas for the whole sample it is 10%). This suggests the presence of between-groups inequality. What is interesting to note is that between-groups inequality remains also after having accounted for household production. This result is emphasized in Fig. 2 where subgroup decile composition for one-earner and double-earner households is reported.

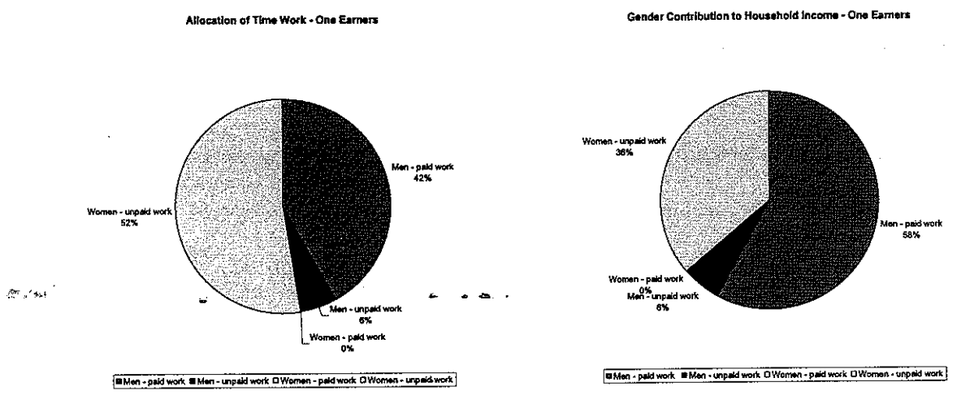
In sum, income inequality decreases and the standard of living increases when one considers unpaid work as part of the household's standard of living. However, it is important to bear in mind that the production of unpaid work is mainly a result of women's work as shown in Section 1. It follows that it is women's unpaid work that sustains a higher standard of living. The object of the next section is the evaluation of gender inequality in earnings and in the use of resources both in traditional and non traditional households.

4. Gender Inequality in Earnings and in the Use of Resources

This section focuses on gender inequality by distinguishing between different aspects of incomes, earnings and use. While the entire approach to inequality has been recently based on identifying what people get out of the means they can use rather than on the means they earn, the traditional approach of relying on earnings as a welfare indicator is useful to point out an important asymmetry between women and men still existing in our society. Women very often work as hard as, or harder than, men, while their earnings are much lower. As shown in fig. 4 more than 50% of the total time devoted to work by the married couple, including the unpaid kind, is done by women, whose contribution to household extended income is less than 50%. This holds both for traditional households where the

by extending income to include unpaid work in 1979-80 and increased in 1975-6.

women's share of working time is 52%, while their contribution to household extended income is 36%, and for non traditional households where women share the 58% of total working time to which about 44% of household extended income corresponds. This is due to the presence of a consistent wage differential by gender in the labour market.[13]



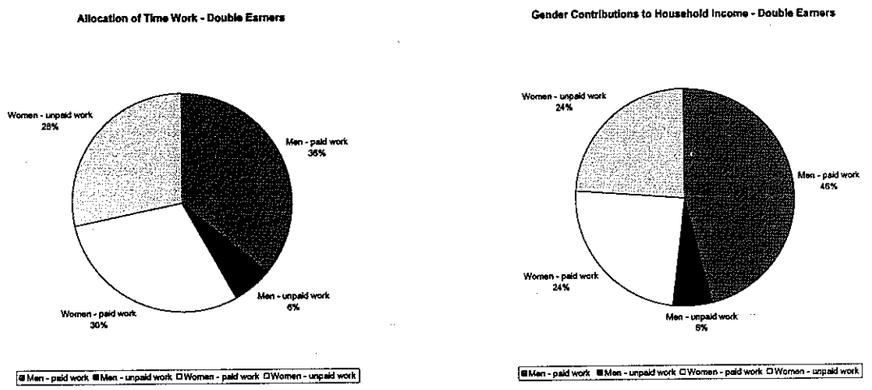
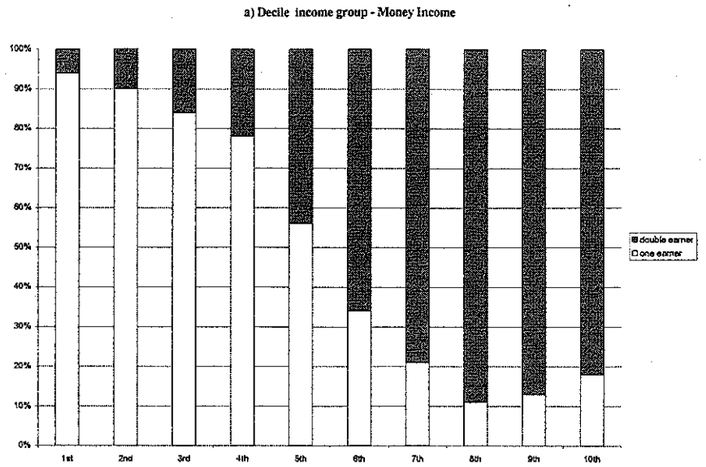


Fig. 4 – Gender Allocation of Time Work and Gender Contribution to Household Income, by One Earner and Double Earner Households

[13] Wage differential by gender in Italy was 22% in 1995 and has been increasing during the last decade (CNEL 1998).



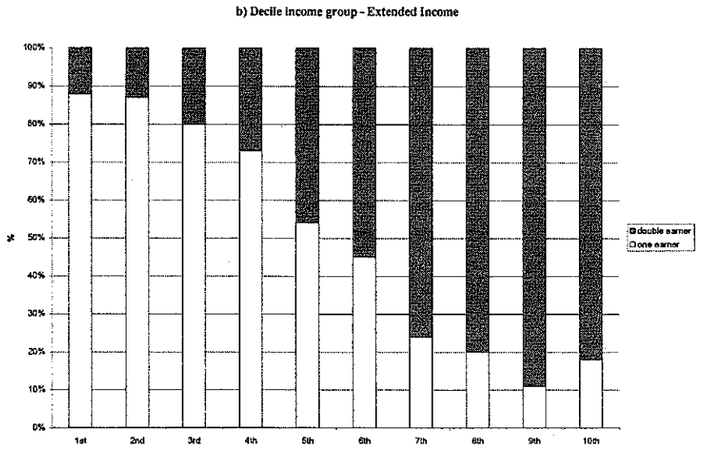


Fig. 2 – Composition of Decile Income Groups, by Household Economic Status for Money Income (a) and Extended Income (Estimates with Opportunity Cost Method) (b).

The assessment of gender inequality in achievement can be evaluated by comparing the amount of inequality in the distribution of household income and the amount of inequality in the distribution of individual income. The larger the gender gap the larger is inequality as measured by any inequality indices. The difference between the inequality measures in the two distributions provides an indirect measure of the extent of the intra-household inequality.

As far as the earnings aspect is concerned, Tab. 5 shows that income inequality is higher amongst individuals rather than amongst households. As expected, the distance between individual and household's income inequality decreases when we extend income to include unpaid work, especially in one-earner households, suggesting that accounting for unpaid work reduces the gender gap. As noted in the previous section, inequality is lower when unpaid work is evaluated at the service price rather than with the opportunity cost method, even if the evaluation method used does not affect the distance in terms of inequality between households and individuals.

Tab. 5 – Inequality measures of earnings, extended income and equivalent income for households and individuals

	Gini		Theil		Log Var	
Whole Sample	**Households**	**Individuals**	**Households**	**Individuals**	**Households**	**Individuals**
Money income	0.30	0.48	0.15	0.45	0.33	
extended income (o.c.)	0.24	0.30	0.10	0.16	0.18	0.30
extended income (s.p.)	0.20	0.27	0.07	0.13	0.12	0.21
Double-Earners						
Money income	0.23	0.32	0.09	0.18	0.17	0.39
extended income (o.c.)	0.22	0.26	0.08	0.11	0.15	0.24
extended income (s.p.)	0.18	0.23	0.06	0.10	0.10	0.16
Equivalent income	0.33	0.3	0.22	0.16	0.34	0.36
One-Earners						
Money income	0.28	0.64	0.14	0.83	0.29	
extended income (o.c.)	0.20	0.3	0.08	0.16	0.12	0.26
extended income (s.p.)	0.16	0.27	0.05	0.14	0.08	0.2
Equivalent income	0.24	0.21	0.1	0.07	0.2	0.14

In the remainder of this section we concentrate on gender inequality related to the use aspect of household resources. This requires the within-family division of income use between women and men to be identified. As known, in most household survey, consumption and expenditure data are collected at the household rather than individual level, so individual consumption is not directly observed. Only few goods, such as leisure, are consumed by only one member in the household. Most empirical tests on household allocation model have, therefore, focused on leisure demand (Chiappori 1992, Browning, Bourguignon, Chiappori and Lechene 1993, Fortin and Lacroix 1997). While it has been recognized since the work of Becker (1965) that a significant proportion of time not allocated to market labor supply is spent in producing goods and services within the household, only Apps and Rees (1996) have tested the implication of the inclusion of household production on the estimates of intra-household resource allocation.

We apply the model proposed by Apps and Rees to our data in order to assess income use by gender. The model proposed by the authors belongs to the collective model class, which assumes that the household consists of individuals with their own utility funtions, who achieve a Pareto-efficient resource allocation. While the specification of the model is reported in Appendix D, we briefly summarize the model features. The individual utility functions are defined over three goods - a market consumption good, a domestically produced good the implicit price of which is determined within the household, and pure leisure – and maximized subject to a budget constraint that restricts the value of demands to the individual share of household income. In particular, no lump-sum transfers between husband and wife are allowed, thus indivual shares are equal to individual full income. Since there is no information available on individual consumption of market and domestic goods, the parameters of these equations in the female and male systems of demand are constrained to be identical[14].

[14] To use the authors' words, *joint consumption shares for market and domestic goods are estimated with female and male parameters constrained to be identical* (p. 206). This sentence contains some inconsistency. In particular, consumption shares are joint only in a unitary model which does not assume individual preferences, while constraining the parameters of the individual equations to be equal implies that an individual model is specified which means that the choice of some rules to allocate consumption goods between spouses is required. We assume that the allocation of consumption between market and domestic goods chosen by each spouse is equal to the allocation observed on aggregate at the household level. This implies imposing some structure on preferences.

Estimation of the behavioural parameters of a specified form of preferences allows money welfare measures to be calculated from the indirect utility function. Behavioural parameters have been estimated on the subsamples of one earner and double earner households by assuming both a unitary decision process within the household and a collective one as described above. The last row in Tab. 5 reports inequality measures defined on equivalent income for the distributions corresponding to the household model - which places all family members at the same point in the distribution, ignoring intra-family inequality - and to the individual model.

Unlike the distributions of earnings and extended income, inequality in the welfare distributions amongst individuals is lower than inequality amongst households. This result is likely due to the hypothesis of exchange between market and domestic goods within the couple underlying the individual model. Apps and Savage (1989), who provide the same exercise without including a domestic good in the specification of preferences, find instead a considerable increase in the value of the inequality index for the individual model than the household one. Our finding confirms Apps and Rees's (1996) suggestion that accounting for household production has relevant implications in order to identify intra-family welfare distribution correctly. Further efforts on this issue should be addressed to test the validity of the collective representation of the decision process and to the estimation of the sharing rule which is not incorporated in the structure of the estimated model, wheras it could add useful information upon the consequences of specific policies.

Evidence on equivalent income inequality by gender is also summarized by the percentage of females in each deciles by household economic status (Fig. 4). While equivalent income is almost equally distributed by gender in all decile in double-earner families, females are all concentrated in the lower deciles in one-earner families, suggesting that housewives are more exposed to the poverty risk than their partners.

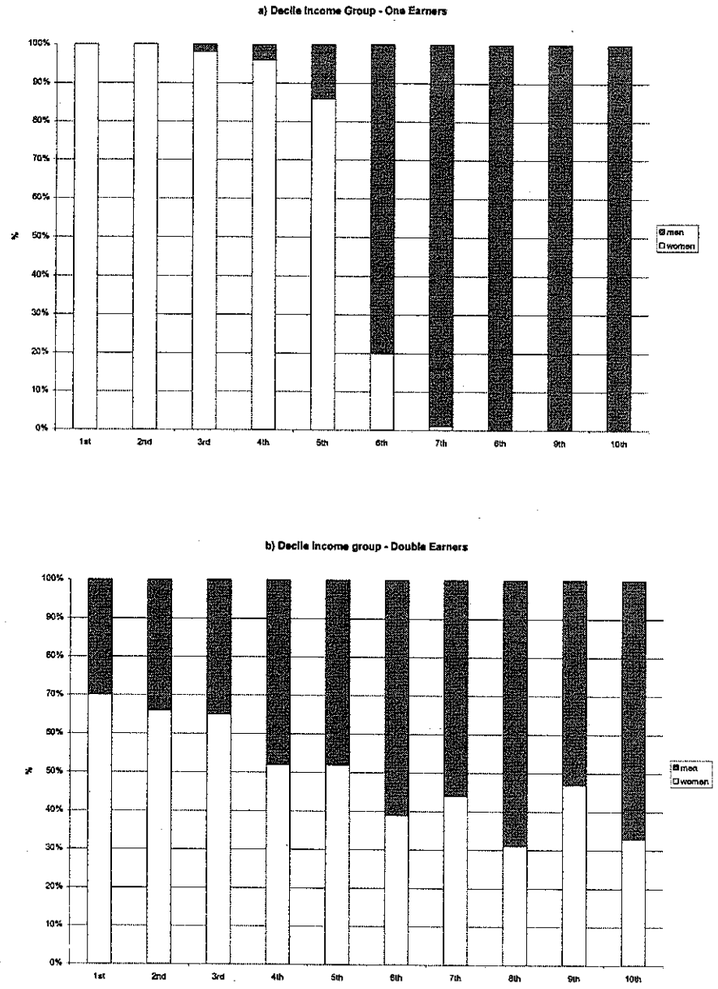


Fig. 4– Composition of Decile Income Groups by Gender in One Earners (a) and Double Earners (b) Households, Estimates of Equivalent Income corresponding to individual model.

Conclusions

In this paper we have extended income to include unpaid work based on Italian data. There is no unique source of data in Italy containing information on time allocation and income. Therefore we have matched different data to acquire the necessary information. We report the estimates on unpaid work for a sample of couples based on ISTAT time budget survey. This analysis shows that household composition and individual characteristics differently affect unpaid work by gender. As expected, women's unpaid work significantly increases with the presence of children according to the type of childcare services available in Italy. We have also found that not only young, but also older dependents significantly increase women's unpaid work. Unpaid work has been imputed to the Bank of Italy Survey on Income and Wealth taking into account the different behaviour by gender, and evaluated by using both service price and opportunity cost method.

This paper focuses on the assessment of ***extended standard of living*** and inequality by gender in one-family households. We provide estimates of equivalence scales that are consistent with the definition of income used. In particular, we apply a non-parametric regression method to estimate equivalence scales on extended and non extended consumption in order to account for the presence of different needs between household members and economies of scale that take place within the household in relation to the consumption of market and non market goods. We have found that the inclusion of household production significantly changes the profile of the cost of characteristics index stimulating further investigations on this issue.

As expected, extended income valued at opportunity cost is characterised by higher inequality than extended income valued at service price, while both are more equally distributed than money income. Our analysis is consistent with Jenkins and O'Leary's (1996) equalisation result, since inequality is lower when we extend income in different household types (in particular one-earner and double-earner family) by using different inequality indicators. This result holds independently of the reference unit – household, percapita, or equivalent adult – of the income distribution. We note also that even accounting for household production does not eliminate the between-groups inequality

distinguishing households by economic status.

As in most existing societies, data used indicate that women perform a higher share of work, including the unpaid kind, with respect to their partners, while their extended income share is much lower. This uneven distribution of working time and income by gender should be taken into account in the assessment of welfare policies. Gender inequality in achievement has been assessed both in earnings and use of resouces. As expected, the distribution of earnings is characterised by a high degree of inequality. Extending the definition of income reduces the gender gap but does not eliminate it. On the contrary, based on estimation of Apps and Rees's model (1996) welfare is more equally distributed by gender. This result confirms Apps and Rees's (1996) suggestion that accounting for household production has relevant implications in order to identify intra-family welfare distribution correctly. Further efforts on this issue should be addressed (a) to test the unitary and collective representations of the household decision process including household production, and (b) to the estimation of the sharing rule which is not incorporated in the structure of the estimated model, whereas it could add useful information upon the consequences of specific policies.

Appendix A – Descriptive statistics of the data used

Tab. A.1 – Descriptive Statistics and t-test on the SHIW and TBS samples

	SHIW (obs 3208)		**TBS** (obs 4297)		**t-test**
	MEAN	**ST.DEV**	**MEAN**	**ST.DEV.**	
AGE	40.17	9.19	41.04	12.67	3.45
ANSTW	9.3	4.03	8.42	4.55	-8.85
NO	0.26	0.44	0.17	0.43	-8.85
NE	0.2	0.39	0.29	0.52	8.57
CENTRE	0.18	0.38	0.17	0.42	-1.08
SOUTH	0.35	0.47	0.37	0.55	1.69
NFLW	0.54	0.49	0.62	0.55	6.64
OCC	0.41	0.49	0.38	0.55	-2.49
CASALW	0.45	0.49	0.52	0.57	5.71
DIP	0.36	0.47	0.28	0.51	-7.03
INDIP	0.1	0.29	0.09	0.33	-1.39
WAGR	0.02	0.14	0.03	0.2	2.55
IND	0.11	0.31	0.06	0.28	-7.20
PTW	0.12	0.32	0.09	0.33	-3.96
PUBW	0.18	0.38	0.09	0.33	-10.73
ALTRATW	0.15	0.35	0.19	0.44	4.38
WSER	0.33	0.46	0.28	0.51	-4.45
NCOMP	3.5	1	3.53	1.15	1.21
NF02	0.1	0.29	0.15	0.43	6.01
NF35	0.18	0.41	0.15	0.44	-3.04
NF617	0.75	0.85	0.2	0.52	-32.40
NF824	0.42	0.69	0.25	0.63	-10.96
ANSTH	9.6	3.96	8.91	4.69	-6.90
AGEH	43.74	9.35	44.57	12.62	3.27
PTH	0.04	0.2	0.1	0.34	9.56
NFLH	0.18	0.38	0.18	0.44	0.00
OCCH	0.77	0.41	0.82	0.44	5.06
DIPH	0.62	0.48	0.57	0.56	-4.16
INDIPH	0.2	0.4	0.23	0.48	2.95
HAGR	0.04	0.19	0.06	0.28	3.68
INDH	0.33	0.47	0.25	0.49	-7.16
PUBH	0.23	0.41	0.16	0.42	-7.24
ALTRATH	0.24	0.42	0.33	0.54	8.12
HSER	0.47	0.49	0.49	0.57	1.63
UNPH	7.62	3.12	8.09	3.65	6.00
UNPW	44.66	13.34	45.78	14.02	3.52
UNPHB	7.62	3.12	8.63	9.36	6.60
UNPWB	44.66	13.34	47.22	18.21	7.03

variables

AGE	woman's age
ANSTW	woman's years of education
NO	lives in North West
NE	lives in North East
CENTRE	lives in Centre
SOUTH	lives in the South
NFLW	woman not in the labour force
OCC	woman employed
CASALW	housewife
DIP	woman employee
INDIP	woman self-employed
WAGR	woman works in agriculture

PTW	woman works less than 30 hrs/week
PUBW	woman works in the Public Sector
ALTRATW	woman works in other Service Sector
WSER	woman works in Service Sector
NCOMP	number of members in the family
NF02	number of children aged less than 3
NF35	number of children aged 3-5
NF617	number of children aged 6-17
NF617	number of children aged 18-24
ANSTH	years of men's education
AGEH	men's age
PTH	men works less than 30 hrs/week
NFLH	men not in the labour force
OCCH	men employed
DIPH	men employee
INDIPH	man self-employed
HAGR	man work in Agriculture
INDH	man works in manufacturing
PUBH	man works in Public Sector
ALTRATH	man works in Other Service Sector
HSER	man work in Service Sector
UNPH	weekly hours of unpaid work for men
UNPW	weekly hours of unpaid work for women
UNPHB	weekly hours of unpaid work for men
UNPWB	weekly hours of unpaid work for women

UNPHB and UNPWB have been computed on the TBS sample by attributing the actual number of unpaid work of the individual if the information on the day of the week in question is available or the estimated otherwise. UNPH and UNPW use the same equations on the different data set to impute the total number of hours of unpaid work.

Appendix B - Unpaid work and wage equations

Tab. B.1 – Unpaid work by gender and day of the week

Tab. B.1.1 - Week-day

	Women			Men		
Variables	**Coeff.**	**t-ratio**	**S.E.**	**Coeff.**	**t-ratio**	**S.E.**
INTERCEPT	1.338	10.450	0.000	-0.249	-1.000	0.319
Age	0.009	2.120	0.034			
Years of education	-0.003	-0.460	0.648	-0.019	-1.970	0.049
North West	0.119	2.230	0.026			
North East	0.042	0.850	0.395	-0.093	-1.060	0.289
South	0.137	2.820	0.005	-0.245	-2.780	0.006
Not in the labour force	0.887	13.930	0.000	0.917	7.600	0.000
self-employed	-0.234	-3.610	0.000	-0.324	-3.310	0.001
Agriculture	0.750	6.100	0.000	0.196	1.050	0.295
Part-time worker	0.314	5.360	0.000	0.202	1.640	0.101
Service Sector	0.375	5.540	0.000	0.288	3.180	0.002
N.children aged<3	0.195	4.500	0.000	0.383	3.940	0.000
N.children aged 3-5	0.041	0.980	0.327	0.059	0.640	0.524
N.children aged 6-17	0.090	2.380	0.017	-0.140	-1.640	0.101
N.children aged 18-24	0.055	1.770	0.077	0.121	1.750	0.081
Partner's yrs educ.	-0.027	-5.410	0.000			
Partner's age	-0.009	-2.120	0.034	0.012	2.550	0.011
Partner part-time w.	0.157	2.890	0.004	-0.145	-1.100	0.271
Partner in service s.				-0.208	-1.360	0.173
Partner not labour f.	-0.094	-1.940	0.053	-0.262	-1.790	0.074
Partner self-employed	0.023	0.540	0.593	0.137	0.960	0.336
Partner in Agriculture	-0.065	-0.830	0.409	-0.308	-1.110	0.269
N.OBS.	948			948		
R^2	0.36			0.16		
Tab. B.1.2 - Saturday						
INTERCEPT	1.688	15.990	0.000	0.119	0.500	0.616
Age	0.003	0.730	0.468	0.006	0.600	0.546
Years of education	-0.002	-0.410	0.683	0.020	2.270	0.024
North West	-0.044	-0.960	0.338	0.070	0.640	0.519
North East	-0.019	-0.460	0.647	0.067	0.670	0.503
South	-0.019	-0.440	0.660	-0.300	-2.980	0.003
Not in the labour force	0.063	1.210	0.225	0.203	1.890	0.060
self-employed	-0.164	-3.030	0.003	-0.086	-0.930	0.353
Agriculture	0.106	1.050	0.293	-0.044	-0.250	0.800
Service Sector	-0.257	-4.830	0.000	-0.326	-3.940	0.000
N.children aged<3	0.238	5.930	0.000	0.345	3.620	0.000
N.children aged 3-5	0.123	3.200	0.001	0.175	1.910	0.057
N.children aged 6-17	0.022	0.650	0.518	0.073	0.910	0.363
N.children aged 18-24	0.026	0.870	0.383	-0.160	-2.240	0.026
Partner's yrs educ.	-0.006	-1.390	0.164			
Partner's age	0.003	0.720	0.471	0.005	0.550	0.582
Partner not lab.force.	-0.042	-1.030	0.303	-0.217	-1.760	0.078
Partner in Agriculture	0.108	1.560	0.120	0.302	1.260	0.209
Parner self-employed	0.071	1.850	0.065	-0.136	-1.060	0.287
Partner in service s.				-0.056	-0.420	0.672
N.observations	1038			1038		
R^2	0.18			0.10		

Tab. B.1.3 - Sunday

	Women			Men		
Variables	**Coeff.**	**t-ratio**	**S.E.**	**Coeff.**	**t-ratio**	**S.E.**
INTERCEPT	1.23	9.88	0.00	-0.10	-0.44	0.66
Age	0.01	2.98	0.00	0.01	2.92	0.00
Years of education	-0.03	-4.57	0.00	-0.02	-1.90	0.06
North West				0.21	2.32	0.02
South	0.07	1.64	0.10	-0.12	-1.47	0.14
Not in the labour force	0.10	2.22	0.03	0.02	0.17	0.87
self-employed	-0.02	-0.31	0.76	-0.21	-2.41	0.02
Agriculture	0.20	1.73	0.08	0.39	2.01	0.04
Service Sector				0.11	1.19	0.23
N.children aged<3	0.29	5.47	0.00	0.43	4.51	0.00
N.children aged 3-5	0.18	3.50	0.00	0.25	2.75	0.01
N.children aged 6-17	-0.08	-1.70	0.09	-0.18	-2.29	0.02
N.children aged 18-24	0.05	1.35	0.18	-0.13	-1.86	0.06
Partner's yrs educ.	0.02	2.67	0.01			
Partner not labour f.	0.08	1.31	0.19	-0.28	-2.16	0.03
Partner self-employed	-0.07	-1.37	0.17	0.24	1.87	0.06
Partner in Agriculture	0.21	1.97	0.05	-0.28	-1.24	0.22
Partner in service s.				-0.26	-1.85	0.06
N.observations	927			927		
R^2	0.11			0.07		

Tab. B.2.1 – Employment Probability

	Women			Men		
Variable	**Coeff.**	**Std. Error**	**t-ratio**	**Coeff.**	**Std. Error**	**t-ratio**
Constant	-5.177	0.538	-9.621	-4.800	0.632	-7.599
Household income	-0.001	0.002	-0.625	-0.014	0.002	-8.248
age	0.238	0.028	8.638	0.308	0.030	10.364
age sqaure	-0.003	0.000	-9.095	-0.004	0.000	-11.927
years of education	0.134	0.007	18.407	0.082	0.008	10.302
number of children aged < than 3	-0.343	0.088	-3.905	0.107	0.111	0.958
number of children aged 3-5	-0.231	0.064	-3.602	0.019	0.080	0.234
number of children aged 6-17	-0.183	0.036	-5.136	-0.141	0.038	-3.681
number of children aged 18-24	-0.157	0.044	-3.550	0.088	0.045	1.951
Regional unemployment rate	-0.049	0.006	-8.735	-0.040	0.006	-6.601
Chronic disease	-0.270	0.087	-3.103	-0.119	0.084	-1.423
Partners not employed	0.156	0.106	1.465	-0.159	0.170	-0.934

Tab. B.2.2 – Wage equations

	Women			Men		
Variable	**Coeff.**	**Std.Err.**	**t-ratio**	**Coeff.**	**Std.Err.**	**t-ratio**
Constant	0.504	0.470	1.072	-0.237	0.302	-0.783
years of education	0.084	0.009	9.411	0.072	0.003	24.272
AGE	0.030	0.019	1.556	0.089	0.014	6.249
AGESQ	-0.000	0.000	-0.982	-0.001	0.000	-6.042
past work experience	0.064	0.019	3.373	0.078	0.011	6.824
South East	-0.103	0.057	-1.812	-0.152	0.026	-5.792
South West	-0.164	0.057	-2.855	-0.155	0.029	-5.287
Centre	-0.109	0.038	-2.880	-0.043	0.023	-1.848
Heckman's lambda	0.175	0.106	1.649	0.449	0.073	6.111
Observations	1290			2455		
R^2	0.27			0.30		

Tab. B.2.3 – Wage equations

	Women			Men		
Variable	**Coeff.**	**Std.Err.**	**t-ratio**	**Coeff.**	**Std.Err.**	**t-ratio**
Constant	1.039	0.449	2.311	-0.324	0.332	-0.976
years of education	0.048	0.009	5.427	0.053	0.004	14.108
AGE	0.023	0.018	1.267	0.106	0.016	6.813
AGESQ	-0.000	0.000	-0.513	-0.001	0.000	-6.395
South	-0.169	0.046	-3.702	-0.211	0.025	-8.555
Centre	-0.103	0.036	-2.863	-0.056	0.024	-2.318
Managerial position	0.119	0.071	1.681	0.246	0.038	6.446
white-collar or teacher	0.178	0.044	4.079	0.100	0.028	3.632
professional	0.135	0.109	1.233	-0.076	0.056	-1.351
self-employed	-0.182	0.051	-3.560	-0.187	0.029	-6.518
co-worker	0.317	0.330	0.960	-0.087	0.256	-0.338
employer or managing partner	-0.557	0.107	-5.202	-0.137	0.047	-2.907
employed in Agriculture	0.046	0.075	0.610	-0.098	0.043	-2.289
employed in Construction	-0.186	0.136	-1.369	-0.076	0.035	-2.188
employed in Trade	-0.038	0.046	-0.822	-0.098	0.031	-3.157
employed in Transport or Comm.	0.122	0.129	0.947	0.096	0.043	2.229
employed in Banking and insur.	-0.041	0.065	-0.635	0.099	0.039	2.540
Other sector employed	0.014	0.054	0.261	0.015	0.056	0.264
Public sector employed	0.146	0.044	3.346	0.089	0.026	3.444
Heckman's lambda	0.082	0.100	0.823	0.588	0.080	7.357
Observations	1290			2455		
R^2	0.34			0.37		

Appendix C. Non Parametric Estimates of Engel Equivalence Scales on Extended Consumption

Household activities contribute to household consumption (well-being) by combining market goods and household time into commodities. It is likely that household economies of scale and needs associated with the non monetary component of consumption are different than those usually estimated on market consumption goods. In section 1 we observed that time spent in household activities depends considerably on household composition. It would be useful then to provide some measures of how equivalence scales change when household production is included into a broader definition of consumption.

Data on extended consumption have been obtained by integrating the Consumptions Survey of the Italian Household (1995) carried out by ISTAT with data on time use (TBS). For this purpose, we use the matching equations described in section 1 and the input-based evaluation method, described in section 2, to value household production.

Equivalence scales on extended consumption are estimated by applying Engel's method which is based on the identifying assumption that the share of the budget devoted to food expenditure correctly allows welfare comparisons between households of different demographic composition. We consider a broader bundle of necessities to include household production.

Engel curves are estimated non parametrically through Kernel regression methods. This approach offers the advantage that does not require to impose any particular functional form to estimate the unknown conditional expectation function.

$$m_m^h(x) = E[W_{mi} \mid X_i = x,\ d_i = d^h]\ h = 1,\ldots,H \qquad \text{(C.1)}$$

The conditional expectation function of the Engel relationship is given by

where W_{mi} is the consumption budget share of good m, X_i denotes income (total expenditure) and d_i is a vector of variables representing household characteristics and we allow d_i to assume a number of discrete values identifying H household groups.

The Engel's curve in (1) is estimated using kernel techniques (see e.g. Hardle, 1990 and

Hardle, Muller and Werwatz, 1997) by

$$\hat{m}_m^h(x) = \frac{\sum_{n=1}^{N} w_{mi}\, K((X_i - x)/h)\, I(d_i = d^h)}{\sum_{n=1}^{N} K((X_i - x)/h)\, I(d_i = d^h)} \qquad \text{(C.2)}$$

where I(A) is the indicator function of the event A and K(.) is a kernel function (we choose the Gaussian density).

An index of the cost of characteristics d^h is given by

$$\hat{s}_m^{(h,r)}(x) = \frac{\hat{m}_m^h(x)}{\hat{m}_m^r(x)} \qquad \text{(C.3)}$$

where $r \neq h$ denotes a reference household. (C.3) provides a measure of the additional expenditure that a family with demographic characteristics d^h needs to achieve the same standard of living as the reference family.

Fig. C.1-2 show non-parametric Engel curves for food and a bundle of necessities (including food, fuel, health, education) on log of expenditure, while Fig. C.3-4 present Engel curves on log of extended expenditure for household production and all necessities including household production. It can be seen that the underlying relationships are strongly linear also in the extreme tails of the expenditure distributions and look downward-sloping indicating that all commodities are necessities.

Fig. C.5 shows non-parametric Engel curves for all necessities by number of children in the household. The sample includes only couples and consists of a pooled data set of three years (1993-1995) in order to keep the number of observations in each demographic group large enough for the non-parametric techniques to apply. The presence of children seems to shift Engel relationships almost in a parallel way.

Engel scales (C.3) are calculated numerically as the distance between the curves estimated for different household composition at various expenditure points - in particular, the median, the thirtieth and the eightieth percentiles - on the distribution of food share, necessities share on expenditure, and all necessities share, including household production, on extended consumption (Tab. C.1). By

comparing these three sets of estimates we observe that equivalence scales estimated on food share underestimate household economies of scale. It is interesting to note that the index of characteristics estimated on the share of necessities on expenditure is very close to recent estimates on Italian data based on a complete demand system (Perali *et al.* 1997).

The inclusion of household production to the selected bundle of necessities significantly changes the index of cost of children. At the median of the expenditure distributions the cost of a child less then two years old increases from 22% to 30% of an adult (the index in Tab. C.1 has to be doubled if the cost of characteristics is referred to a single adult of the reference household instead of the couple), while the cost of an older child in all other age classes decreases appreciably. The reduction is higher for the cost of a baby between three and five years old, going from 30% to 18% of an adult. Note also that unlike the estimates on non-extended consumption, the cost of a dependent adult in terms of extended consumption is not higher than the cost of a neonate below the median level of welfare. This result does not hold at a higher level of extended consumption where the cost of a dependent adult seems to increase significantly as the evidence on non-extended consumption shows.

As far as economies of scale are concerned, it seems that the cost of two children in the same age class increases the cost of the reference household less than proportionally. In particular, economies of scale seem much higher within extended consumption.

It should be noted that even the same value of the equivalence scale associated to a given household implies a very different ammount of the compensation needed to achieve the same standard of living of the reference household according to consumption definitions, as the median of the household expenditure distribution is about 3,000 thousand lire, while the extended consumption one is about 5.000 thousand lire.

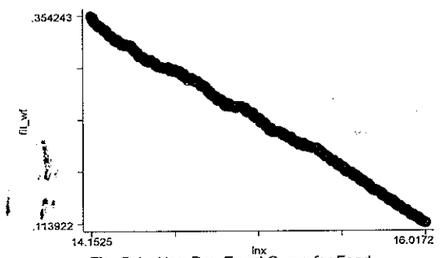


Fig. C.1 - Non-Par. Engel Curve for Food

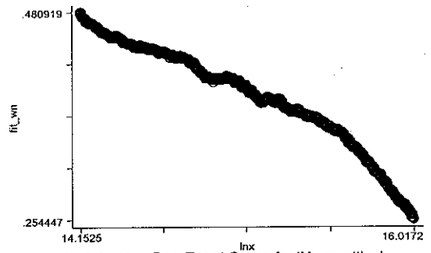


Fig.C.2 - Non-Par. Engel Curve for 'Necessities'

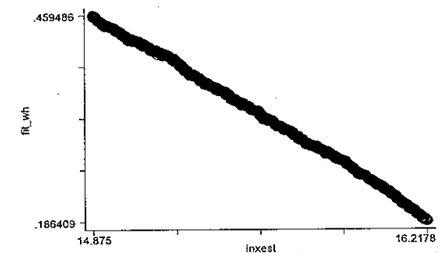


Fig. C.3 Non-Par. Engel Curve for Hh. Production

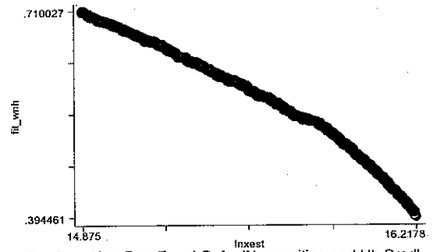
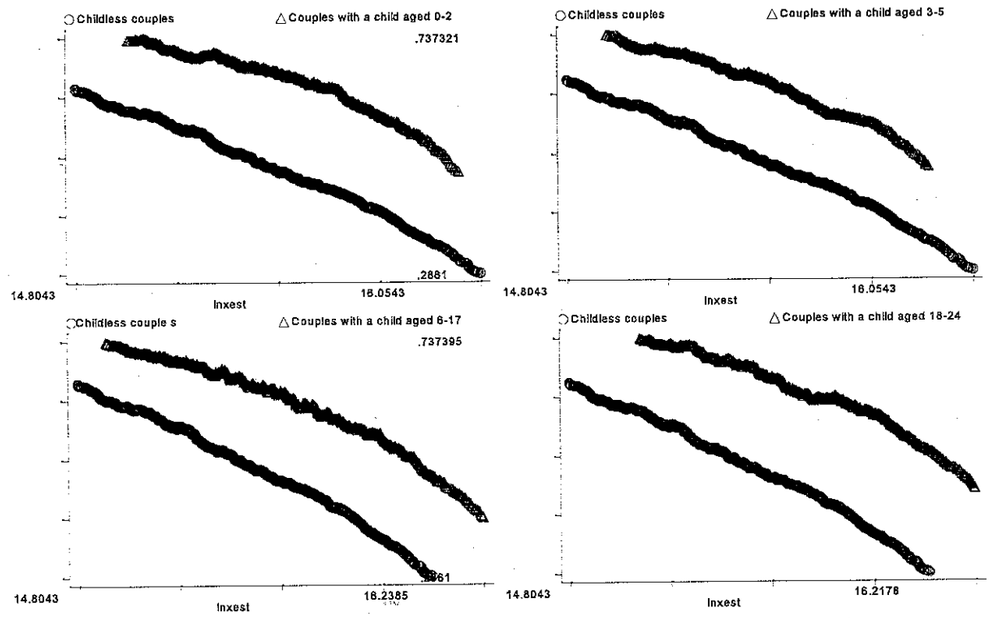


Fig. C.4 - Non-Par. Engel C. for 'Necessities and Hh Prod'



g. C.5 - NP Engel C. by child age: 'Neces. + Home Prod.'

Tab. C.1 - Non-Parametric Engel Scale

Quantile	Age class	N. Child.	Scale		
			Food	Necessities	Necessities plus HhProd
30 percent	<2	1	1.120	1.069	1.134
	3<age<5	1	1.117	1.115	1.084
	6<age<17	1	1.158	1.084	1.078
	6<age<17	2	1.297	1.164	1.117
	18<age<24	1	1.283	1.163	1.135
	18<age<24	2	1.399	1.219	1.181
median	<2	1	1.196	1.111	1.147
	3<age<5	1	1.197	1.146	1.091
	6<age<17	1	1.200	1.107	1.086
	6<age<17	2	1.330	1.198	1.125
	18<age<24	1	1.317	1.170	1.147
	18<age<24	2	1.493	1.269	1.201
80 procent	<2	1	1.157	1.127	1.142
	3<age<5	1	1.100	1.068	1.078
	6<age<17	1	1.208	1.101	1.099
	6<age<17	2	1.315	1.193	1.141
	18<age<24	1	1.395	1.199	1.173
	18<age<24	2	1.466	1.227	1.185

Appendix D. Intra-family welfare distribution: specification of gender preferences on leisure, household production and a market consumption good

The indirect utility function *i* takes the form proposed by Deaton and Mullbauer (1980) to represent the well known "*almost ideal demand system*" preferences

$$^{i}(w_i, p^*; d^i) = \ln(s_i^* / A^i(w_i, p^*; d^i)) / B^i(w_i, p^*) \quad \text{(D.1)}$$

where i=1,2, $A^i(.)$ and $B^i(.)$ are price indexes given by

$$\ln A^i(w_i, p^*; d^i) = \alpha_0 + \alpha_z^i(d^i) \ln w_i + \alpha_y^i(d^i) \ln p^* + 0.5\gamma_{zz} \ln w_i \ln w_i$$
$$+0.5\gamma_{yy} \ln p^* \ln p^* + \gamma_{zy} \ln w_i \ln p^* \quad \text{(D.2)}$$

$$B^i(w_i, p^*) = w_i^{\beta_z^i} p^{*\beta_z^i} \quad \text{(D.3)}$$

d^i is a vector of demographic variables and s_i^* is i's full income, determined by the household sharing rule.

Denoting z as leisure, y as the domestic good and x as the market composite good, individual demand systems in share form are

$$S_z^i = \alpha_z^i(d^i) + \gamma_{zz}^i \ln w_i + \gamma_{zy} \ln p^* + \beta_z^i \ln s_i^* / A^i(w_i, p^*; d^i)) \quad \text{(D.4)}$$

$$S_y^i = \alpha_y^i(d^i) + \gamma_{yz}^i \ln w_i + \gamma_{yy} \ln p^* + \beta_y^i \ln s_i^* / A^i(w_i, p^*; d^i)) \quad \text{(D.5)}$$

$$S_x^i = \alpha_x^i(d^i) + \gamma_{xz}^i \ln w_i + \gamma_{xy} \ln p^* + \beta_x^i \ln s_i^* / A^i(w_i, p^*; d^i)) \quad \text{(D.6)}$$

where $S^i_z=w_i z_i/s_i^*$, $S^i_y=w_i y_i/s_i^*$ and $S^i_x=w_i x_i/s_i^*$.

While the price of the market good is fixed as unity and the price of leisure is market wage w_i, the price of the domestic good, p, is implicitly determined through the estimation of the household production function. By assuming that the household cost function is linear homogeneous, the price of domestic good

$$p = c = \exp\ (a_0 + \sum a_i(d^i)\ \ln w_i\ +\ 0.5\ \sum\ \sum\ a_{ij}\ \ln w_i\ \ln w_j) \qquad (D.7)$$

can be computed as the exponent of the unit cost function, which we define by the translog functional form where d_i is a vector of demographic variables.

The household demand system can be derived by extending the system of equations (D.4-6) to a four-goods system comprising the demands for male and female leisures, a domestic good and a composite good.

Estimation results for the individual model and the household one by household economic status are available upon request. Here it should be noted that the concavity conditions of the estimated expenditure functions, required in order to recover the indirect utility function (D.1) by integrating the Marshallian budget shares, are satisfied at the sample means for the household and individual models in all cases, except for the individual model in the case of double earner households.

References

Addabbo, T. (1998), 'Probabilità di occupazione e aspettative individuali', Materiali di Discussione del Dipartimento di Economia Politica dell'Università degli Studi di Modena, n.216.

Apps, P.F. and E. Savage (1989), 'Labor Supply, Welfare Ranking, and the Measurement of Inequality', *Journal of Public Economics* 39, 335-364.

Apps, P.F. and R. Rees (1996), 'Labor Supply, Household Production and Intra-family Welfare Distribution', *Journal of Public Economics* 60, 199-219.

Becker, G.S. (1965), 'A Theory of the Allocation of Time', *The Economic Journal*, vol. 75, p. 493-517.

Bonke, J. (1992), 'Distributions of Economic Resources: implications of including household production', *The Review of Income and Wealth* (38), pp.281-93.

Brandolini, A. and L. Cannari (1994), 'The Bank of Italy's Survey of Household Income and Wealth', in Ando A., Guiso, L. and Visco, I. (eds), *Saving and the Accumulation of Wealth. Essay on Italian Household and Government Saving Behaviour*, Cambridge, Cambridge University Press.

Browning, M., F. Bourguignon, P.A. Chiappori and V. Lechene (1994), 'Income and Outcomes: A Structural Model of Intrahousehold Allocation', *Journal of Political Economy*, vol. 102, n. 6, p. 1067-1096.

Bruyn-Hundt, M. (1996), *The economics of unpaid work*, Amsterdam, Thesis Publishers.

Bryant, K.W. and C.D. Zyck (1985), 'Income distribution implications of rural household production', in *American journal of agricultural economics* (67), pp.1100-1104.

Capellari, S. (1996), 'Lavoro per il mercato, lavoro domestico e tempo libero: le scelte di uomini e donne all'interno della famiglia', paper presented to the XI AIEL conference, Naples.

Chadeau, A. (1985), 'Measuring household activities: some international comparisons', *The Review of income and wealth*, pp.237-253.

Chiappori, P.A. (1992), 'Collective Labour Supply and Welfare', Journal of Political Economy, vol. 100, n. 3, p. 437-67.

CNEL (1998), 'Il lavoro e la "sovranità sociale". Quarto rapporto CNEL sulla distribuzione e redistribuzione del reddito in Italia, 1996-1997', Bologna, Il Mulino.

Fortin, B. and G. Lacroix (1997), 'A Test of the Unitary and Collective Models of Household Labor Supply', *The Economic Journal*, 107, p. 933-955.

Goldschmidt, L. and E. Pagnossin-Aligisakis (1996), ' Measures of unrecorded economic activities in Fourteen countries', in UNDP (1996) Background papers Human Developmetn report 1995, New York.

Gronau, R. (1986), 'Home Productivity: a Survey', in O.C. Ashenfelter and R. Layard (eds), *Handbook of Labor Economics*, Amsterdam, North-Holland, Ch. 4.

Haddad, L., and R. Kambur (1990), 'How Serious is the Neglect of Intra-Household Inequality ?', *The Economic Journal*, 100, p. 866-881.

Hardle, W. (1990), *Applied Nonparametric Regression*, Cambridge University Press, Cambridge.

Hardle, W., M. Muller, A. Werwatz (1997), *A Course on Non- and Semiparametric Modelling*, Humbold-

Universitat zu Berlin, Berlin.

Hersch, J. and L.S. Stratton, (1994), 'Housework, wages and the Division of Housework Time for employed spouses', *American Economic Review*, (Papers and Proceedings), 84 (2), pp.120-25.

Jenkins, S.P., and N.G. O'Leary (1995) 'Modelling domestic work time', *Journal of Population Economics* (8), pp.265-79.

Jenkins, S.P., and N.G. O'Leary (1996) 'Household income plus household production: the distribution of extended income in the UK', *The Review of Income and Wealth*, 42 (4), pp.401-419.

Murphy, M. (1982), 'Comparative estimates of the value of household work in the United States for 1976', *The Review of Income and Wealth*, march, pp.29-43.

Palomba, R. and L.L. Sabbadini, (a cura di) (1994), *Tempi diversi. L'uso del tempo di uomini e donne nell'Italia di oggi*, Roma, Istat.

Perali, F., R. Ray, A. Caiumi, V. Atella and P.E. Estrada Belli (1997), 'Stima delle scale di equivalenza utilizzando i Bilanci Familiari ISTAT 1985-94', Working Paper N. 36, CEIS, Università di Tor Vergata, Roma.

Picchio, A. (1996), 'The analytical and political visibility of the work of social reproduction' in UNDP (1996) Background papers Human Developmetn report 1995, New York.

Radner, D.B. (1997), 'Noncash Income, Equivalence Scales, and the Measurement of Economic Well-being', *The Review of Income and Wealth* 43, pp.71-88.

United Nation Development Programme (1995), *Human Development Report*, New York: Oxford University Press

Thomas, D. (1990), 'Intra-Household Resource Allocation: An Inferential Approach', The Journal of Human Resources, XXV, 4, p. 635-664.

1. Maria Cristina Marcuzzo [1985] "Yoan Violet Robinson (1903-1983)", pp. 134
2. Sergio Lugaresi [1986] "Le imposte nelle teorie del sovrappiù", pp. 26
3. Massimo D'Angelillo e Leonardo Paggi [1986] "PCI e socialdemocrazie europee. Quale riformismo?", pp. 158
4. Gian Paolo Caselli e Gabriele Pastrello [1986] "Un suggerimento hobsoniano su terziario ed occupazione: il caso degli Stati Uniti 1960/1983", pp. 52
5. Paolo Bosi e Paolo Silvestri [1986] "La distribuzione per aree disciplinari dei fondi destinati ai Dipartimenti, Istituti e Centri dell'Università di Modena: una proposta di riforma", pp. 25
6. Marco Lippi [1986] "Aggregations and Dynamic in One-Equation Econometric Models", pp. 64
7. Paolo Silvestri [1986] "Le tasse scolastiche e universitarie nella Legge Finanziaria 1986", pp. 41
8. Mario Forni [1986] "Storie familiari e storie di proprietà. Itinerari sociali nell'agricoltura italiana del dopoguerra", pp. 165
9. Sergio Paba [1986] "Gruppi strategici e concentrazione nell'industria europea degli elettrodomestici bianchi", pp. 56
10. Nerio Naldi [1986] "L'efficienza marginale del capitale nel breve periodo", pp. 54
11. Fernando Vianello [1986] "Labour Theory of Value", pp. 31
12. Piero Ganugi [1986] "Risparmio forzato e politica monetaria negli economisti italiani tra le due guerre", pp. 40
13. Maria Cristina Marcuzzo e Annalisa Rosselli [1986] "The Theory of the Gold Standard and Ricardo's Standard Comodity", pp. 30
14. Giovanni Solinas [1986] "Mercati del lavoro locali e carriere di lavoro giovanili", pp. 66
15. Giovanni Bonifati [1986] "Saggio dell'interesse e domanda effettiva. Osservazioni sul cap. 17 della General Theory", pp. 42
16. Marina Murat [1986] "Betwin old and new classical macroeconomics: notes on Lejonhufvud's notion of full information equilibrium", pp. 20
17. Sebastiano Brusco e Giovanni Solinas [1986] "Mobilità occupazionale e disoccupazione in Emilia Romagna", pp. 48
18. Mario Forni [1986] "Aggregazione ed esogeneità", pp. 13
19. Sergio Lugaresi [1987] "Redistribuzione del reddito, consumi e occupazione", pp. 17
20. Fiorenzo Sperotto [1987] "L'immagine neopopulista di mercato debole nel primo dibattito sovietico sulla pianificazione", pp. 34
21. M. Cecilia Guerra [1987] "Benefici tributari nel regime misto per i dividendi proposto dalla commissione Sarcinelli: una nota critica", pp. 9
22. Leonardo Paggi [1987] "Contemporary Europe and Modern America: Theories of Modernity in Comparative Perspective", pp. 38
23. Fernando Vianello [1987] "A Critique of Professor Goodwin's 'Critique of Sraffa'", pp. 12
24. Fernando Vianello [1987] "Effective Demand and the Rate of Profits. Some Thoughts on Marx, Kalecki and Sraffa", pp. 41
25. Anna Maria Sala [1987] "Banche e territorio. Approccio ad un tema geografico-economico", pp. 40
26. Enzo Mingione e Giovanni Mottura [1987] "Fattori di trasformazione e nuovi profili sociali nell'agricoltura italiana: qualche elemento di discussione", pp. 36
27. Giovanna Procacci [1988] "The State and Social Control in Italy During the First World War", pp. 18
28. Massimo Matteuzzi e Annamaria Simonazzi [1988] "Il debito pubblico", pp. 62
29. Maria Cristina Marcuzzo (a cura di) [1988] "Richard F. Kahn. A discipline of Keynes", pp. 118
30. Paolo Bosi [1988] "MICROMOD. Un modello dell'economia italiana per la didattica della politica fiscale", pp. 34
31. Paolo Bosi [1988] "Indicatori della politica fiscale. Una rassegna e un confronto con l'aiuto di MICROMOD", pp. 25
32. Giovanna Procacci [1988] "Protesta popolare e agitazioni operaie in Italia 1915-1918", pp. 45
33. Margherita Russo [1988] "Distretto Industriale e servizi. Uno studio dei trasporti nella produzione e nella vendita delle piastrelle", pp. 157
34. Margherita Russo [1988] "The effect of technical change on skill requirements: an empirical analysis", pp. 28
35. Carlo Grillenzoni [1988] "Identification, estimations of multivariate transfer functions", pp. 33
36. Nerio Naldi [1988] "'Keynes' concept of capital", pp. 40
37. Andrea Ginzburg [1988] "locomotiva Italia?", pp. 30
38. Giovanni Mottura [1988] "La 'persistenza' secolare. Appunti su agricoltura contadina ed agricoltura familiare nelle società industriali", pp. 40
39. Giovanni Mottura [1988] "L'anticamera dell'esodo. I contadini italiani della 'restaurazione contrattuale' fascista alla riforma fondiaria", pp. 40
40. Leonardo Paggi [1988] "Americanismo e riformismo. La socialdemocrazia europea nell'economia mondiale aperta", pp. 120
41. Annamaria Simonazzi [1988] "Fenomeni di isteresi nella spiegazione degli alti tassi di interesse reale", pp. 44
42. Antonietta Bassetti [1989] "Analisi dell'andamento e della casualità della borsa valori", pp. 12
43. Giovanna Procacci [1989] "State coercion and worker solidarity in Italy (1915-1918): the moral and political content of social unrest", pp. 41
44. Carlo Alberto Magni [1989] "Reputazione e credibilità di una minaccia in un gioco bargaining", pp. 56
45. Giovanni Mottura [1989] "Agricoltura familiare e sistema agroalimentare in Italia", pp. 84
46. Mario Forni [1989] "Trend, Cycle and 'Fortuitous cancellation': a Note on a Paper by Nelson and Plosser", pp. 4
47. Paolo Bosi , Roberto Golinelli , Anna Stagni [1989] "Le origini del debito pubblico e il costo della stabilizzazione", pp. 26
48. Roberto Golinelli [1989] "Note sulla struttura e sull'impiego dei modelli macroeconometrici", pp. 21
49. Marco Lippi [1989] "A Shorte Note on Cointegration and Aggregation", pp. 11
50. Gian Paolo Caselli e Gabriele Pastrello [1989] "The Linkage between Tertiary and Industrial Sector in the Italian Economy: 1951-1988. From an External Dependence to an International One", pp. 40
51. Gabriele Pastrello [1989] "Francois quesnay: dal Tableau Zig-zag al Tableau Formule: una ricostruzione", pp. 48
52. Paolo Silvestri [1989] "Il bilancio dello stato", pp. 34
53. Tim Mason [1990] "Tre seminari di storia sociale contemporanea", pp. 26
54. Michele Lalla [1990] "The Aggregate Escape Rate Analysed throught the Queueing Model", pp. 23
55. Paolo Silvestri [1990] "Sull'autonomia finanziaria dell'università", pp. 11
56. Paola Bertolini, Enrico Giovannetti [1990] "Uno studio di 'filiera' nell'agroindustria. Il caso del Parmigiano Reggiano", pp. 164

57. Paolo Bosi, Roberto Golinelli, Anna Stagni [1990] "Effetti macroeconomici, settoriali e distributivi dell'armonizzazione dell'IVA", pp. 24

58. Michele Lalla [1990] "Modelling Employment Spells from Emilia Labour Force Data", pp. 18

59. Andrea Ginzburg [1990] "Politica Nazionale e commercio internazionale", pp. 22

60. Andrea Giommi [1990] "La probabilità individuale di risposta nel trattamento dei dati mancanti", pp. 13

61. Gian Paolo Caselli e Gabriele Pastrello [1990] "The service sector in planned economies. Past experiences and future prospectives", pp. 32

62. Giovanni Solinas [1990] "Competenze, grandi industrie e distretti industriali,. Il caso Magneti Marelli", pp. 23

63. Andrea Ginzburg [1990] "Debito pubblico, teorie monetarie e tradizione civica nell'Inghilterra del Settecento", pp. 30

64. Mario Forni [1990] "Incertezza, informazione e mercati assicurativi: una rassegna", pp. 37

65. Mario Forni [1990] "Misspecification in Dynamic Models", pp. 19

66. Gian Paolo Caselli e Gabriele Pastrello [1990] "Service Sector Growth in CPE's: An Unsolved Dilemma", pp. 28

67. Paola Bertolini [1990] "La situazione agro-alimentare nei paesi ad economia avanzata", pp. 20

68. Paola Bertolini [1990] "Sistema agro-alimentare in Emilia Romagna ed occupazione", pp. 65

69. Enrico Giovannetti [1990] "Efficienza ed innovazione: il modello "fondi e flussi" applicato ad una filiera agro-industriale", pp. 38

70. Margherita Russo [1990] "Cambiamento tecnico e distretto industriale: una verifica empirica", pp. 115

71. Margherita Russo [1990] "Distretti industriali in teoria e in pratica: una raccolta di saggi", pp. 119

72. Paolo Silvestri [1990] " La Legge Finanziaria. Voce dell'enciclopedia Europea Garzanti", pp. 8

73. Rita Paltrinieri [1990] "La popolazione italiana: problemi di oggi e di domani", pp. 57

74. Enrico Giovannetti [1990] "Illusioni ottiche negli andamenti delle Grandezze distributive: la scala mobile e l''appiattimento' delle retribuzioni in una ricerca", pp. 120

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