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ABSTRACT

Use of Time and Value of Unpaid Family Care Work: A Comparison between Italy and Poland[*]

This study provides a comparison of the size and value of unpaid family care work in two European member States, Italy and Poland. Using the Italian and Polish time use surveys, both the opportunity cost and the market replacement approaches are employed to separately estimate the value of family childcare and care of the elderly. The results show that, overall, in Italy the number of people performing family care work is higher, also due to the larger population. Italians participate somewhat less than Poles in child care, but substantially more in care of the elderly because of demographic factors. However, the huge difference in the value of unpaid family care work, which in Italy exceeds the value of Poland by about eight times, is largely to be attributed to the discrepancy in hourly earnings, average earnings of Poles being about one fifth of those of Italians. In GDP terms, instead, the value of unpaid family care work is more similar, ranging between 3.7 and 4.4 per cent of the Polish GDP and 4.1 and 5 per cent of the Italian GDP, depending on the estimation approach. The national values of these activities are discussed and an interpretation of the country differentials in the family care-taking gender gaps is given in terms of differences in culture, economic development and institutions.

JEL Classification: E01, E26, J13, J14, J16, J22

Keywords: unpaid work, time use, child care, care of the elderly, adult care, Poland, Italy, satellite accounts

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1 Introduction

Unpaid family care work encompasses care and assistance provided by members of a household to other members. This work is similar in character to paid care occupations, such as those related to childcare provision, nursing, and care of the elderly and of the disabled or sick persons. The majority of unpaid family caregivers are women, and the recipients of care are usually children, elders, and disabled members. As it is such an essential human activity, a large body of literature in the social sciences has tried to analyse unpaid family care work both theoretically and empirically.

There are several motives for studying unpaid work, each one connected to policy issues. First, the motive of measuring the contribution of unpaid work to GDP, which has led to the construction of satellite accounts to be incorporated in the System of National Accounts (Chadeau, 1992; EUROSTAT, 2000, 2003). The aim of this methodology is to answer such questions as what the GDP of a country would look like if unpaid domestic work were measured, valued and included in national accounts. Second, the motive of its interrelation with labour market work, especially important for women. The economic literature in this field follows different approaches (Becker, 1965; Lundberg, 2008; Folbre, 2008). The issue of women's participation in the labour market is studied in the framework of the theory of allocation of time, thus involving the analysis of its interaction with domestic work (Breen and Cooke, 2005; Bonke et al., 2008) with family child care tasks and fertility choices (Del Boca and Vuri, 2007; Del Boca et al., 2008) and with care of the elderly (Spiess and Schneider, 2003). A central concern involves measuring and assigning values to unpaid informal care to track the gender inequalities arising from the unequal sharing of family care tasks between women and men (Aliaga, 2006). Third, the motive of choosing the optimal mix of public and private resources to meet the demand of family care in a welfare system. In fact, in a cost-benefit analysis, the value of unpaid family care may be viewed as a cost not only for the family, but also for the society, when household members performing unpaid work could generate, with the same amount of work, a higher value added in the market. In this case, state intervention with public services or subsidies might be more efficient. With sufficiently detailed data, estimates of the value of specific family-based care activities that could be in part either subsidized or supplied by the State at possibly lower costs for the society may be derived. Some of the available studies addressing related problems, mainly focused on the time rather than the value aspect, have concentrated on child care regimes in Europe (Plantenga and Remery, 2008; Ray et al., 2008) while others on long-term care of the elderly and of the disabled or sick persons (Bettio et al., 2006; Simonazzi, 2009). All these motives are in the background of this analysis.

A major objective of this paper stems from the first motive, namely, measuring the value of unpaid family care work, both child care and adult care (care of disabled, sick or elderly people), a set of activities which have been less investigated so far from the point of view of their size and monetary evaluation. At a European level, a comprehensive evaluation of the size and value of unpaid family household activities has shown that their total value ranges between 20.1 per cent and 36.8 per cent of the EU GDP, depending on the applied methodology (Giannelli et al., 2011). Analogous values have been found for a subset of European countries and for the US (Alesina and Ichino, 2009). These are astonishingly high percentages and the normal caveats related to estimating household

production models (Gronau, 1973) may lead to revising them downwards. However, even if cut in half, they would still represent a sizeable percentage of GDP that may seriously undermine policy decisions that ignore them.

Two European member States are compared here, Italy and Poland, an "old" Mediterranean member and a "new" member respectively, showing remarkably different historical and socio-economic backgrounds, but also amazing similarities. Both countries are critical cases for the EU policy since households and institutions there have not favoured the achievement of the employment targets of the Lisbon Strategy. The choice of these countries also serves to test the assumption of whether or not the level of economic development, contributing to the monetization of care work in the service sector, reduces the amount of unpaid family care work. If this hypothesis holds true, Italy should show a smaller amount of unpaid family work as compared to Poland. If not, it might be the case that the grade of economic development is less relevant than culture, traditions and institutions in determining the size of unpaid family work.

An inspection of the related literature for these two countries reveals that the only similar study, although different in scope from the present one, is available for Italy (Addabbo and Caiumi, 2003). Focusing on the role of unpaid family work on income distribution, that study shows that inequality drops significantly when the value of unpaid work is included in household income. The result of an equalising effect of home production can be expected on the basis of standard economic theory, assuming that households with lower overall working hours will spend more time on unpaid work, to compensate partly for lower incomes. This result is in fact confirmed by other studies based on a wide variation in the type of data used, in the restrictions on the kind of home production activities considered, in the populations addressed, and in the approaches chosen to derive a monetary value for unpaid work (Frick et al., 2009; Frazis and Stewart, 2009).

Several issues arise over the methodology to use to assign a monetary value to unpaid work. Interest in the techniques to address household production, originally prompted by the need to incorporate unpaid work in the national accounts, has recently grown among micro-economists, also subsequent to the availability of time budget data and the recommendation to use them for scientific research (Hamermesh and Pfann, 2005). Among the first pioneering studies, the paper by Jenkins and O'Leary (1995) reviews the micro-econometric evaluation of household production conducted up to the mid-90s and proposes using regressions for matching time use and income surveys. Two alternatives are available for the monetary valuation of these activities, the "output method" which assigns a price to the goods and services produced and the "input method" which assigns a price to hours worked in unpaid production activities. Within the latter, two main approaches have been developed, namely, the "opportunity cost" and the "replacement cost" methods. The former uses the forgone wage of the person involved in performing the unpaid activities as a result of opting not to supply all working hours in the market, namely, the individual potential wage imputed with some occupational, educational, age and other relevant characteristics (Gronau, 1973). The latter assigns the wage of an unskilled paid domestic worker or distinct market wages for each specialised activity like cooking, cleaning and caring (Goldschmidt-Clermont and Pagnossin-Aligisakis, 1999).

A micro-data analysis is developed on data drawn from the Italian and Polish time use surveys to estimate the total time input cost for unpaid family child care and adult care work with both the opportunity cost and market replacement approaches. The "input" method, as opposed to the "output" method which is more suitable for pure accounting purposes, enables the problem of the social cost of unpaid work to be addressed. For example, the finding that the opportunity cost of family care is higher than its market value - obtained multiplying the market price of care activities by the time spent in performing them - might indicate that the public provision of care services is rationed and that a larger share of them should be provided by the state.

The paper also intends to contribute to a deeper investigation of the size and value of some specific activities of family care work. In fact, the two countries offer the opportunity, for the quality of their micro data on incomes and on the use of time, to conduct the evaluation analysis at a level of disaggregation which, to our knowledge, is not yet present in the literature. In particular, the values of some specific activities (for example teaching, transporting) of child care work and adult care work (care of the elderly and of the disabled or sick persons) are derived, an issue which, so far, has not been investigated because of the lack of data.

The paper is organised as follows. Section 2 gives some background for the comparison of Italy and Poland, Section 3 describes the methods and data, Section 4 presents the results of the evaluation and Section 5 concludes.

2 Background comparison between Italy and Poland: facts and figures

The two countries chosen for comparison have indeed a different historical background that led, after the second world war, to choose diverging paths towards economic development - the capitalist model in Italy and planned economy model in Poland. As a matter of fact, these two EU members still show, after the transition period and after the accession of Poland to the EU, a remarkable differential in the degree of economic development in terms of GDP (according to Eurostat, the GDP per capita in Euros in 2007 was 26000 and 8200 respectively) and of other fundamental macroeconomic indicators. Wages, as a result, are much higher in Italy than in Poland[1]. As for demographic factors, the population size is quite different (about 60 millions and 38 millions respectively), and older in Italy (in 2009 about 20 per cent of the population was older than 65 in Italy, whereas in Poland it was only 13 per cent) even if in Poland the tendency towards low fertility rates - below replacement rates - was already clear at the end of the '90s. Poland is characterized by an urban/rural polarization, due to the large number of families living off the products of their own small farms, while Italy is historically affected by a north-south divide.

These largely different backgrounds, however, go together with family models which, for different

[1] See Section 4.

reasons, are fairly similar, also due to the fact that both populations are catholic (Del Boca et al., 2003; Plomien, 2010). Both in Italy and Poland two economic models of the family coexist, one where women are mainly housewives and males are the "breadwinners" and another one where women participate in the labour market and also take on the burden of household care together with their partners. In both countries the "breadwinner" model predominates, and, as a result, Italy and Poland show low female employment rates, among the lowest in all EU countries. Italy has one of the lowest (46.4 per cent after Malta; Eurostat, 2009, females aged 15 to 64); Poland has the fourth lowest after Malta, Italy and Greece and the same as Spain (52.8 per cent; Eurostat, 2009, females aged 15 to 64). Males, however, have higher employment rates in Italy than in Poland (68.6 versus 66.1; Eurostat, 2009, males aged 15 to 64). The increase in the rates of employment, considerably distant from the Lisbon Strategy targets, is definitely one of the highest priorities of economic and social policy in both countries. However, family policies, in both countries have predominantly left the burden of family care to women. The need for care is a common problem to both countries. Two groups particularly burdened with care activities are women aged 30-45 and persons at pre-retirement age (caring for their parents and for grandchildren). Also to a different extent, in both countries formal child care, both private and public, is rationed;[2] and flexible working time, part-time accessibility and parental leave are not adequately responding to demand.[3] Several studies document the responsibility of these institutional features in determining not only low female participation rates, but also low fertility rates as compared to the rest of Europe (Heinen and Wator, 2006; Grotkowska, 2007; Ichino and SanzdeGaldeano, 2005; Del Boca and Vuri, 2007). Key problems indicated as obstacles for the reconciliation of economic and family life are work organisation (such as lack of flexible working time arrangements, taking time off, home-working, part-time working) and the lack of access to high-quality care institutions. Institutional care for children is underdeveloped with an insufficient supply of places in public institutions and limited access to private sector institutions (with relatively high prices). An even more severe situation is observed in the sector of adult care where the only alternative to family care is often only provided by hospitals as in Poland (Crepaldi et al., 2009) or with private arrangements, according to which migrant female workers are employed by families to look after elderly relatives - this being a typical arrangement in Italy, where migrant female carers are often Polish (Bettio et al., 2006).

In sum, all these features have a role in the determination of household organization, of the number of hours devoted to family care and of the gender gaps in their distribution. Before focusing on family care, some suggestive evidence on the amount of hours of household work helps to justify the choice of the two countries for the comparison.[4] Table 1 shows the average daily hours of family domestic and care work performed by females and males by age of the youngest person in the household for a selection of EU countries available in the Harmonized European Time Use

[2]For example, both Italy and Poland lie under the Barcelona target of 33 per cent in the use of formal child care arrangements for 0 to 2 year old children, with 11 and 2 per cent respectively according to national data. As for children at pre-school age the coverage in Italy is nearly total, whereas Poland has one of the lowest in the EU with 45 per cent (Simonazzi, 2008; Plomien, 2010).

[3]According to EU-SILC 2006, for example, the rate of female part-time employment is 5.9 per cent in Italy and 4.1 per cent in Poland against the EU average of 12 per cent.

[4]Even if household work is not the focus of this analysis, it is anyway naturally connected to family care work.

Survey.[5]

Table 1: Average daily hours and minutes of family work (domestic plus care work) by sex and age of the youngest person in the household

	Age of the youngest person in the household						
	0-1	2-3	4-7	8-12	13-19	20+	All
Females							
France	6:42	5:41	5:13	5:01	4:31	4:23	4:43
Germany	7:00	..	5:30	4:53	4:01	3:59	4:22
Italy	8:10	6:52	6:35	6:04	5:29	5:07	5:35
Poland	8:03	6:30	5:43	5:02	4:18	4:11	4:50
Spain	7:34	6:28	5:50	5:38	4:59	4:38	5:09
Sweden	7:02	5:06	4:30	4:01	3:22	3:20	3:47
UK	6:51	5:41	5:10	4:37	3:43	3:54	4:22
Males							
France	3:06	2:56	2:44	2:49	2:42	3:02	2:57
Germany	3:28	..	2:47	2:27	2:17	2:43	2:42
Italy	2:21	2:15	1:59	2:02	1:59	2:23	2:16
Poland	3:11	2:58	2:51	2:37	2:28	2:42	2:43
Spain	3:03	2:41	2:21	2:12	2:01	2:09	2:15
Sweden	3:45	3:51	3:09	2:50	2:36	2:30	2:43
UK	3:10	2:56	2:45	2:33	2:18	2:35	2:37

Source: HETUS

It turns out that Italian and Polish females are the ones who perform the highest amounts of household work when the youngest child in the household is aged 1-3. However, summing the work of females and males, it appears that for the same age of youngest child category, Poland ranks first. When the youngest child is less than two years, Poland is followed by Sweden, Spain and Italy. The highest gender gap is found in Italy, followed by Poland and Spain, while the lowest in Sweden. As the youngest member becomes older, the amount of domestic work decreases progressively and then stabilizes. Italy shows the least decrease and continues to hold the highest gender gaps.

3 Methods and Data

The total value of unpaid family care work at a national level depends on (i) the amount of time that each person devotes to this activity, on (ii) the number of people who perform it and on (iii) the value attributed to each unit of time of this work. As for the information needed for (i) and (ii) data have been drawn from the time use surveys of the two countries, choosing as the reference

[5]HETUS by EUROSTAT collects time-use information of 13 European countries. Each country survey refers to a different year which is then harmonised by Statistics Sweden. The time span varies between 1998 and 2005. HETUS records domestic work like cleaning, ironing, shopping etc. and child care work like personal care of the child, teaching a child and transporting a child. Adult care is not recorded.

population people aged 18-74. As for (iii) two methods are used in this paper for imputing a value to unpaid family care work. One is the "opportunity cost method" which is based on the idea that each hour devoted to domestic activities could have been sold in the labour market instead. The other method is based on the assumption that households save money by performing family care work themselves instead of buying similar services on the market or hiring someone to provide them for the household. This method is known as the "market replacement cost". Even if conceptually different, both methods require the imputation of a labour earning for each unit of time spent in unpaid family care work.

With the opportunity cost approach each hour devoted to family care should be evaluated at the labour earning a caregiver could aim at given his/her individual characteristics if she/he decided to sell this hour in the labour market instead. For working people, the value imputed to unpaid work is therefore equal to their actual labour earnings. Non-working people, who potentially might supply their labour force in the market, are defined here as all people aged 18-74 who do not work and may perform family care work. Their potential earnings have been estimated using the Heckman Selection model (Heckman, 1979) separately for men and women (See the Appendix).

As for the market replacement cost method, two procedures have been used: the generalist market replacement cost and the specialist market replacement cost. The chosen labour earning of a generalist domestic worker to be imputed to each family caregiver, either working or not working, corresponds to the average labour earning of occupations classified in ISCO-88 with code 91, namely, "Sales and services elementary occupation", which includes, among other similar occupations, the category "Domestic and related helpers, cleaners and launderers". This wage was differentiated by sex.

As for the specialist replacement cost, the average wages of four specialist ISCO-88 occupational classes have been imputed to the time use categories present both in the Italian and Polish time use surveys: "Personal and protective services workers" (code 51) imputed to the time use category "Physical care and supervision of a child" and to "Adult physical care"; "Teaching associate professionals" (code 23) imputed to the time use category "Helping children with homework"; "Drivers and mobile plant operators" (code 83) imputed to the time use category "Going out with children, transporting a child"; "Sales and services elementary occupations" (code 91) imputed to the time use category "Other child care and child and adult care performed inside and outside the household". These wages were differentiated by sex.

The data used for the analysis are drawn from the Italian and Polish time use surveys for 2003 and from EU-SILC 2006. The ideal source to estimate the value of unpaid family care work is a data set containing information on both hours devoted to unpaid family care work and the labour earnings necessary to estimate its value. This is the case of the Polish time use survey 2002-2003 - the most recent available - that includes questions on both time use and earnings. Unfortunately a survey as inclusive as the Polish time use does not exist for Italy, since the Italian time use survey - the Multipurpose 2002-2003, the most recent one - does not include questions on earnings.

To overcome this problem, the Italian time use survey is matched with the cross-section for Italy drawn from the European Statistics on Income and Living Conditions (EU-SILC by EUROSTAT) for 2006.[6] The statistical matching procedure consists of assigning to each individual in the Italian Multipurpose data set the information of the Italian EU-SILC data set according to a series of common characteristics, available in both data sets, which are believed to be relevant to explain the observed heterogeneity. For the opportunity cost approach, another imputation procedure is needed, namely, the estimation of potential labour earnings for non-working people. This is performed using a standard Heckman technique, taking as the reference population people aged 18-74. (For a description of the statistical matching procedure see the Appendix).

Of course, each method of evaluation has advantages and shortcomings. A broad debate on the evaluation of Non - Standard National Accounts production activities, at both academic and institutional levels, exists (Jackson, 1996; Landefeld and McCulla, 2000; UN, 2000; Abraham and Mackie, 2004). Several authors have pointed out that the opportunity cost method may lead to serious inconsistencies with market valuation, as the value of any particular household unpaid work depends on the lost earnings of the worker and so different values for similar tasks will arise. Moreover, the approach is based on several microeconomic assumptions which are rarely satisfied due to labour market and household functioning constraints, which prevents individuals from freely choosing the number of their working hours. The (generalist and specialist) replacement cost approach, as it uses market wage rates to value unpaid family activities, does not suffer from the previous issues, making this method more appropriate for national income accounting purposes. However, this market approach may also be problematic, especially in its specialist variant. The major problem with this variant is that the working conditions and productivity of the specialized worker may be significantly different from those of the unpaid household worker. This usually leads to an overestimation of the unpaid household work. The present analysis, however, has the aim of deriving an approximation of this value, in order to provide, for the first time, a range of variation for it. The idea is to show that, whatever the methodology applied, be it overestimating or underestimating it, the value of family care work represents a substantial amount in relation to the national product.

4 Unpaid family care work: size and value

As mentioned in Section 3, one fundamental element for the estimation of the value of unpaid family care work is the number of people who perform it. The Polish and Italian time use surveys allow the computation of the total number of people who perform these activities and the participation rates in child care and adult care (see Table 2).

The participation rate in child care is higher in Poland and, in both countries, it is higher for people who are working in the market. This fact is due to the age breakdown chosen for the analysis

[6] Although the EU-SILC survey for 2003 was available, it could not be used since the detailed information on earnings necessary for imputations was not present there. However, the fact that the time use data refer to three years earlier than 2006 should not present a problem since changes in the use of time occur rather slowly.

Table 2: Participation rates, number of persons, average minutes per day in child care and adult care, by gender and work status of the population aged 18-74. Poland and Italy.

	Women		Men	
	Working	Non-Working	Working	Non-Working
Participation rate in child care (per cent)				
Poland	35.2	29.6	27.8	16.7
Italy	32.4	23.6	22.6	8.2
Number of people who perform child care (millions)				
Poland	2.02	2.01	2.03	0.74
Italy	2.69	2.93	2.93	0.54
Average time spent on primary child care (minutes per day)				
Poland	108.5	145.4	73.6	89.2
Italy	116.5	134.8	76.5	86.6
Participation rate in adult care (per cent)				
Poland	4.2	4.8	2.4	3.4
Italy	9.5	13.3	7.3	15.1
Number of people who perform adult care (millions)				
Poland	0.24	0.33	0.18	0.15
Italy	0.82	1.73	0.89	0.95
Average time spent on primary adult care (minutes per day)				
Poland	31.9	41.5	30.3	46.2
Italy	60.2	66.1	55.3	75.4

Source: Italian Multipurpose 2002/2003 and Polish Time Use Survey 03/04; authors' calculations.

which implies that, among working people, persons with young children are relatively more numerous than among non-working people. Entrance into the labour market coincides with setting up families and having small children, while leaving the labour market usually takes place when children have already left the household or do not require care. In Poland, the higher participation rates in child care with respect to Italy are probably due to the younger population. As for gender differences, in Poland the participation gap between women and men is around 7 percentage points among working people, and 13 percentage points among non-working people. In Italy, the gender gap is larger, ranging from 10 percentage points among working people to 15 percentage points among non-working people. In Poland, then, relatively more men perform child care than in Italy. The number of people who perform child care amounts in Poland to around 7 million, and in Italy to slightly more than 9 million. In Italy a participation rate in child care activities of 32.4 per cent for working women corresponds to 2.69 million women, whereas a participation rate in child care activities of 22.6 per cent for non-working women corresponds to 2.93 million women, a higher number since non-working women are more numerous than working women.

As for the other element needed for imputation, namely, the average amount of time spent in child care - which is calculated on the people who perform child care - it turns out that in Poland working people spend less time in primary[7] child care than Italian working people, whereas for

[7]The time use information is recorded taking into account that any person could undertake two different activities

non-working people the opposite is true. In both countries, men spend considerably less time than women in this activity, and the average times are remarkably similar for men in the two countries.

As for adult care, the participation rates are considerably smaller than in child care in both countries, but in Poland they are much lower than in Italy, probably because of the younger population. Gender gaps are more contained when compared to child care, an unexpected evidence being that the participation rate of non-working Italian men is higher than that of Italian women. This result might be driven by the fact that a relatively old population implies a significant amount of family care which is shared fairly equally among sexes since adult individuals tend to care for their own elderly parents and relatives first. Even if the participation rates are low, the number of people who perform this activity is not negligible, amounting to around one million in Poland and four million and four hundred thousands in Italy. The average amount of time dedicated to this activity is higher in Italy than in Poland, and non-working men engage in it for a longer time than working and non-working women in both countries, the gap being more pronounced in Italy. The time engaged in adult care ranges on average from one fourth to half of that spent in childcare, with the highest value for Italian non-working men and the lowest for Polish working men.

The total national yearly value of unpaid family work is then derived by multiplying the estimated value of each unit of unpaid work, namely the potential average hourly net earnings of a family caregiver, by the time spent in care in an average weekday,[8] by the number of days in a year and by the number of people who perform child care.[9]

4.1 Opportunity cost

Table 3 shows the results obtained with the opportunity cost estimation method. The total yearly value of unpaid family care work equals to 8.29 and 67.06 billion Euros, which corresponds to 4.3 per cent and 4.5 per cent of GDP in Poland and Italy respectively.[10] The above analysis helps in understanding the gap in the values for the two countries, which originates not only from the difference in the dimension of the populations, but also in average net hourly earnings, which in Poland amount to less than one fourth of earnings in Italy. In Poland 95 per cent of the estimated total value of care may be attributed to child care, whereas in Italy it is 72 per cent. The value of child care is mostly the result of women's activity, with 5.42 over 7.92 and 35.3 over 52.2 billion Euros

at the same time. This, for instance, means that while a mother is ironing she could also be looking after her child. In this case, the primary activity is ironing, while the secondary activity is child care.

[8] In the Italian time use survey each individual filled in the diary during weekdays or on Saturday or on Sunday. The average weekday is obtained by multiplying the weights by 5/7 for individuals who filled in the diary on a weekday and 2/7 for those who filled in the diary on Saturday or on Sunday.

[9] Precisely, total daily amount of care (sum of all minutes of care performed by the whole population in one day) multiplied by sample weights, by the average hourly net labour income in Euros and by 365.

[10] The GDP used for the computation of these percentages is the Polish Gross domestic product at market prices in 2003 which was equal to 191.6438 billion Euros (http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/). The GDP used for the computation of these percentages is the Italian Gross domestic product at market prices in 2006 (1485.3773 billion Euros; http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/).

Table 3: Estimated value of unpaid family care work with the opportunity cost

Poland	Women		Men		All		Total	
	W	NW	W	NW	Women	Men	Euros	% GDP
Average hourly net earnings (Euros)	1.77	1.72	1.95	1.81				
Value of care in one year (billions)								
Child care	2.36	3.06	1.77	0.73	5.42	2.5	7.92	4.1
Adult care	0.08	0.14	0.06	0.8	0.23	0.14	0.37	0.2
Total care	2.44	3.2	1.83	0.81	5.65	2.64	8.29	4.3
Italy	Women		Men		All		Total	
	W	NW	W	NW	Women	Men	Euros	% GDP
Average hourly net earnings (Euros)	8.57	6.33	9.33	7.60				
Value of care in one year (billions)								
Child care	18.1	17.2	14.6	2.65	35.3	17.25	52.55	3.5
Adult care	2.62	4.88	2.9	4.11	7.5	7.01	14.51	1.0
Total care	20.72	22.08	17.5	6.76	42.8	24.26	67.06	4.5

Source: authors' elaborations on: Polish Time Use Survey 2003/2004; Italian Multipurpose Survey 2002/2003 and EU-SILC-IT 2006.

in Poland and Italy respectively. In Poland, the larger estimated value for non-working women as compared to working women is attributable to the longer average time spent daily by non-working women in child care, since hourly earnings and the number of people in the two groups are quite similar. In Italy, instead, the earnings gap in favour of working women is such that the value of their child care activity exceeds that of non-working women even if working women are fewer in number and spend less time on it. In both countries, non-working men show the lowest values of child care. Compared to working men, even if non-working men spend more time on child care, their potential earnings are lower and there are fewer people.

The picture for care of the adult is different: in both countries the bigger share is attributable to non-working people and the gender gap is negligible, especially in Italy. Even if its value is much more contained in absolute and GDP terms with respect to child care, nonetheless, the weight of this activity is noteworthy, especially in Italy where it reaches 1 per cent of GDP - a remarkable percentage considering, as reference figure, that public expenditure in long term care for social assistance to disabled, sick and elderly people amounted to 0.17 per cent of GDP in 2008.[11]

4.2 Generalist market replacement cost

Table 4 shows that the total yearly value of unpaid family care work equals 6.79 and 61.77 billion

[11]This is the share of long term care (LTC), to be distinguished from health care, which includes non-residential assistance (care provided in houses and apartments that are not built specifically for persons needing LTC, 63 per cent of the total) residential assistance (nursing homes, residential care homes and old-age homes where there is a permanent presence of care assistants, 24 per cent of the total) and monetary transfers to households where old and disabled people live (13 per cent of the total). Source: Ragioneria Generale dello Stato, 2009.

Table 4: Estimated value of unpaid family care work with the generalist market replacement cost

Poland	Women		Men		All		Total	
	W	NW	W	NW	women	men	Euros	% GDP
Average hourly net earnings (Euros)								
Low qualified job (ISCO 91)	1.42	1.42	1.81	1.81				
Value of care in one year (billions)								
Child care	1.89	2.52	1.65	0.73	4.42	2.37	6.79	3.5
Adult care	0.07	0.12	0.06	0.8	0.18	0.14	0.32	0.2
Total care	1.96	2.64	1.71	0.81	4.6	2.51	7.11	3.7

Italy	Women		Men		All		Total	
	W	NW	W	NW	women	men	Euros	% GDP
Average hourly net earnings (Euros)								
Low qualified job (ISCO 91)	6.81	6.81	7.94	7.94				
Value of care in one year (billions)								
Child care	14.2	18.70	12.3	2.72	32.9	15.02	47.92	3.2
Adult care	2.13	5.28	2.34	4.10	7.41	6.44	13.85	0.9
Total care	16.33	23.98	14.64	6.82	40.31	21.46	61.77	4.1

Source: authors' elaborations on: Polish Time Use Survey 2003/2004; Italian Multipurpose Survey 2002/2003 and EU-SILC-IT 2006.

Euros, which corresponds to 3.7 per cent and 4.1 per cent of GDP in Poland and Italy respectively. As might be expected, the total value of unpaid family work is significantly lower when estimated with the generalist market replacement method with respect to the opportunity cost method. This is because the wage of a general domestic worker, attributed by sex to the same population of participants as the opportunity cost, is lower than the estimated opportunity cost (except for non-working women in Poland for whom it is the same, and for non-working women and non-working men in Italy for whom it is slightly higher). In Poland the difference with respect to the total value of care estimated with the opportunity cost is more contained, whereas in Italy the drop is more evident, mainly due to the difference with respect to OC labour earnings of working women which are 26 per cent higher. The proportion, instead, of the value of adult care on the total value of unpaid family care work is roughly the same as that derived with the opportunity cost approach in both countries.

4.3 Specialist market replacement cost

Table 5 shows that the total yearly value of unpaid family care work estimated with the specialist market replacement cost equals 8.53 and 75.08 billion Euros, which corresponds to 4.5 per cent and 5 per cent of GDP in Poland and Italy respectively. Taking into account the differences in labour earnings between different categories of workers that potentially could replace family care activities provided by members of a household to other members significantly increases the estimated value of unpaid family care work. The value of childcare still predominates in both countries. Whatever the applied approach, the value of childcare supplied by women outweighs that supplied by men. It is interesting to note, instead, that this is not the case for care of the adult in Italy, which

Table 5: Estimated value of unpaid family care work with the specialist market replacement cost

Poland	Women		Men		All		Total	
	W	NW	W	NW	women	men	Euros	% GDP
Average hourly net earnings (Euros)								
Low qualified job (ISCO 91)	1.42	1.42	1.81	1.81				
Physical care(ISCO 51)	1.29	1.29	1.63	1.63				
Teaching (ISCO23)	3.98	3.98	4.27	4.27				
Transport (ISCO83)	1.75	1.75	1.62	1.62				
Value of care in one year (billions)								
Child care	2.46	3.23	1.76	0.77	5.69	2.53	8.22	4.2
Adult care	0.06	0.11	0.06	0.08	0.17	0.14	0.31	0.2
Total care	2.52	3.34	1.82	0.85	5.86	2.67	8.53	4.5

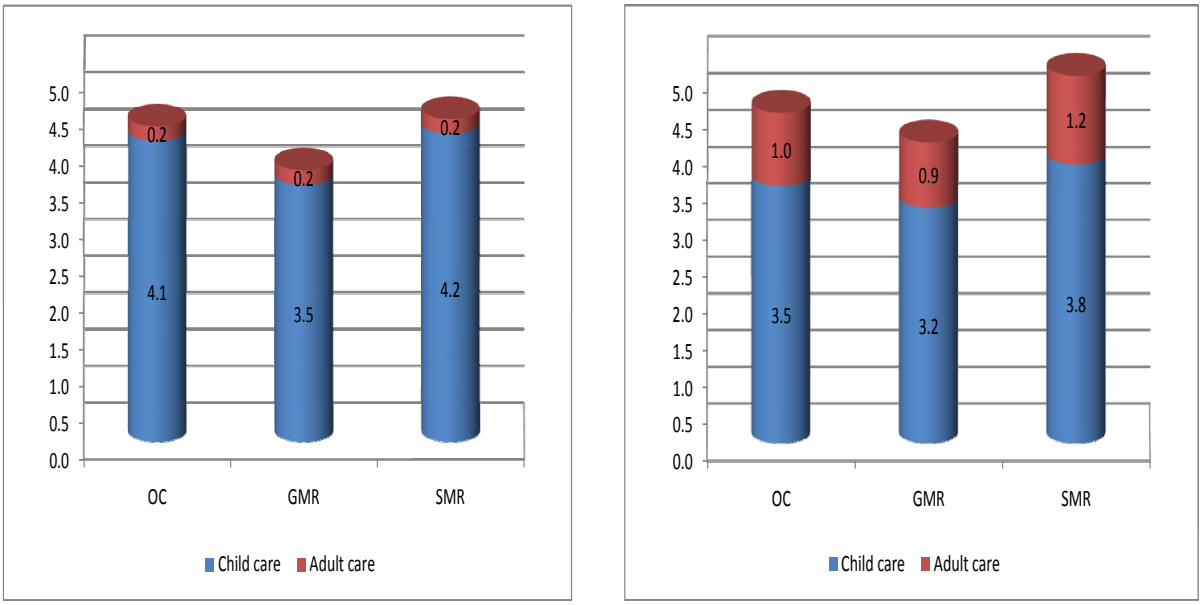
Italy	Women		Men		All		Total	
	W	NW	W	NW	women	men	Euros	% GDP
Average hourly net earnings (Euros)								
Low qualified job (ISCO 91)	6.81	6.81	7.94	7.94				
Physical care(ISCO 51)	7.19	7.19	8.64	8.64				
Teaching (ISCO 23)	15.30	15.30	16.28	16.28				
Transport(ISCO 83)	10.17	10.17	8.76	8.76				
Value of care in one year (billions)								
Child care	17.3	22.9	13.5	2.9	40.2	16.4	56.6	3.8
Adult care	2.57	6.2	3.45	6.26	8.77	9.71	18.48	1.2
Total care	19.87	29.1	16.95	9.16	48.97	26.11	75.08	5.0

Source: authors' elaborations on: Polish Time Use Survey 2003/2004; Italian Multipurpose Survey 2002/2003 and EU-SILC-IT 2006.

is nearly equal with the generalist market replacement cost and which is sensibly higher for men.[12]

4.4 The social cost of unpaid family care work

Figure 1 summarizes the results obtained with the three methods.



(a) Value of care work in per cent of GDP - **Poland**

(b) Value of care work in per cent of GDP - **Italy**

Figure 1: The value of family care work in Poland and Italy

The value of child care in Poland ranges from a minimum of 3.5 per cent of the GDP (GMR) to a maximum of 4.2 per cent of the GDP (SMR). The value of childcare in Italy ranges from a minimum of 3.2 per cent of GDP (GMR) to a maximum of 3.8 per cent (SRM) of GDP. The value of adult care is lower in Poland (almost 0.2 per cent of GDP with all methods) than in Italy (around 1 per cent with all methods). As for the use of these findings in a cost-benefit analysis, the positive difference between the OC and the GMR value of unpaid family care might be symptomatic of a possible waste of resources for the society as a whole. In other words, it might turn out to be more convenient subsidizing or providing public services for certain types of household activities in order to allow a more efficient allocation of the labour force. In Poland, the loss in the value of childcare amounts to 0.6 percentage points of the GDP(a loss of 17 percent), whereas in Italy the loss amounts to 0.3 percentage points (a loss of 9 per cent). In relative terms, the loss in Poland is higher than in Italy, thus supporting the hypothesis that the loss would be higher where public

[12]In Poland the value for adult care does not differ from the value obtained with the generalist market replacement, simply because of the lack of more detailed earnings data on these activities with respect to the generalist wage approach.

services are less developed. However, the loss is contained in absolute terms, if compared to other European countries as shown in Giannelli et al. (2011). Moreover, the picture changes completely if the SMR values are taken into account. These values are higher than the OC values, mainly because of the fact that hourly wages of teachers are imputed to hours spent by family members in teaching children.

5 Concluding remarks

The advantages of the time use micro-data analysis conducted in this paper, compared to that usually performed in similar studies, are that it is possible to (i) identify more accurately not only the amount of time spent in unpaid family care work and the characteristics of the population performing it, but also the characteristics of the population receiving care, the characteristics of the work performed, the days of the week in which this work is done; (ii) distinguish between time devoted to child care and time devoted to adult care, an aspect which is particularly important given the growing interest in family care of the elderly and disabled or sick persons and the lack of studies that estimate its value; (iii) better identify the value of each unit of unpaid family care work (hourly labour income) supplied by the population contributing to unpaid family care; (iv) use more sophisticated techniques to impute labour income to individuals observed in time use surveys (the so called "matching" of different surveys) in order to derive more reliable estimates.

Employing these data and techniques, the analysis has shown that unpaid family care work represents a substantial contribution, ranging from 3.7 to 5 per cent of national product whatever the applied method of estimation. The analysis enables one to estimate the value of unpaid family care work in the two countries separately for child care and adult care. The different years of analysis, the different purchasing power of the two currencies, the use of an exchange rate to convert the Polish value in Euros may entail comparability problems. However, the estimated value computed in percentage of the national GDP turns out to be not only comparable but also very similar.

Two further aspects might be remarked on to the advantage of this approach. The first one is that data and methods adopted in this analysis allow one to disentangle the determinants of the value of unpaid family care work in each country. The analysis has shown that the differences in the estimated value of unpaid family care work in the two countries are due to the proportion of the population involved in unpaid activities and the value of their time in the labour market, whereas the time spent in care-giving is roughly the same in the two countries. The second aspect to remark on is that this analysis has allowed one to estimate the share of adult care in the value of unpaid family work. This is particularly important in ageing societies. In fact, family adult care is quite relevant in Italy, a country with a relatively older population compared to the rest of Europe. In Poland, adult care turns out to be less prominent, because of the younger population. Since the two countries are quite similar in terms of family care regimes, the estimated value of unpaid family adult care should represent two similar regimes at different stages of ageing. This means that in perspective, for a deep understanding of the consequences of ageing, EU countries should place more emphasis on collecting data on paid and unpaid care work of the elderly and disabled

or sick persons. Lastly, since Italy does not show a consistently smaller amount of unpaid family work as compared to Poland, the results might suggest that the grade of economic development is less relevant than culture, traditions and institutions in determining the size of unpaid family work. In conclusion, this analysis has shown that in the two countries studied unpaid family care work would represent a substantial contribution to GDP when valued with different estimation methods, a fact that should not be ignored by policy makers.

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Appendix

The purpose of this appendix is to describe the data sets used for Italy and Poland and to provide additional information on the similarities and differences in the approaches used in the analysis for the two countries. We show, for instance, the results of the Heckman selection model adopted for both countries to estimate the potential earnings for non-working people, but also discuss the need, only for Italy, of combining two data sets (ISTAT Multipurpose 2002-2003 and Italian EU-SILC 2006) due to the lack of income information in the Italian time use survey.

The Polish time use survey is a cyclical survey carried out by The Central Statistical Office. It is based on the representative sample of the households indicative of 6 socio-economic groups (employees, employees with access to agricultural farms, farmers, self-employed, old-age and disability pensioners and persons living on non-working sources of income). The most recent survey was carried out in 2003-2004 and consisted of three parts: a household questionnaire (filled in by a head of the household), a personal questionnaire and a time use diary.
The household questionnaire referred to all household members, irrespective of their age and was filled in by the head of the household. It consisted of 33 questions regarding the composition of the household (with information on gender, age, family relationship and economic activity of each household member), living conditions (type of building, size and fittings of the dwelling, access to the internet), the household's activity regarding growing plants and keeping animals, income of the household (main source of income and its level), assistance obtained and use of different external services.

The personal questionnaire was addressed to all household members aged 15 and above. It consisted of 53 questions grouped in modules regarding different groups of enquired household members. Groups were defined by the type of economic activity. Persons that declared working in the week preceding the survey answered questions concerning the type of organisation they worked for, its ownership, size, sector, type of occupation, type of job, type of contract, time of work, income and second job. Persons that did not work in the week preceding the survey were asked standard questions allowing for the assessment of their activity (forms of looking for work, readiness to undertake a job for two weeks). All persons filling in the questionnaire were asked to answer questions concerning their education career (past and present), voluntary work and community service, assistance offered to persons from outside their household and some information on their health status (illness and disability).

The third questionnaire was a time-use diary - a booklet concerning a list of all activities carried out during a 24-hour span (from 4 AM to 4 AM) divided into 10-minute intervals (144 intervals per day). The diary included information on the main and secondary activity during each span (parallel activity), persons accompanying a surveyed person during a given activity (four categories: alone, with children under 9 from a given household, with another person from a given household and with persons from outside the household) and location of a given activity (or transport mode in case of activity connected with moving). There was also some additional information concerning completing the diary (where it was completed, if it was a special or unusual day, if enquired per-

sons were travelling during that day, where he/she was at the beginning of the record and at the end of the record). All activities were grouped in ten groups: physiological needs, professional work, education activity, household activities, voluntary work in organisations and beyond, social life and entertainment, sport and recreation activities, personal hobbies, using mass-media, time spent on moving and transportation. The instruction for enquirers listed 198 different activities. The time use diary was filled in twice: once on a week day (Monday-Friday) and once on a weekend day (Saturday or Sunday).

As said before, one of the most important advantages of the Polish time use survey is the availability of information on income. This enables one to use the labour earnings of individuals working recorded in the Polish time use survey to impute the value of each unit of unpaid family care work for people reported performing care activities in the same survey. Unfortunately, this is not possible for the Italian time use survey since it does not include income information and data on income need to be imputed from a different source.

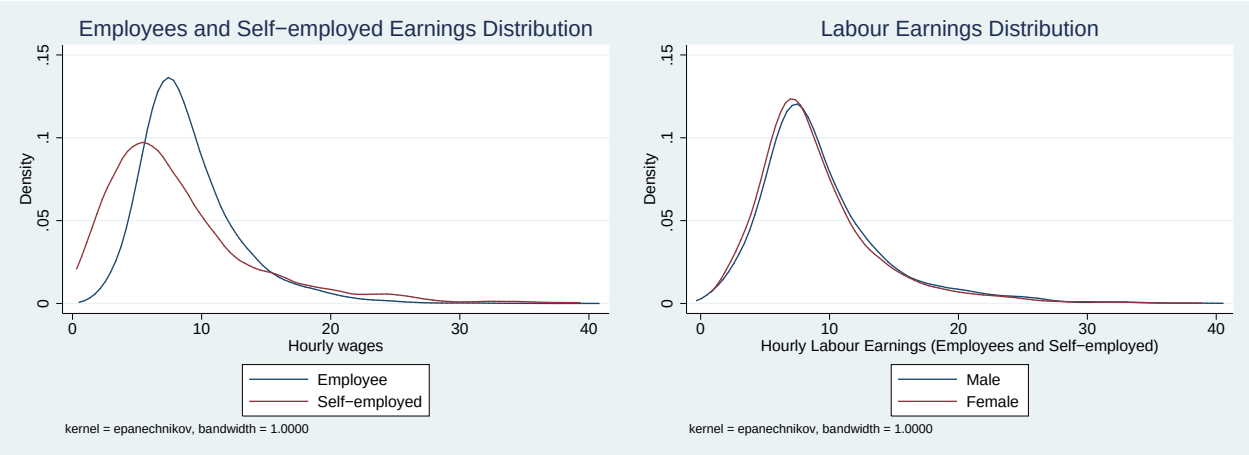
The Italian Multipurpose 2002-2003 time use survey, carried out by the Italian Institute for Statistical (ISTAT), provides detailed information on adult care activities (for disabled, sick or old people) and child care activities. The survey covers a sample of 21,075 households for a total of 55,773 individuals. The unit of observation is the *de facto* family defined as a group of people who share the same house with the household head and have with him/her a family or affective relationship. The survey is composed of three questionnaires: the individuals'questionnaire contains general information on the individuals and their household, the daily questionnaire records the daily use of time of all the household individuals aged three years or more, and the weekly diary records the weekly use of time for all the household individuals aged 15 years or more. Individuals are required to fill in the daily questionnaire for week-days, Saturdays, and Sundays randomly . Sample weights are used to obtain statistics representative for the whole Italian population. Weights need to be multiplied by 5/7 for individuals who filled in the diary on a weekday and by 1/7 for those who filled in the diary on Saturday or on Sunday.

Of the 55,773 individuals only 51,206 filled in the daily diaries providing information on daily individual time use for nearly 92 per cent of the sampled population. Of the total available diaries, 16.48 per cent were collected in days defined as "particular day" by the respondents including holidays (18 per cent), travelling (15 per cent), personal or family health problems (10 per cent), unusual work or study engagement (8 per cent) and others. Aiming to estimate the unpaid family care work at national level in a certain interval of time (e.g. one year) "particular days"are kept in the analysis as exceptional days that contribute to explaining the average allocation of time in one year. The Multipurpose survey contains a great deal of information regarding the households' use of child care and adult care classified, as in the Polish time survey, in ten groups: physiological needs, professional work, education activity, household activities, voluntary work in organisations and beyond, social life and entertainment, sport and recreation activities, personal hobbies, using mass-media, time spent on moving and transportation, enabling a detailed analysis of the time each household member spend on each activity. Unfortunately, it does not provide data on family

members' income and wages. The EU-SILC (European Union Statistics on Income and Living Conditions) is a European household survey for 24 EU member States plus Norway and Iceland which has the advantage of being comparable with that collected in several other European countries. The data set provides a detailed range of information on several household aspects including family composition, household income, taxes and benefits. It also collects information at individual level on work status, health, education and also labour earnings but does not provide information on time use making it inappropriate as a unique source for the evaluation of the value of the unpaid family care work. In order to overcome these limits, we combine the Multipurpose survey with the Italian EU-SILC survey. The basic idea is to use the value of the labour earnings of individuals observed in the EU-SILC data set as a proxy for the value of the time individuals in the Multipurpose survey devote to unpaid family care work. In doing that, we selected in both data sets individuals aged 18-74 assuming that this is the age in which individuals are active, that is, able to perform either paid or unpaid work activities. An individual is then defined as "working" if the individual reports being working in the question v14 (col. 32) on the "Self-defined current main occupation" in the Multipurpose survey and being "working full-time" or "working part-time" in the question pl030 on "Self-defined current economic status" in the EU-SILC 2006 survey.

The interpretation of the value of the time spent in unpaid work, and consequently, the technique adopted for the imputation of the labour earnings from the EU-SILC data set is different for the opportunity cost approach and the replacement cost approach. The opportunity cost method is based on the idea that each hour devoted to domestic activities could have been sold in the labour market instead. As the alternative option could be either work as employee or self-employed both types of earnings are taken in consideration. The market replacement cost is based on the assumption that households save money by performing family care work themselves instead of buying similar services on the market or hiring someone to provide them for the household. In principle services can by bought either from employees or self-employed providers, thus, even in this case, both types of earnings are included. As expected Figure 2 (left panel) shows that self-employed earnings have a higher variance. However, keeping together self-employed and employees earnings, men ad women earnings distributions are very close (see Figure 2 - right panel).

The estimation of the value of unpaid work can be seen as a problem of missing values in the Multipurpose survey. The technique adopted for the imputation with the market replacement cost method is much easier than that needed with the opportunity cost approach since it only requires one to impute the cost of care services which do not depend on the caregivers' characteristics. Thus, for the generalist market replacement the chosen labour earning imputed to each family caregiver, either working or not working, corresponds to the average labour earning of the generalist domestic worker identified in the EU-SILC data base as individuals working as 'Sales and services elementary occupation" (ISCO-88, code 91), which includes, among other similar occupations, the category "Domestic and related helpers, cleaners and launderers". As for the specialist replacement cost, time use categories in the Multipurpose survey were matched with four specialist ISCO-88 occupational classes in EU-SILC, and average occupational classes earnings are used for the imputation as follows: "Personal and protective services workers" (ISCO-88, code 51) imputed



(a) Employees and Self-employed

(b) Labour earnings

Figure 2: Labour earnings

to the time use category "Physical care and supervision of a child" and to "Adult physical care"; "Teaching associate professionals" (ISCO-88, code 23) imputed to the time use category "Helping children with homework"; "Drivers and mobile plant operators" (ISCO-88, code 83) imputed to the time use category "Going out with children, transporting a child"; "Sales and services elementary occupations" (ISCO-88, code 91) imputed to the time use category "Other child care and child and adult care performed inside and outside the household".

With the opportunity cost approach each hour devoted to family care should be evaluated at the labour earning a caregiver could aim at given his/her individual characteristics if she/he instead decided to sell this hour in the labour market. For working people, the value of the unpaid work is therefore equal to their actual labour earnings. For non-working people, who are performing care work but potentially might supply their labour force in the market, the value of the unpaid work is their potential earnings. In this case, then, there are two complications: 1) the need to estimate the potential earnings for individual in the EU-SILC data set who are not-working, 2) the imputation of labour earnings and potential labour earnings from the EU-SILC data set to the the Multipurpose data set. The potential earnings have been estimated using the Heckman Selection model (Heckman, 1979) separately for men and women. Results of the analysis are shown in Table 6. The un-weighted summary statistics of the observed and predicted labour earnings are reported, separately by gender, in Table 7.

Turning to the imputation of earnings form EU-SILC data set to Multipurpose data set a variety of techniques could be used in order to perform unbiased imputation. The choice of the technique is subject to the missing mechanism. When the missing data are a random sample of observable data the missing mechanism is called MCAT (Missing Completely At Random). In this case the missing data is not dependent on observed or missing data. If the probability of an observation being missing depends only on observable data but not on unobservable missing data the missing

Table 6: Estimation results : Heckman Selection Model (people aged 18-74)- Italy

	Men		Women	
Variable	Coefficient	Std. Err.	Coefficient	Std. Err.
	Equation 1: hourly earnings (ln)			
Aged 18-30	-0.474***	-0.054	-0.436***	-0.051
Aged 31-40	-0.331***	-0.052	-0.319***	-0.048
Aged 41-50	-0.25***	-0.049	-0.226***	-0.045
Aged 51-65	-0.158***	-0.043	-0.083**	-0.039
Not EU citizen	-0.122***	-0.021	-0.122***	-0.025
Lower secondary education	0.084***	-0.017	0.083***	-0.023
Secondary education	0.230***	-0.018	0.316***	-0.023
Post-secondary non tertiary education	0.237***	-0.023	0.340***	-0.026
Tertiary Education or Higher	0.524***	-0.021	0.578***	-0.025
Years of work experience	0.018***	-0.003	0.01***	-0.003
Years of work experience (square)	0.000***	0.000	0.000	0.000
Years of regular job	0.004	-0.003	0.007**	-0.003
Years of regular job (square)	0.000***	0.000	0.000***	0.000
Intercept	1.920***	-0.061	1.829***	-0.062
	Equation 2: Employment selection			
Aged 18-30	1.061**	-0.503	1.902***	-0.406
Aged 31-40	0.609	-0.476	1.938***	-0.399
Aged 41-50	0.241	-0.458	0.661*	-0.372
Aged 51-65	-0.379	-0.397	0.032	-0.330
Not EU citizen	0.535**	-0.25	-0.071	-0.207
Lower secondary education	-0.015	-0.157	-0.027	-0.192
Secondary education	0.280*	-0.165	0.626***	-0.202
Post-secondary non tertiary education	1.214***	-0.453	0.551**	-0.272
Tertiary education or Higher	0.719***	-0.225	0.965***	-0.253
Never married	-1.037*	-0.596	-0.429	-0.306
Married	-0.959	-0.587	-0.467	-0.300
Speared or Divorced	-1.329**	-0.608	-0.557*	-0.334
Person has chronic illness	-0.168	-0.136	0.254	-0.190
Household size	0.143	-0.129	0.328**	-0.156
Two adulst, no dep. children, both younger than 65 years	0.720***	-0.211	0.842***	-0.253
Two adults, no dep. children, at least one 65 years	0.677**	-0.31	0.802**	-0.389
Other households without dep. children	1.036***	-0.349	0.866**	-0.397
Single parent with one or more dep children	0.140	-0.423	0.173	-0.316
Two adults, one dep. child	0.843***	-0.306	0.875**	-0.341
Two adults, two dep. children	1.261***	-0.44	1.52***	-0.499
Two adults, three or more dep. children	1.270*	-0.659	1.362*	-0.727
Other households with dep. childrens	1.050**	-0.49	0.673	-0.499
At least one child in the household aged 0-2	-0.305	-0.234	-0.59**	-0.273
At least one child in the household aged 3-8	-0.589**	-0.23	-1.207***	-0.27
At least one child in the household aged 6-14	-0.178	-0.22	-0.463*	-0.268
At least one child in the household aged 15-17	-0.315	-0.227	-0.383	-0.285
At least one person in the household aged 18-24	-0.275*	-0.163	0.027	-0.190
At least one person in the household aged 25-64	0.712***	-0.249	0.369	-0.270
At least one person in the household aged 65-74	0.221	-0.247	0.095	-0.314
At least one person in the household aged 75 or more	0.017	-0.285	-0.161	-0.333
Years of work experience	0.053**	-0.026	0.207***	-0.028
Years of work experience (square)	0.000	0.000	-0.002***	-0.001
Years of regular job	0.104***	-0.022	0.102***	-0.023
Years of regular job (square)	-0.002***	0.000	-0.003***	0.000
household's income (ln)	-0.015***	-0.003	-0.01***	-0.002
Intercept	-0.506	-0.821	-3.223***	-0.525
athrho	-0.091	-0.121	0.197**	-0.096
lnsigma	-0.789***	-0.007	-0.801***	-0.008
rho	-0.910	0.120	0.194	0.092
sigma	0.454	0.003	0.449	0.003
lamda	-0.041	0.055	0.087	0.005
LR test of indep. eqns. (rho = 0)	chi2(1)=0.64 Prob>chi2=0.4248		chi2(1)=3.64 Prob>chi2= 0.056	
Observations	Cens:7140, Uncens:10943, Tot: 18083		Cens:11728, Uncens:7643, Tot: 19371	

Source: Eu-Silc 2006 Italy, authors' elaborations. Significance levels : * : 10% ** : 5% *** : 1%
Unweighed estimation, controlled for regions and degree of urbanization. †51-60 for women, ††do not include the individual's labour income.
Baseline category:aged 66-74 for men and 60-75 for women, pre-primary and primary education, widowed, one person household.

Table 7: Summary statistics of observed and predicted labour earnings - weighted

	Men			Women		
Variable	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Observed hourly earnings	9.386	5.115	11734	8.996	4.900	7901
Predicted (adjusted) hourly earnings (all)	8.795	4.380	18868	7.525	3.561	19624

Source: Eu-SILC 2006 Italy, authors' elaborations.
Adjusted means corrected for the log back transformation bias

mechanism is called MAR (Missing At Random). The MCAT is the best scenario and enables one to obtain unbiased results even with simple approaches. The MAT scenario can also enable one to obtain unbiased results but only if more advanced approaches are applied. When the missing values are generated by a "non answer process" it is quite difficult to establish the missing mechanism. However, in some cases the researcher can be confident that the missing mechanism is a MCAT (Schafer, 1997). This is when information is not available because the question was not introduced in the questionnaire; in this case the missing mechanism depends on the sampling design. This is our case. In fact, the questions on earnings are not in the Multipurpose sample and so the missing values in earnings depend on the sampling design that is random for the Italian population. Once we established that the missing mechanism is an MCAR we can use different techniques which rely on this assumption.

The analysis for Italy in this study is conducted using the Propensity Score Matching (PSM) for the opportunity cost method. The propensity score is defined as the conditional probability to be assigned at a treatment given a vector of observable covariates (Rosenbaum and Rubin 1983). In the imputation context the PS estimates the "likelihood/probability" of "having the outcome observed" for any subject with a similar background measured by the independent variables. Subjects with close propensity scores are considered "similar" and will be matched together. The procedure adopted for the PS matching is the "Nearest neighbours matching". The intuition behind this procedure is to assign to each individual who performs unpaid care work in the Multipurpose survey the labour income of the individual observed in the EU-SILC survey with the closest characteristics (i.e. age, marital status, education, etc.). To make matching feasible two conditions must hold: (i) the two surveys must be random samples of the same population (ii) there must be a common set of conditioning variables in the recipient and in the donor data set. In our cases the first condition is satisfied since both Multipurpose and EU-SILC data sets are randomly selected from the Italian population. The second condition is also satisfied after some recoding of the common information in the data sets. Once this common set of characteristics is chosen and properly coded we created a new data set "appending" the Multipurpose survey data set and the EU-SILC 2006 survey data set.

To impute the labour earnings for the opportunity cost method working men and working women observed in the Multipurpose survey are matched with working men and working women observed in EU-SILC controlling for all their relevant observable background characteristics. For these two sub-samples we also control for job characteristics in order to match individuals who perform "similar jobs" in "similar conditions"(e.g. same sector, same type of contract). In this way it is

possible to impute the value of unobserved labour incomes to people at work sampled in the Multipurpose survey. These labour incomes are used as a proxy of the opportunity cost of the time spent in unpaid family care work for workers sampled in the Multipurpose survey.
Non-working men and non-working women in the Multipurpose survey, for whom labour incomes are obviously not observed, are also matched with the sub-samples of working men and working women with similar characteristics in EU-SILC. The matching procedure is the same as the one used for the two sub-samples of working men and women in both the Multipurpose and EU-SILC data sets but the set of covariates used and the output obtained are different. Here, only the background characteristics (and not job-related variables) can be used as covariates for the match and the imputed labour earnings are the potential labour earnings of non-working people. The imputed earnings are then used as opportunity cost for individuals who are non-working.