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**Measuring the Interaction Between
Parents and Children in Italian Families:
a Structural Equation Approach**

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In this paper we theoretically and empirically analyse the capability to social interaction between parents and children in Italy, within a capability approach framework. For this purpose, after having identified the functionings and conversion factors related to this capability, we have built an integrated dataset for year 2008 with a procedure inspired to the propensity score matching. This allows us to work on a wide set of information, both on the realized functionings, and on the personal and familiar factors that are likely to affect children's attainments. We have then analysed this data using a structural equation model. Our results suggest lower levels of interaction for fathers that for mothers. Further, children's capability to interact with the parents is negatively affected by the number of siblings in the household, by child's increasing age and by living in the South of Italy. Also parents' characteristics are crucial: highly educated fathers tend to perform better in their interaction with the child and father-child relationship, furthermore, is positively affected by the fact that the mother is employed, while mother-child interaction does not significantly change.

1.   Introduction[1]

The capability approach represents a powerful informational framework that focuses on the space of capabilities in order to understand the multidimensional concept of well being, i.e. on the freedom a person has to be the person she wants to be, and to do the things she may value (Sen, 2009).

The capability approach stresses how the space of capabilities is influenced by personal, familiar and environmental characteristics (Sen, 1985, p.17). In the case of children, family characteristics and parents' idea of what is a good life tend to shape children's opportunities and achievements. It is therefore clear that in child well-being evaluations researchers should not only consider children's realised functionings, but they should also study to what extent parental care and parents' characteristics influence children's capabilities development.

In this paper, we adopt the analytical framework of the capability approach, in order to model the capability to social interaction of Italian children with their parents, on both a theoretical and empirical level. Child-parent social interaction refers to the interaction opportunities and to the activities children engage in with parents, as well as to the way they behave in these occasions. Social interaction is a relevant dimension of child well being, as it is intrinsically valuable and as the development of social abilities in the childhood leads to an higher level of social competences over the entire life cycle: research carried out in developmental psychology stresses the importance of living circumstances and experience during the childhood and adolescent years for future attainments (see Haveman and Wolfe 1994 for a review) and suggests that behavioural problems during the childhood are likely to persist also during the adolescence years (Campbell 1995).

In order to empirically analyse the interaction between parents and children, we have built a dataset using a micro procedure inspired by propensity score matching, similar to the one first carried out in Morciano (2005) and Addabbo et al. (2007), combining the information included in the Istat Multipurpose Survey on Daily Life for year 2008, with the one provided by the Bank of Italy Survey on Household's Income and Wealth for the same year. The matched dataset includes a wide set of information on different aspects of

children's daily life, such as the typology and frequency of interaction with their parents, together with information on the personal, familiar and environmental sociodemographic factors that affect children in the development of this capability, as well as a quantitative information on household income and wealth.

This data is analysed using the Multiple Indicators and Multiple Interrelated Causes (MIMIC) approach, a tool widely used in the literature focusing on well-being evaluation within a capability approach framework, that helps us in understanding the mechanism that drives the development of this capability. In particular, we study the social relationship between parents and children aged 3 to 8, within a model that considers social interaction as a latent variable, that is measured imperfectly by a set of reflective indicators (the functionings) and that is influenced by a set of exogenous variables (the conversion factors).

The paper is organized as follows. In Section 2 we focus on the functionings and conversion factors related to the capability to interact socially. The relevant economic literature is presented in Section 3, while Section 4 describes the methodological framework of the MIMIC approach. In Section 5 we present the data used in our analysis, while the results of the structural model referred to the interaction between parents and child are discussed in Section 6. The last Section concludes.

2.   The capability of social interaction

Given the multidimensional concept of well-being, several authors have endorsed lists of central capabilities, representing beings and doings that are universally valuable and that policy makers should address for the development of citizens.

Nussbaum's well-known list (2000) contains ten capabilities, that a society should guarantee to all its citizens for them to live with dignity. Nussbaum's list contains "affiliation", that reflects individuals' social dimension and that is denoted as the ability "*to live with and toward others, to recognize and show concern for other human beings, to engage in various forms of social interaction; (…), having the social bases of self-respect and non-humiliation; being able to be treated as a dignified being whose worth is equal to that of others*" (2000, p. 79).

In this paper, we focus on the social interaction between the parents and the child. Social interaction represents an important constituent not only of men's and women's well-

being, but also of children's well-being. The intrinsic value of this dimension is given by the fact that the human being is socially grounded, and this dimension must therefore be developed for him to become a full member of the society. The child-parent relationship is even more important in a country like Italy, where 46.5 percent of couples have only one child (Sabbadini, Romano, Crialesi, 2010).

The capability to social interaction is widely recognized as fundamental for children: it has an instrumental value, as the development of this capability in the childhood plays an important role for its further development in the adulthood, as well as for the expansion of other capabilities (Addabbo, Facchinetti, Di Tommaso, 2004 and Biggeri et al., 2006). This capability is strictly linked to others, as it provides capacity to study, to be well-educated, to be engaged in sport activities, to be motivated, but also to work in a team in the adulthood. Also, studies in psychology have demonstrated that the security of the infant's attachment to the parents, and especially to the mother, is an important factor affecting future outcomes, such as relations with peers, self-esteem and behaviour problems (Thompson, 1998).

Several authors have proposed different lists of central children's capabilities. Although the differences among them, all of them include the social dimension or related behaviours: it is called "affiliation" by Di Tommaso (2007), "social interaction" by Addabbo, Facchinetti, Di Tommaso (2004) and "social relations" by Biggeri (2004). Phipps (2002), instead, considers "bullying". White (2002), Di Tommaso (2007), Addabbo, Facchinetti, Di Tommaso (2004) and Biggeri et al. (2006) have also pointed out that the evaluation of child well-being should take in consideration different conversion factors than the case of adults.

Hence, in order to better understand the capability of the children to interact with the parents, as well as the factors driving its development, it is important to identify the conversion factors and the functionings related to it. The starting point for defining this capability is to observe the type and the number of child's relationships with parents. The functioning of social interaction is defined by the type of activities children engage in with the parents, the frequency of these activities, the kind of attachment relationship between parent and child and so on (Addabbo, Facchinetti, Di Tommaso 2004). Different social activities are likely to imply different levels of interaction: watching TV together is probably less valuable than the activity of playing together, or of reading a story to the child, as it is less dynamic and has a lower educational content. Also, as highlighted by

Nussbaum (2000), interaction opportunities should occur between parent and child with an appropriate behaviour, showing self-respect and respect for the other.

When reasoning about the conversion factors of children's capabilities, we must be aware of the fact that familiar factors play an important role in the developing of this capability. According to Biggeri et al. (2006), children's capability sets are influenced by their parents' capability sets, as they are shaped by the same available means and by the same environmental factors. Therefore a sort of *"intergenerational transfer of capabilities"* (p. 63) exists, and family and parents' characteristics are important determinants of children's attainments.

A relevant conversion factor of child's capability of social interaction is for example the kind of household in which he grows up. Growing up in lone parenthoods has shown to negatively affect educational and psychological outcomes (McLanahan, 1997), in addition to being correlated to higher poverty rates. This is a relevant social factor in Italy, where divorces rates have grown from 8 percent in year 1995 to 15.1 percent in year 2005 (ISTAT, 2007).

Further, the increase in the labour force participation of women in industrialized countries over the last decades, and the subsequent increase in nonmaternal child care supply has led the economic and psychological debate on the impact of maternal employment on children's outcomes. In addition, a change in mother's employment condition is likely to affect also the time the father spends with his child, that in Italy is very low, especially in the South (Bloemen, Pasqua and Stancanelli, 2010).

The psychological literature has analysed the relation between mother employment and the quality and quantity of her interaction with the child, especially during the early childhood, as the infant-mother attachment security has positive consequences on child future outcomes (Thompson, 1998). However, the empirical evidence is not conclusive. Booth et al. (2002) use U.S. time-use data and find that when the infants spend at least 30 weekly hours in non-maternal childcare, mothers spend 32 percent less time interacting with their child; however, the quality of the interaction is not negatively affected: as the time spent apart increases, the decreasing quantity of mother-child interaction may be compensated by an increase in the attention and involvement demonstrated during the interaction. Instead, the National Institute of Child Health and Human Development Early Child Care Research Network (NICHD ECCRN) has shown that the replacement of maternal care with nonmaternal child care lightly decreases the quality of the interaction over the first three years of life (NICHD ECCRN 1999), but with no significant effect on

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the infant's attachment security to the mother (NICHD ECCRN 1997). Subsequent longitudinal analyses have shown that child care history is likely to affect children outcomes also later in life (NICHD ECCRN 2003)[2].

The economic literature on child-parent interaction has focused in particular on the link between parents' employment and cognitive and educational outcomes. As pointed out by Ermish and Francesconi (2005), maternal employment produces a positive income effect and a negative substitution effect on the time women spend with their children: while non-working spend more time with their child, working mothers can more easily afford to pay for better educational goods and services. Obviously, it is important to observe what kind of child care replaces mother's time, as not only the person that cares is relevant, but also quality of the care. Also, an endogeneity problem arises when examining childcare and employment decisions, as women self-select themselves into the labour market, according to their observable and unobservable characteristics, as well as to their child's abilities and problems (Bernal 2008). For example, mothers of a child with disabilities may prefer not to work and to devote themselves to the child. Therefore it is not straightforward to predict the link between mothers' employment and children's development, and empirical evidence is not conclusive (see Ermish and Francesconi 2005 and Bernal and Keane 2010 for a review).

However, the economic and psychological literature has highlighted the positive impact of high-quality child care on maternal sensitivity (NICHD ECCRN 1999 and 2003) and on other children's outcomes, these effects being stronger for children from low-income and low-education families (OECD 2006, Peterson and Peterson 1986, Lamb 1998, Del Boca and Pasqua 2010) and in case of maternal depression (NICHD ECCRN 2003).

Also other environmental social factors, like the supply of full-time schools, the presence of parks and other open spaces where the children can enlarge their social network and competence, as well as the diffusion of sport, artistic and other social activities influence the child's capability set (Addabbo, Facchinetti, Di Tommaso 2004).

Finally, as suggested by Addabbo, Facchinetti and Di Tommaso (2004), institutional factors impact on the possibility of parents to interact with children. In Italy, Law No 53/2000 regulates paid maternal and parental leave and benefits for working parents. Maternal leave is compulsory and has a 5 months length, while parental leave gives the right to parents of children aged under eight to take the leave for an overall

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[2] For a complete review of the psychological literature focusing on mother employment, child care and mother-child interaction see, among others, NICHD ECCRN 2003.

period of ten months and with an incentive for fathers to take the leave. However OECD data demonstrate that in year 2007 only 0.2 percent of the Italian fathers with a child aged less than one were on leave, suggesting that in Italy childrearing is still mainly considered a mother's responsibility.

3.   Literature review

Although it is considered a relevant dimension of child well being, the empirical capability literature that focus on the determinants and achievements of social interaction is not very rich.

Addabbo, Di Tommaso, Facchinetti (2004) produce a theoretical analysis focusing on the environmental conversion factors and the functionings related to the capability to social interaction of Italian children. Furthermore, they pioneer the application of the fuzzy approach to the measurement of child well being, proposing a fuzzy expert system for the interaction between father and child.

Addabbo, Facchinetti, Mastroleo (2006) study the interaction between father and child implementing a fuzzy expert system using ISTAT Multipurpose data for year 1998 and focusing on one-child families. Their findings suggest that fathers in teaching jobs or in white-collar positions tend to perform relatively better. Also, fathers are more likely to have an higher level of interaction with daughters than with sons, although this result is partially affected by the rules according to which the fuzzy expert system has been constructed.

The same system is then used in Addabbo et al. (2008) and extended also to mother-child interaction, if both parents live with the child. For this purpose they use a new data set obtained by matching the available information on household income included in the Bank of Italy Survey on Income and Wealth 2000 with information on parent-child interaction provided by ISTAT Multipurpose data 1998. This procedure allows them to have extra-information that can be relevant in their analysis. In this paper we have addressed the same issue implementing a procedure inspired by the propensity score matching similar to the one performed by Addabbo et al., but with some important improvements (see the Appendix for more details).

The findings by Addabbo et al. suggest a significantly higher level of interaction of mothers respect to fathers. Fathers that are teachers, white-collars or unemployed tend to

perform relatively better, while mothers living in the South of Italy are more likely to have a low level of interaction with their child. Interestingly, data reveal also a significant positive complementarity in parents' involvement in activities with their child.

4.   MIMIC approach for the operationalization of the Capability Approach

As pointed out by Sen (1980, 1985, 2009), the capability set represents the space within which evaluate human well-being. Many researchers have underlined that, since the space of potential functionings is not observable, the operationalization of the capability approach requires statistical techniques that are able to conceptualize the capability as a latent variable, or a factor underlying a set of indicators (see, among others, Kuklys 2005, Di Tommaso 2007, Krishnakumar 2007).

Such a tool is represented, for example, by Structural Equation Models, and in particular by the Multiple Indicators and Multiple Interrelated Causes (hereafter MIMIC) approach, that was originally developed by Jöreskog and Goldberger (1975).

Within this framework, each latent variable – the capability – is measured by multiple indicators, representing imperfect signals of the underlying construct, as they are subjected to measurement errors. Indicators are referred to as "reflective", as they are manifestation of the latent factor, implying that a variation in the capability determines a variation in all functioning measures.

A further appeal of this method is connected to the fact that it allows us to identify the causal link between the observed exogenous factors (i.e. resources and conversion factors) and the latent capabilities. Being aware of the mechanism that drives the development of capabilities is the very first step toward the design and implementation of public policies aimed at enlarging the space of human possibilities. The adequacy of the capability approach as a normative framework for well-being evaluations and policy-making is therefore preserved also within the MIMIC operationalization strategy[3].

Formally, MIMIC is a methodology that allows us to estimate two sub-models: a structural equation model, showing the causal link between the observed indicators and the

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[3] Previous works that use Structural Equation Modelling for operationalising the Capability Approach are, among others: Kuklys (2005), Di Tommaso (2007), Krishnakumar (2007), Krishnakumar and Ballon (2008).

latent capabilities, and the measurement model, in which capabilities are estimated through multiple observable indicators using Confirmatory Factor Analysis.

To investigate the capability of Italian children to interact socially with the parents, we estimate a model with two latent factors (one related to the interaction with the father and one related to the interaction with the mother). These are likely to be correlated, as they may be affected by the same exogenous shocks, or because of the presence of unobserved heterogeneity correlated within household.

The measurement model is therefore made up of two equations, having the following structure:

$$y^m = \Lambda^m \eta_m + \varepsilon_m$$

$$y^f = \Lambda^f \eta_f + \varepsilon_f$$

Where the first equation refers to the mother and the second to the father, with η_m and η_f representing the latent capabilities. The vectors $y^m = (y_1^m, y_2^m, ..., y_n^m)$ and $y^f = (y_1^f, y_2^f, ..., y_n^f)$ represent the observed independent indicators of the respective capabilities. $\Lambda^m = (\Lambda_1^m, \Lambda_2^m, ..., \Lambda_n^m)$ and $\Lambda^m = (\Lambda_1^f, \Lambda_2^f, ..., \Lambda_n^f)$ represent the respective vectors of factor loadings. The variance-covariance matrixes across the error terms of the indicators of the two capabilities, ε_m and ε_f, are indicated by Θ_ε^m and Θ_ε^f. Each of them is diagonal, as the errors are assumed to have covariance equal to zero: the indicators are assumed to be correlated only as an effect of the common factor. No other factors are assumed to influence the indicators, as this would imply that the latent variable we are analysing is not the only one underlying the set of our indicators.

The structural model can be written as follows:

$$\eta_m = x_m' \gamma_m + \zeta_m$$

$$\eta_f = x_f' \gamma_f + \zeta_f$$

Where γ_m and γ_f are vector of parameters and x_m and x_f are vectors of observable exogenous variables, corresponding, in the terminology of the capability approach, to the available resources and to the conversion factors. Furthermore, ζ_m and ζ_f represent the disturbance errors in the structural model, that are allowed to be correlated with correlation coefficient $\rho_{m,f}$.

5.   The microdata used to analyse the capability to social interaction

The data used in this analysis derives from a matching procedure that combines the information of the Istat Multipurpose Survey on Daily Life (hereafter ISTAT) for 2008, with the information from the Bank of Italy Survey on Household's Income and Wealth (SHIW) for 2008. The matching has been carried out in order to give us the possibility to work on a wide set of data, including information on the social activities and behaviours related to the capability of social interaction between parents and children, and on individuals' and households' conversion factors. The ISTAT survey contains many information on both of these, in particular as it dedicates a entire section to the daily life of Italian children aged less than 17; however, it lacks a quantitative data on household income.

Vice versa, SHIW lacks information on social aspects of the daily life, and in particular on the interaction activities of children with the parents. For this reason, as in previous papers analysing children well being and capabilities (Addabbo et al. 2008), a matching procedure has been carried out. The procedure is inspired by propensity score matching (Rubin 1977, Rosembaum and Rubin 1983; Dehejia and Wahba 1999), and it was originally developed by Morciano (2005). In short, the SHIW and ISTAT units are matched according to their similarity with respect to set of common covariates. In the present work, as the matching has been carried out with the main goal of performing analysis on child well-being, the variables that are taken into account for assessing similarity are the ones we consider the main conversion factors, i.e. they include both individual characteristics and parental and household sociodemographic characteristics[4].
The matching procedure allows us to carry out our empirical analysis on a sample of children on which a wide set of information is available.

In this work we restrict our analysis on children living in households where both parents are present: although it would be interesting to see how children living in single parenthoods perform with respect to the others, the sample of lone parent households is too small for such an analysis. Further, for our empirical analysis we focus on children belonging to the age group 3 to 8 and we exclude all observations in which one or more of the variables of interests are missing. Our final sample is made up of 830 children (395 girls and 435 boys), one fourth of those are only-child.


[4] See the appendix for more details on the matching precedure.

Table 1: Parental sociodemographic characteristics

		Fathers	Mothers
Age		40	37
Educational attainment			
Primary school		5.04	5.40
Secondary school		47.25	40.79
High school		35.77	35.89
Degree		11.92	17.91
	Total	100	100
Professional condition			
Unemployed		4.86	9.35
Not employed (student, retired..)		0.31	0.37
Housewife		0.00	36.29
	Total not employed	*5.17*	*46.01*
	Total employed	*94.83*	*53.99*
	Total	100	100
Employment position			
Blue-collar		42.83	29.26
White-collar		24.36	44.93
Manager		9.67	5.46
Self-employed		22.88	17.30
Collaboration worker		0.25	3.04
	Total	100	100
Average working hours			
Less than 30		6.98	25.98
More than 30		93.02	74.02
	Total	100	100

Source: Our elaboration on Matched Dataset 2008

Given the importance of parents in the development of children, we also look at their sociodemographic characteristics (see table 1). Mothers and fathers are, on average, respectively 37 and 40 years old. The former are better educated than the latter: 18 percent of the mothers have a university degree, this is against about 12 percent of the fathers. However, while 95 percent of fathers is employed, only about 54 percent of the mothers' sample is at work, but with deep regional differences: the South of Italy shows very low employment rates among the mothers, equal to 33.8 percent, while the Centre and the North are much more dynamic realities, with employment rates respectively equal to 60.1 and 70.8 percent.

Figure 1: Percentage of places available in kindergarten (private and public) by Italian region for 0-2 year olds.

Childcare supply

Places available in %
21.5 - 28.4
15.5 - 21.5
14.4 - 15.5
9.9 - 14.4
4.9 - 9.9
2.7 - 4.9
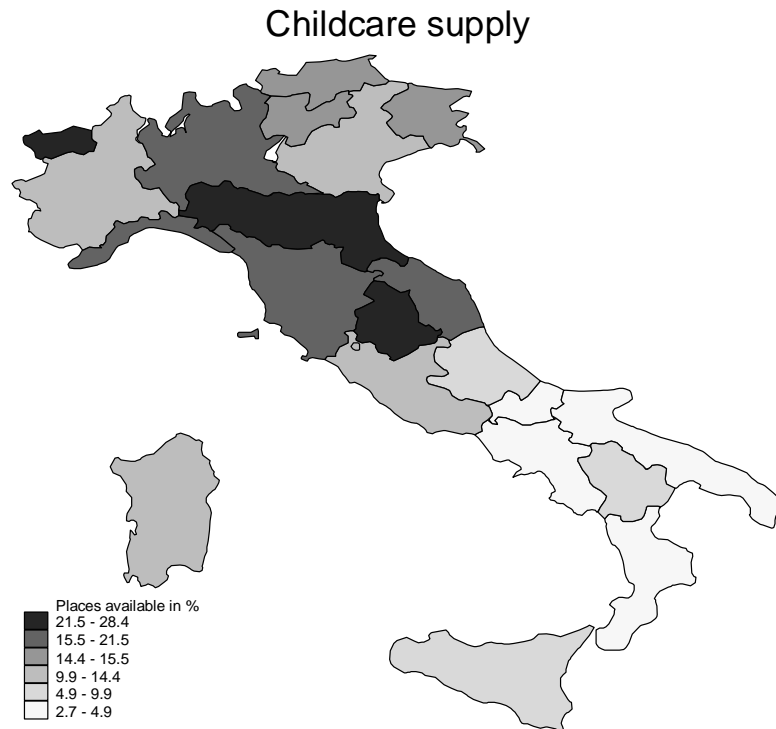
Source: Our elaboration on ISTAT (2010)

The persistence of regional differences in mothers' employment is in line with the higher diffusion of public childcare services in the North and in the Centre of Italy (see figure 1), as well as with the higher availability of part-time working positions in these areas. In fact, the percentage of mothers working less than 30 hours (equal to 26 on average in Italy) ranges from about 31 in the North to 16 in the South, suggesting that part-time as a conciliation instrument is more widespread in the Northern regions (table 1).

Finally, when employed, mothers are much more likely to be in white-collar positions or to have a collaboration contract with respect to fathers.

After having described the main features of the analysed children, we can now turn to the main variables of interest. The type of activities children do together with their parents and that we select as indicators of achieved functionings of social interaction are the following: reading stories or storytelling, going together to the park, singing and dancing together, playing together and watching DVD together.

It must be stressed that the choice of the age group (3 to 8) is mainly driven by data availability, i.e. by the type of interaction activities that are observable in our secondary data source. In particular, the surveyed data does not allow us to observe this information for children aged less than three, that are therefore excluded from the analysis. The upper

bound of age eight, instead, is fixed by ourselves as, in our opinion, parents are less likely to read stories to their child once he has learnt how to read, and, as the child grows up, other activities gain importance in the child-parent interaction, as, for example, verbal communication, that is not observable. Also, during the primary school years (starting in Italy at the age of six), child's social network expands significantly to include peers and other adults outside the family, reducing in this way the importance of the interaction with parents and the role of home environment (Collins, Madsen and Susman-Stillman, 2002).

Table 2: Functionings of social interaction between parents and children

	Reading stories	Watching videos	Going to the park	Singing and dancing	Playing
Mother – Child					
Every day	20.97	16.81	6.82	15.26	64.02
More than once a week	21.09	36.38	28.84	25.19	27.64
Once a week	12.25	8.56	15.89	8.49	1.35
Sometimes monthly	20.24	13.37	19.65	10.89	3.06
Sometimes yearly	12.83	7.67	12.82	6.43	1.08
Never	12.62	17.21	15.98	33.74	2.85
Total	100	100	100	100	100
Father – Child					
Every day	4.33	10.63	1.77	4.73	40.71
More than once a week	16.43	34.41	21.25	13.15	41.15
Once a week	9.61	11.33	13.72	6.8	7.57
Sometimes monthly	21.71	15.78	25.06	14.19	4.1
Sometimes yearly	20.42	7.08	18.11	7.55	1.89
Never	27.5	20.77	20.09	53.58	4.58
Total	100	100	100	100	100

Source: Our elaboration on Matched Dataset 2008

In table 2 we report the frequency of engagement in the above-mentioned activities. The statistics show a much higher interaction of children with the mothers than with the fathers. This is true for all activities and it is in line with previous findings in the literature. Mothers' involvement is particularly high in activities like reading stories or playing with the child, in which respectively 21 and 64 percent engage every day. Also fathers are likely to play with their child every day (41 percent of the sample), while 10 percent of them watch every day DVDs together with their child. It must be stressed that fathers tend to perform quite poorly, particularly in the more dynamic activities and in those implying a higher level of social interaction, like the activity of singing and dancing together (4.7

percent engage every day in such activity with the child) and reading stories to the child (4.3 percent).

6.   Estimation of the MIMIC model on the interaction between child and parents.

Using the matched dataset, we are now going to estimate the two-factor MIMIC model described in section 4. We are interested in modelling two latent unobserved capabilities, representing respectively the interaction between mother and child and the interaction between father and child.

As stated before, the observed indicators of social interaction we are using in our analysis are the following: reading stories to the child, watching DVD, going to the park, singing and dancing, and playing together. For this purpose we assign values ranging from 6 to 1 to the response categories "everyday", "more than once weekly", "once weekly", "sometimes monthly", "sometimes yearly", and "never", and analyse the extent to which household's and parents' characteristics affect children opportunities.

As the scale of the observed indicators is ordinal, as long as they indicate the frequency of engagement in these activities, the data should be analyzed using Weighted Least Square (WLS) method and the matrix of polychoric correlations. However, Olsson et al. (2000) found that, when the sample size is limited, such in our case, even in presence of a violation of the normality assumption, WLS performance was lower than the performance of Maximum Likelihood estimator (MLE).

We estimate our model using the software LISREL. The results of the structural model are reported in table 3, while the results of the measurement equations are shown in table 4.

Similarly to Addabbo and Di Tommaso (2008), we propose three different specifications including different sets of exogenous covariates. In the first specification we include only the child individual characteristics (gender, age, living in the South, number of siblings) and the logarithm of household income among the regressors of the structural model. The results suggest that the interaction with both parents decreases when the child grows up and with increasing number of children in the household. Also living in the South (with respect to living in the Centre-North) has a significant negative effect, suggesting the

existence of cultural differences across Italian regions and that in areas of the country where childcare services are more widespread, children tend to develop better social competences, having a positive impact also on their social relationships with the parents (in line with the results of NICHD ECCRN 2003). Child's gender has no effect. We also find that the father-child interaction increases with family income.

The second specification, instead, excludes family income while including information on parents' employment and education. In this specification the results related to the child individual variables do not significantly change with respect to the first specification. In the case of father-child interaction we find that this is encouraged by mother's employment, this being either in a part-time or in a full-time position. The mother-child interaction, instead, does not significantly change. As it has been shown in the previous literature (Booth et al. 2002), the decreasing quantity of mother-child interaction in the case of maternal employment may be compensated by an increase in the quality of the interaction. We find that better educated fathers have a significantly higher level of interaction with their child, demonstrating that educational level represents an important conversion factor in shaping children's well-being and that better educated fathers are more aware of the importance of their role in child development.

Finally, the third specification includes both family income and parents' characteristics (together with other child individual characteristics). Again, our results on the latter coefficients do not change. However, we find that the significant coefficient on the logarithm of family equivalent income on the interaction between the child and the father disappears when his educational level (that is likely to be correlated with family income) is taken into account. The importance of mother employment and father education, instead, are confirmed. This result highlights the importance of female employment for increasing children well-being: it appears clear that mother's employment encourages fathers' engagement in care giving, as well as a fairer division of unpaid work among the partners, making men more aware of their role in the household and in children's upbringing. This result suggests the higher bargaining power of working mothers in the intra-household decisions of time allocation, in line with the new household collective approach (Chiappori 1988 and 1997) and is consistent with the results of Addabbo, Caiumi, Maccagnan (2010).

Our findings are partially in line with what has been found in Addabbo et al. (2008), i.e. a lower child-mother interaction when the child grows up and if living in the South.

Table 4 contains the results of the measurement model, i.e. the estimated factor loadings for each of the indicators of the capability of child-mother interaction and the capability of child-father interaction. We show both the results of the unstandardized solution and of the completely standardized solution, as the former provides also estimates of the standard errors and of the significance of the parameters, while the latter facilitates making comparisons among variables in the case one is not observable.

As expected, the estimates remain quite consistent across the three different specifications.

In the unstandardized solution we set, for each latent construct, a lambda parameter equal to one, defining in this way the measurement unit of the capabilities. The factor loadings are all positive and highly significant for both latent variables.

The completely standardized solution allows us to read the coefficients of the measurement model as the change in the standard deviation of the observed functioning, given one unit change in the standard deviation of the latent capability.

Focusing on interaction between mother and child, we see that factor loadings range from 0.694 for the activity of reading stories to the child, to 0.395 for watching movies together (Specification 3). Similar results can be observed with regard to the interaction between father and child, with factor loadings ranging from 0.676 to 0.492. As expected, factor loadings tend to be higher when referred to more dynamic and with an higher educational content activities, than to passive ones.

A (standardized) factor loading equal to 1 would imply that the functioning coincides with the latent capability. It can be therefore stated that the higher the standardized coefficient, the closer the functioning to the capability and therefore the higher the quality of the interaction. The assessment of the quality of the interaction linked (on average) to a certain functioning represents an output of our empirical analysis. This represents an important advantage of this analysis with respect to previous studies using fuzzy expert systems or studies in psychology, that imply less impartial valuations. While in the former case the quality of the interaction implied by a particular functioning is assessed by a team of expert and is reflected in the system's set of rules, in the latter case it is derived from an observational rating of the parent-child interaction, that is likely to be intrusive and distortive.

Table 3: Parameter Estimates: Structural Model

Interaction Mother – Child						
	Spec. 1		Spec. 2		Spec. 3	
Child's age	-0.237***	(0.027)	-0.232***	(0.027)	-0.236***	(0.027)
Boy=1; 0 otherwise	-0.024	(0.237)	-0.031	(0.089)	-0.033	(0.089)
Number of siblings	-0.191***	(0.053)	-0.203***	(0.053)	-0.191***	(0.053)
South	-0.289***	(0.094)	-0.301***	(0.090)	-0.290***	(0.098)
Log of family equivalent income	0.047	(0.045)			0.088	(0.055)
Mother in part-time employment			0.235	(0.150)	0.190	(0.152)
Mother in full-time employment			-0.038	(0.103)	-0.095	(0.109)
Father in employment			-0.089	(0.211)	-0.262	(0.237)
Mother high school or degree			-0.013	(0.077)	-0.038	(0.079)
Number of Obs.	830		830		830	
Interaction Father – Child						
	Spec. 1		Spec. 2		Spec. 3	
Child's age	-0.115***	(0.024)	-0.112***	(0.024)	-0.114***	(0.024)
Boy=1; 0 otherwise	0.021	(0.082)	0.034	(0.082)	0.033	(0.082)
Number of siblings	-0.139***	(0.049)	-0.140***	(0.049)	-0.132***	(0.049)
South	-0.275***	(0.087)	-0.227***	(0.090)	-0.220***	(0.090)
Log of family equivalent income	0.106***	(0.042)			0.052	(0.051)
Mother in part-time employment			0.280**	(0.138)	0.250**	(0.140)
Mother in full-time employment			0.203**	(0.095)	0.166*	(0.101)
Father in employment			0.085	(0.195)	0.018	(0.219)
Father high school or degree			0.197***	(0.070)	0.190***	(0.071)
Number of Obs.	830		830		830	

* Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level

Standard errors in parenthesis

Source: Our elaboration on Matched Dataset 2008

Table 4: Parameter Estimates: Measurement Model

	Interaction mother-child								
	Spec. 1			Spec. 2			Spec. 3		
	Unstd. Sol.		CS Sol.	Unstd. Sol.		CS Sol.	Unstd. Sol.		CS Sol.
	Lambda	S.E.	Lambda	Lambda	S.E.	Lambda	Lambda	S.E.	Lambda
Stories	1	-	0.696	1	-	0.694	1	-	0.694
Movies	0.610***	(0.060)	0.400	0.604***	(0.060)	0.395	0.603***	(0.060)	0.395
Going to the park	0.795***	(0.055)	0.586	0.799***	(0.055)	0.587	0.799***	(0.055)	0.587
Singing and dancing	0.995***	(0.067)	0.600	1.001***	(0.067)	0.602	1.000***	(0.067)	0.602
Playing	0.494***	(0.038)	0.527	0.497***	(0.038)	0.528	0.497***	(0.038)	0.528
	Interaction father-child								
	Spec. 1			Spec. 2			Spec. 3		
	Unstd. Sol.		CS Sol.	Unstd. Sol.		CS Sol.	Unstd. Sol.		CS Sol.
	Lambda	S.E.	Lambda	Lambda	S.E.	Lambda	Lambda	S.E.	Lambda
Stories	1	-	0.672	1	-	0.676	1	-	0.676
Movies	0.813***	(0.067)	0.495	0.803***	(0.066)	0.491	0.804***	(0.066)	0.492
Going to the park	0.939***	(0.060)	0.671	0.920***	(0.059)	0.662	0.920***	(0.059)	0.662
Singing and dancing	0.896***	(0.064)	0.584	0.893***	(0.063)	0.585	0.893***	(0.063)	0.585
Playing	0.653***	(0.049)	0.542	0.652***	(0.049)	0.544	0.652***	(0.049)	0.544

Legend: Unstd. Sol. = Unstandardized Solution; CS Sol. = Completely Standardized Solution

* Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level

Standard errors in parenthesis

Source: Our elaboration on Matched Dataset 2008

Table 5 provides the RMR our models, together with the correlation coefficient among the two latent variables. The RMR of the three specifications is always lower than 0.08. This indicates that the model fit is good, although it would be preferable it to be lower than 0.05. The RMR is the lowest for the third specification.

Finally, we can see that the error components of the two latent variables are significantly correlated, in line with the findings in Addabbo et al. and suggesting a complementarity in the parents-child interaction.

Table 5: Goodness of fit and correlation among latent variables

	Spec. 1	Spec. 2	Spec. 3
RMR	0.072	0.061	0.057
Correlation coefficient among latent variables	0.891***	0.900***	0.900***
	(0.016)	(0.016)	(0.015)

* Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level

Standard errors in parenthesis

Source: Our elaboration on Matched Dataset 2008

7.   Conclusions

In this paper we work within the capability approach framework in order to analyse the capability to social interaction between parents and children in Italian families. Italy is an interesting study case, as female fertility rate is very low, and about 50 percent of the couples have only one child (Sabbadini, Romano, Crialesi, 2010).

After having theoretically described the relevant functionings and conversion factors related to this capability, we have decided to carry out a matching procedure, combining data of the Istat Multipurpose Survey on Daily Life for year 2008 with the Bank of Italy Survey on Household Income and Wealth for year 2008. This allows us to work on a wide set of relevant information.

This data has been analysed using structural equation modelling. This is an appealing approach, as it allows us to operationalize the capability approach with a statistical technique that is able to conceptualize the capability as a latent variable, or a factor underlying a set of indicators. This also allows us to identify the factors affecting child well being and driving the development of capabilities.

The empirical results suggest that children's capability to interact with the parents is negatively affected by child's increasing age, by living in the South of Italy and by the number of siblings in the household, which could be one of the mechanisms that drive the negative relationship between birth order, family size, and educational outcomes found in the literature (Booth and Kee, 2005). Family income seems to have a positive effect on the interaction between father and child, but it disappears when also parents' characteristics are taken into account. In this case, we find that highly educated fathers tend to perform better in their interaction with the child. Father-child relationship, furthermore, is positively affected by the fact that the mother is employed, whether full-time or part-time, while mother-child interaction does not significantly change. These results remain significant even when also household income is taken into account. Female employment appears to be a positive conversion factor for the development of children's capability to interact with the father, suggesting that female empowerment can have a positive impact on important children's outcomes, in line with the literature that demonstrates a higher involvement of mothers in the construction of children's well-being both in terms of markets' goods and services, and in terms of time spent together.

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Appendix

In Appendix we explain the strategy we have undertaken for building up the dataset used in our analysis[5].

The surveys we have integrated are the Bank of Italy Survey on Household's Income and Wealth (hereafter SHIW) for year 2008 and the Istat Multipurpose Surveys on Daily Life (hereafter ISTAT) for the same year. More precisely, we have not carried out the matching procedure on the whole datasets, but only on the samples of children aged less than 18, since we are going to use it for analyses on child well-being. Further, in order to work on a homogeneous dataset, although the increasing importance of non-traditional households, we have decided to carry out the matching procedure on children living in families where both parents are present.

The primary data set is SHIW 2008, containing information on 2,582 children, while the auxiliary data source is represented by the sample of 7,441 children drawn from the ISTAT data for the same year. In this way, the lower number of "treated units" is more likely to find a good match among the bigger sample of "control units".

The micro procedure we have followed is inspired by propensity score matching (Rubin 1977, Rosembaum and Rubin 1983; Dehejia and Wahba 1999). Individuals of the two datasets are matched according to their similarity , that is measured through the score of a logistic regression on a set of common variables (the control vector). The closer two units in terms of the score, the more similar they are. Also, the more detailed the control vector, the higher the quality of the matches (Addabbo et al. 2007). As familiar background plays a fundamental role in children's development and outcomes, it is extremely important to add also parents' sociodemographic variables in the control vector. Performing the matching procedure not only on the individual's characteristics (as it is done in the paper by Addabbo et al. 2007), but also on the household's characteristics, leads to an improvement in the performance of the matching method.

As we are willing to avoid to implement the matching procedure in the case of systematic differences in the covariates between the two groups, we have to make sure that the two surveys represent the same population, i.e. that the frequency distribution of the variables that are in common does not significantly differ (Addabbo et al. 2007).

In order to check whether this condition is satisfied, the data has gone through a process of recoding that has ensured homogeneity in the definition of the set of common variables. Table 6

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[5] A more exhaustive description can be found in Morciano (2005) or Addabbo et al. (2007). In particular, Addabbo et al. 2007 integrate SHIW 2000 with ISTAT 1998 data. We thank Morciano for providing us the Stata syntax used originally in the matching procedure. This section contains a summary of the description of the matching procedure carried out and underlines the differences with the previous ones.

shows the set of the most important variables in common in the two surveys and their definition after homogenization. The control vector contains both information on the child (gender and age), on the household (region of residence, number of members in the household, number of children in the household) and on the parents (age, employment condition and education).

In line with Morciano (2005), frequency distributions on the two data sets are compared using a Chi-squared similarity test. The p-values associated to the null hypothesis of identical distributions show very similar frequency distribution for all the variables, up to fathers' type of job and household's type of dwelling. While the latter is due to a higher percentage of households saying that they live in a self owned property among the ISTAT sample the former is related to a higher presence of fathers declaring to be employed in a collaboration position among the ISTAT sample.

Having verified these conditions, although discrepancies related to two (not crucial) dimensions, we proceed with the matching.

The statistical matching procedure has been implemented by following exact matching on the propensity score. As we think that some variables play a more crucial role in determining children's outcomes, we implement the matching procedure in a way that ensures the overweighting of some variables. An operative strategy suggested by the literature (Bryson, Dorsett and Purdon 2002, Caliendo and Kopeining 2005 and Heckman Ichimura and Todd 1997) consists in implementing non-exact propensity score matching on different groups, that have been identified through exact matching carried out on the variables of greatest interest.

For the purpose of our analysis, we are interested in preserve several dimensions: gender, age group, geographical area where the family lives, mother's employment condition and parents' educational level. As the sample size is too limited for dividing the datasets in terms of all these variables, we follow an alternative strategy. In particular, to each SHIW and ISTAT sample we applied a reiterated procedure that specifies nine logistic estimates containing more and more detailed covariate vectors (table 7). In the first step, we produce a number of matches equal to the size of the SHIW sample and the control vector on which the exact matching procedure is implemented contains dummies on gender (boys and girls), three regional dummies (North, Centre, South), four dummies referred to the child's age group (0-2, 3-5, 6-13, 14-18), two mother's employment status dummies (employed – not employed) and two dummies referred to the number of children in the household. In this way, the base SHIW sampling design is preserved – by assigning to all units at least one unit from ISTAT sample – as well as some of the relevant dimensions of interest.

In further steps we proceed with the aim of making the matching method more precise, increasing the size of the control vectors. A lower number of matches is found, as at each step we use stricter and stricter criteria to evaluate the similarity between statistical units. The new matches replace the matches carried out in the previous steps that required a less strict similarity criterion. The SHIW individuals that are matched in the final steps have a higher degree of similarity to ISTAT individuals, in comparison with the individuals matched in the first steps of the procedure (Addabbo et al. 2007). However, also in the very first step of our procedure we manage to preserve some of the relevant dimensions we are interested in.

Figure 2 shows the number of matches realized in each single step for the entire sample of children that are never replaced in further steps. We can see that only 19 children that find a match in the first step do not find a better match in the further steps. Most of the SHIW-children find their definitive ISTAT-match in the fifth step, where the following dimensions are preserved: child's gender, child's age group (0-2, 3-5, 6-8, 9-10, 11-13, 14-18), macro-region of residence (Northwest, Northeast, Centre, South or Islands), parents' age group (younger or older than 40), parents' educational level (primary or secondary school degree vs. high school or university degree) and parents' employment condition (not employed, self-employed or employed). The propensity score procedure we have implemented has allowed us to generate a dataset containing a wide amount of information on sociodemographic characteristics, income and wealth at the individual and household level. The data is therefore appropriate for the purpose of our analysis, but also for other empirical analyses on different dimensions of human well being.

Table 6: Frequency distributions of SHIW08 and ISTAT08 and Chi-squared test

	Freq. SHIW08	Freq. ISTAT08	diff= ISTAT/BDI-1	Chi-squared test
Sex				
male	52.02	50.95	*-2%*	
female	47.98	49.05	*2%*	
				0.83
Region				
Piemonte and Valle d'Aosta	5.38	6.56	*22%*	
Lombardia	16.14	16.01	*-1%*	
Trentino Alto Adige	2.22	1.81	*-18%*	
Veneto	10.51	8.15	*-22%*	
Friuli Venezia Giulia	2.55	1.75	*-31%*	
Liguria	1.80	2.06	*14%*	
Emilia Romagna	6.06	5.92	*-2%*	
Toscana	4.43	4.96	*12%*	
Umbria	1.19	1.34	*13%*	
Marche	1.81	2.37	*31%*	
Lazio	8.13	8.95	*10%*	
Abruzzo	2.51	2.14	*-15%*	

Molise	0.91	0.53	*-42%*	
Campania	11.19	11.93	*7%*	
Puglia	8.06	8.08	*0%*	
Basilicata	4.03	1.13	*-72%*	
Calabria	4.10	3.89	*-5%*	
Sicilia	7.37	9.73	*32%*	
Sardegna	1.61	2.68	*66%*	
				1.00

Age

0	4.04	4.51	*12%*	
1	5.16	5.40	*5%*	
2	4.14	4.82	*16%*	
3	5.38	5.35	*-1%*	
4	5.40	5.11	*-5%*	
5	5.81	5.16	*-11%*	
6	4.85	4.91	*1%*	
7	4.81	4.84	*1%*	
8	5.82	5.59	*-4%*	
9	5.33	5.66	*6%*	
10	5.48	5.26	*-4%*	
11	6.33	5.41	*-15%*	
12	5.12	5.29	*3%*	
13	4.59	5.26	*15%*	
14	6.24	5.91	*-5%*	
15	5.52	5.18	*-6%*	
16	5.89	5.92	*1%*	
17	5.22	5.55	*6%*	
18	4.87	4.87	*0%*	
				1.00

Number of family members

3	20.58	21.05	*2%*	
4	52.69	55.04	*4%*	
5	19.61	19.15	*-2%*	
6	5.93	3.18	*-46%*	
7	0.98	1.22	*24%*	
8 and more	0.22	0.36	*64%*	
				0.91

Number of children in the family

1	31.21	31.32	*0%*	
2	49.76	51.89	*4%*	
3	15.31	14.49	*-5%*	
4	2.67	1.74	*-35%*	
5	0.89	0.50	*-44%*	
6	0.15	0.05	*-67%*	
				0.98

Mother's education level

Primary	8.95	6.41	*-28%*	
Secondary	43.17	44.56	*3%*	
High school	34.36	35.19	*2%*	
Degree	13.53	13.85	*2%*	
				0.85

Father's education level

Primary	7.16	6.24	*-13%*	
Secondary	49.41	48.17	*-3%*	

High school	32.79	32.15	*-2%*	
Degree	10.64	13.44	*26%*	
				0.83

Mother's type of job

Blue collar	17.66	12.19	*-31%*	
White collar	23.26	24.57	*6%*	
Manager	2.94	3.86	*31%*	
Professional - entrepreneur	5.04	5.44	*8%*	
Self-employed	3.03	3.60	*19%*	
Collaboration worker	1.00	1.49	*49%*	
Unemployed	6.75	6.34	*-6%*	
Housewife	39.63	41.31	*4%*	
Other not employed	0.69	1.20	*74%*	
				0.94

Father's type of job

Blue collar	41.87	32.30	*-23%*	
White collar	22.58	21.32	*-6%*	
Manager	7.93	8.63	*9%*	
Professional - entrepreneur	9.96	12.44	*25%*	
Self-employed	10.41	14.15	*36%*	
Collaboration worker	0.22	2.08	*845%*	
Unemployed	5.04	6.49	*29%*	
Other not employed	1.98	2.59	*31%*	
				0.00

Mother's age

Less than 24	0.76	0.94	*24%*	
25-34	19.21	20.30	*6%*	
35-44	59.10	58.98	*0%*	
45-54	20.15	18.57	*-8%*	
55-64	0.78	1.21	*55%*	
				0.98

Father's age

Less than 24	0.37	0.18	*-51%*	
25-34	8.68	10.15	*17%*	
35-44	51.36	53.08	*3%*	
45-54	35.03	31.29	*-11%*	
55-64	4.29	5.03	*17%*	
More than 64	0.27	0.27	*0%*	
				0.93

Type of dwelling

owned	65.03	70.67	*9%*	
rent	21.50	19.43	*-10%*	
other	13.48	9.90	*-27%*	
				0.44
Nr. Children	**2582**	**7441**		

Source: our elaboration on SHIW 2008, ISTAT 2008 (in line with Morciano 2005)

Table 7: Covariates used in the different matching procedure steps

Common variables (dummies)	Phases 1	2	3	4	5	6	7	8	9
Gender	2	2	2	2	2	2	2	2	2
Age group	4	4	4	5	6	6	6	6	18
Region of residence	3	3	3	5	5	5	20	20	20
Mother's employment condition	2	2	2	3	3	7	7	7	7
Number of siblings	2	2	2	2	3	3	3	3	3
Mother's eduational level		2	2	2	2	4	4	4	4
Father's educational level		2	2	2	2	4	4	4	4
Father's employment condition			3	3	3	7	7	7	7
Number of family members			4	4	4	4	4	4	4
Mother's age group					2	2	3	3	3
Father's age group					2	2	3	3	3
Father's employment sector							2	6	6
Mother's employment sector								6	6
Type of dwelling								3	3
Variable used	*13*	*17*	*24*	*28*	*34*	*46*	*65*	*78*	*90*

Source: our elaboration in line with Morciano (2005)

Figure 2: Number of never-replaced matches realized in each step for the entire SHIW archive

Number of not-replaced matches by step
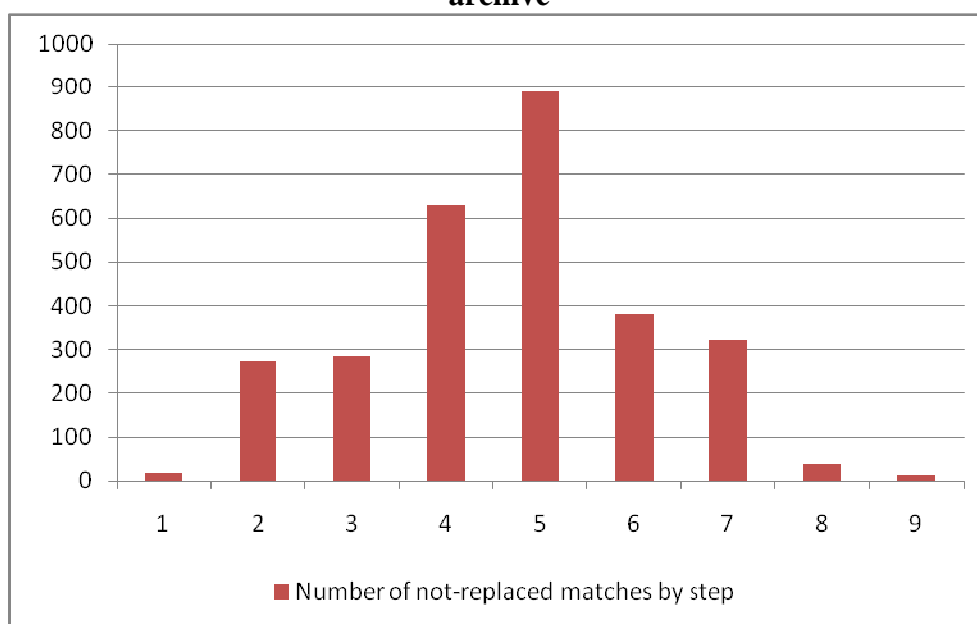
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