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Low Fertility and Labour Force Participation of Italian Women: Evidence and Interpretations

Daniela Del Boca

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Daniela Del Boca

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Summary

In Italy, as well as in other Southern European countries, low labor market participation rates of married women are observed together with low birth rates. Our proposed explanation for this apparent anomaly involves the Italian institutional structure, particularly as reflected in rigidities and imperfections in the labor market and characteristics of the publicly-funded child care system. These rigidities tend to simultaneously increase the costs of having children and to discourage the labor market participation of married women.

We analyze a model of labor supply and fertility, using panel data from the Bank of Italy which have been merged with regional data describing the available opportunities in each sample household's environment. The empirical results show that the availability of child care and part time work increase both the probability of working and having a child. Policies which would provide more flexible working hours choices and greater child care availability would aid in reducing the financial burden of children.

We would like to thank Marilena Locatelli and Vito Moscato for support in data access and data organization.

Résumé

En Italie comme dans les autres pays de l'Europe du Sud, on observe un faible taux de participation à l'emploi des femmes mariées lié à un faible taux de naissances. L'explication mise en avant pour cette apparente anomalie suppose l'implication de la structure institutionnelle italienne, qui présente quelques rigidités et imperfections sur les questions du marché de l'emploi et les caractéristiques du système de garde d'enfants prises en charge par l'état. Ces rigidités tendent à accroître simultanément les coûts liés à un enfant et la démobilisation sur le marché du travail des femmes mariées.

Nous analyserons un modèle d'offre de main d'oeuvre et de fertilité en utilisant des données de panel de la Banque d'Italie qui ont été associées à des données régionales décrivant les opportunités disponibles dans chaque échantillon de l'environnement des ménages. Les résultats empiriques montrent que la disponibilité pour un enfant et le travail à temps partiel augmentent tous deux les probabilités de travail et d'avoir un enfant. Les politiques qui tendent à proposer des choix d'heures de travail plus flexibles et une offrir une plus grande disponibilité de prise en charge de la garde d'enfant favoriseraient la réduction financière des coûts liés à l'enfant.

Nous voudrions remercier Marilena Locatelli et Vito Moscato pour l'aide apportée au traitement des données.

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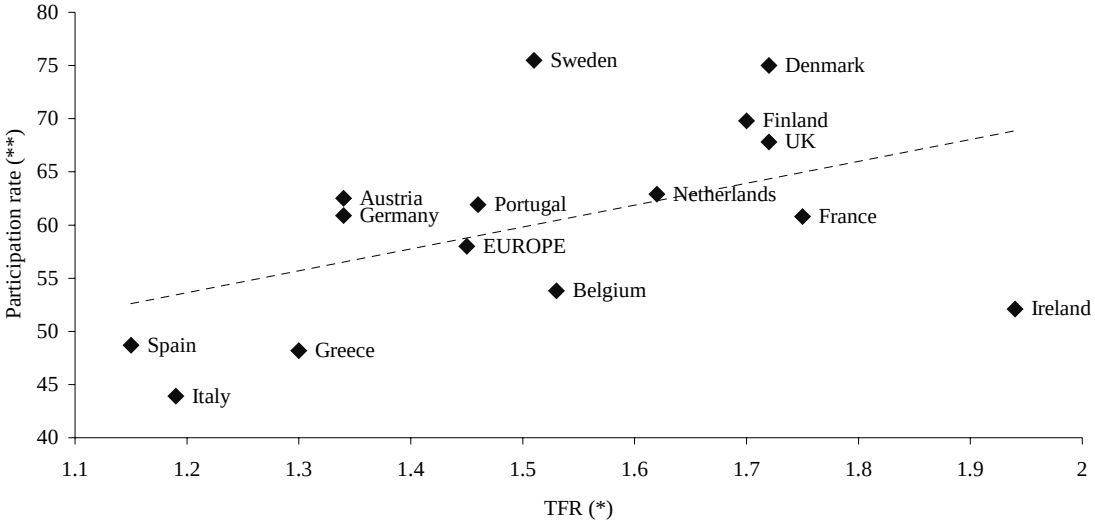
LOW FERTILITY AND LABOUR FORCE ATTACHMENT OF ITALIAN WOMEN: EVIDENCE AND INTERPRETATIONS. [1]

Introduction

In almost all industrialized countries a rise in female participation and a decline in birth rates have been observed in the last few decades. In Italy, however, fertility has declined dramatically while increases in labor market participation rates have been modest. Figure 1 shows that in Italy (as in Spain and Greece) fertility and participation rates are substantially lower than in other non-Mediterranean countries. Our proposed explanations for this apparent anomaly involve the characteristics of the Italian institutional environment, most importantly the particular rigidities and imperfections that are pervasive in the labor market and peculiar features of the publicly-funded child care system.

Figure 1

Women's participation rate and fertility in Europe (1998)



1 . Daniela Del Boca, CHILD and Dipartimento di Economia – Università di Torino - Via Po 53, 10124 Torino, ITALY - Phone: +39-0116702704 - Fax: +39-0116702762 - e-mail **daniela.delboca@unito.it**

In regards to the labor market, the work rules and wage-policies implemented during the seventies and eighties have served to increase job security for full-time labor market participants, but this benefit for some has come at the cost of a lower probabilities of finding work for new entrants and/or individuals looking for temporary or part-time employment. The fact that part-time employment is extremely rare in Italy is an important factor in accounting for the low employment rates of married women, particularly those with children. As a consequence, married women are forced to choose between no work or full-time work, neither of which is necessarily their preferred option. Married women who choose to work tend to have full-time work commitments, which is not compatible with having large numbers of children. Moreover, even married women who do not work tend to limit their family size, at least in part due to the characteristics of the labor market. Because entry level positions are so hard to find, many children live at home until they find their first ‘‘stable” employment. Thus the labor market indirectly imposes large fertility costs on families even when the mother does not work; thus the structure of the Italian labor market both directly and indirectly acts so as to discourage fertility.

The public child care system does not provide services which are of much assistance to married women in terms of reducing the direct costs of participation. In particular, while the quality of publicly-provided child care services is very high in many regions in Italy, their are a limited number of slots available and the hours of child care is typically compatible with full-time jobs hours. Public child care institutions were developed in an era when the wife either did not participate in the labor market and was responsible for organizing all family activities in a very bureaucratic society, or worked in public sector jobs which required limited time commitments each day [e.g., teaching or public administration]. These institutions are evolving slowly over time and continue to do little to increase the attractiveness of full-time work for women with children.

In light of these considerations, we will consider other factors in the determination of labor participation and fertility besides traditional individual-specific determinants of prices and income. We analyze the effects of several aspects of institutional characteristics using panel data from the Bank of Italy survey of Income and Wealth (SHIW).

In Section 2 we discuss several types of market rigidities in Italy which impact the cost of children. Section 3 describes previous empirical literature on the determinants of participation and fertility decisions. Section 4 provides a description of the sample used and the econometric methods. Section 5 contains a discussion of the empirical results, and Section 6 provides some closing remarks.

Institutional rigidities in Italy.

In spite of recent institutional changes, the Italian labor market still remains a highly regulated one. Strict rules apply regarding the hiring and firing of workers and permissible types of employment arrangements. The hiring system and the high entry wage as well as very strict firing rules severely restrict employment opportunities for labor market entrants. These labor market regulations have been largely responsible for the high unemployment rates of women and youth (Bertola et al 1999). The Italian unemployment rate is the highest among industrialized countries, especially the long-term unemployment rate. The unemployment rate of women is twice as high as the male rate (16.8 against 9.5, while the long-term unemployment rates are 11.5 per cent and 6.5 per cent respectively (ISTAT 1998)).

An important aspect of the rigidity of the labor market is the limited menu of available employment arrangements. Progression towards a more flexible working hours system has started later in Italy than in other countries and has been much slower. On one hand, unions have traditionally opposed part-time employment fearing that potential divisions of the work force (in terms of working arrangements, demographic characteristics, etc.) could reduce workers' cohesion. On the other hand, under current regulations social contributions paid by employers are strictly proportional to the number of employees, not their hours worked, which makes the employment of two part-time workers more costly than one full-time employee.

Moreover the service sector, where part-time work is traditionally more widespread, has not developed as quickly in Italy as in other countries. Table 1 shows the low percentage of part-time workers and women in the service sector (as a % of total employment) relative to other European countries. Another source of rigidity is from the Italian child care sector. Child care services are typically inexpensive, relative to private sector alternatives. Private child care costs are on average much higher than comparable public ones. According to Bank of Italy Survey on Income and Wealth data, the monthly costs for private childcare for children under three years of age are €228.8 for private care and only €101.8 for public care. The monthly costs for private child care for children 3 to 5 are €210 versus €45 in the public sector.

Table 1 Proportion of women working part time and women working in the service sector

	Part time	*Women in the service sector*		*Part time*	*Women in service sector*
Sweden	24.7	69	Austria	16.0	47
Netherlands	38.8	67	France	12.5	59
Denmark	22.8	68	*Italy*	*10.1*	*56*
UK	25.6	62	Spain	10.6	52
Germany	17.5	48	Greece	6.1	54

Source: Eurostat 1999

The system is highly subsidised but characterised by extreme rigidity in the number of weekly hours available. This makes the service compatible with part-time work but not with full-time activities. Having school age children does not necessarily increase the attractiveness of full-time employment since school days often end in mid-afternoon, thus making child care necessary for late afternoon and early evening. School hours per week are 27 in Italy, and 30 in Denmark , 35 in France and 33 hours in the UK.

A remarkable difference exists between the availability of child care for children under 3 years of age and for children between 3 and 6. Table 2 shows that in Italy the percentage of children less than 3 who are in child care is quite small (6 per cent), relative to other European countries such as Sweden, Denmark, Norway, while the proportion of children older than 3 in child care is relatively high (95 per cent) even relatively to Northern European countries.

While the availability of child care for children older than three is quite uniform across Italian regions, this is not the case for children under three. There are marked differences across regions. The proportion of children less than three years of age in public child care is about 28% in some areas of the North and only 1-2 percent in most Southern areas (this ratio is the number of places available divided by the population 0-3 years of age). The rigidity and limitations of the supply of publicly-provided child care are somewhat compensated for by a substantial family support system. The number of children under 3 under grandparents' care is 45.7 percent in households where the mother works and 16.9 percent in households where the mother does not work. Among children between 3 and 6 years of age, the proportion of children under grandparents care is still very high: 39.9 percent when the mother works and 13.6 percent when the mother does not work (Indagine Multiscopo ISTAT, 1998).

The empirical evidence presented in this section seems to point to the importance of several market limitations in Italy that are likely to be responsible for the high direct and indirect costs of raising children. Figure 2 show that the employment rates of mothers of children under 3 is much lower in Italy as well as the other Southern European countries (except Portugal) relatively to other European countries (such as Sweden, Netherlands) and show the smallest increase between 1989-1999 among all countries considered.

Table 2. Proportion of young children using child-care arrangements

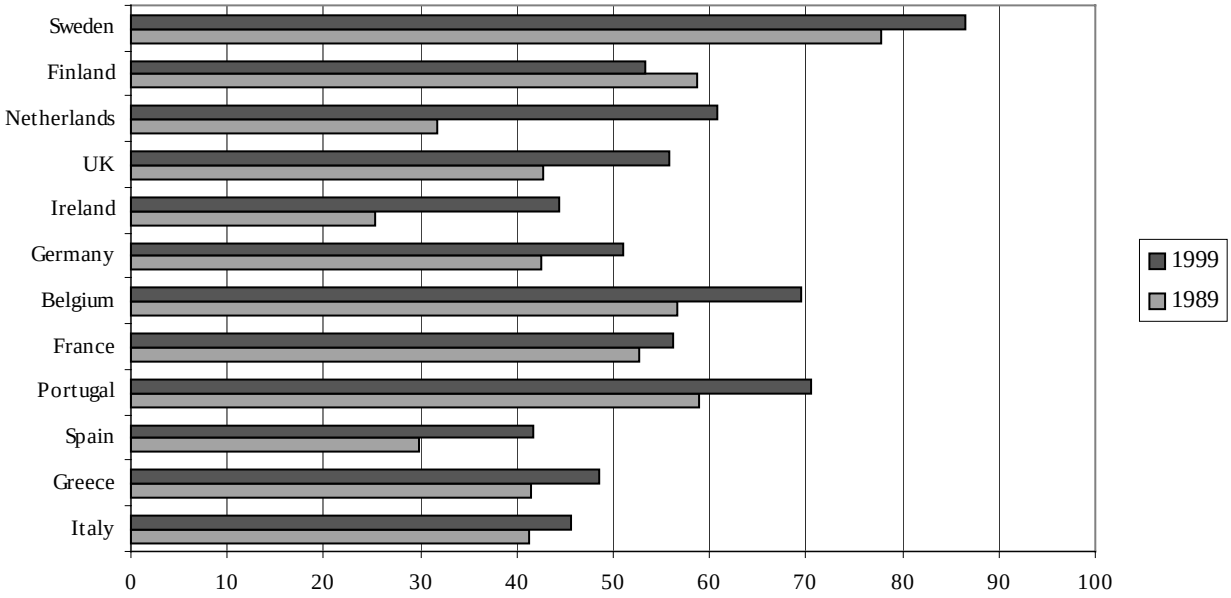
(private and public, various types)

	Year	*Aged under 3*	*Aged 3-6*
Finland	1998	22	66
Norway	1997	40	80
Sweden	1998	48	80
Denmark	1998	64	91
Netherlands	1998	6	98
UK	2000	34	60
Ireland	1998	38	56
Germany	2000	10	78
Austria	1998	4	68
Belgium	2000	30	97
France	1998	29	99
Portugal	1999	12	75
Italy	*1998*	*6*	*95*
Spain	2000	5	84
Greece	2000	3	46

Source: OECD, *Employment Outlook*, 2001

Figure 2

Employment rates of mothers with child(ren) under 6



Source: OECD, *Employment Outlook*, 2001

Previous Empirical Results.

In the last few years there has been an increasing interest in the effect of institutions (social policies and labor market regulations) on labor market decisions. It has been noted that Italy shares with some other European countries the characteristics of the so-called "Southern model": the lowest level of social protection (especially social expenditures for families and children) and the strictest employment regulations, which together require the family to provide essential ''social" services (Ferrera 1996). Cross-country data show that where public support for children is the lowest, women's participation rates are also the lowest (Bradshaw 1997, Gornick et al. 1997).

Analyzing in-kind transfers, it has been shown that the availability of child care services significantly affects women's preferences for non-market time versus time spent in paid work. Improvements in child care options as well as variations in their costs have been associated with significant increases in the labor supply of mothers in most countries (Ermisch, 1989, Blau 1992, Connelly 1992, Gustaffson and Stafford 1992, Gustaffson 1994, 1995).

Del Boca (1993) and Chiuri (1999) have analyzed the effect of child care on participation of married women in Italy and the specific characteristics of the supply of public and private child care systems in Italy. Data on household labor supply and child care use show a strong interdependence between the time use of households members as substitutes for the lack of flexibility and the scarcity of public-provided child care services. Using different data sets the studies arrive to similar conclusions, that is household labour supply depend on child care rationing rather than its costs. The estimation of the relationship between child care costs and labor supply shows that a reduction in child care costs increases the probability of mothers' part-time employment, but has no effect on the probability of working full time (Del Boca 1993). These results raise some concerns, given that part-time employment opportunities are in such a short supply in the Italian labor market.

The problem of child care cost is only relevant for children younger than 3 years of age. While for these child care (both public and private) is quite expensive (about 406 euros per month), for children between 3 and 6 child care is highly subsidised (and it costs only about 255 euros per month). Child care costs seems to affect labour supply only in Northern regions of Italy, where places are not rationed (Del Boca (2002), showing results similar to some extent to results reported in Sweden (Gustaffson and Stafford 1992)

Del Boca, Locatelli and Pasqua (2000) found that the number of children has a negative impact on wives' probability of employment, while a positive impact is found for child care availability at regional level. These effects, however, are mediated by the spouses' attitudes towards female work measured by spouses' mothers' work activity at the same age of the woman. Del Boca (2002) focuses on the rigidities of the Italian public child care sector: the number of children accepted and the daily hours offered are both very limited. Most of the working mothers have to rely on family support system (mainly to grand-parents' help) or to babysitters, since also private child care system has still a limited offer. The results show that the decision to work and to have a child are both positively influenced by the availability of public child care. An increase in the provision of public child care in terms of number of slots and hours provided per day, would reduce the cost of taking a full-time job and increase female labour supply.

Other studies have considered more closely the relationship between fertility and the labor market characteristics. Bettio and Villa (1998) focus on the way women form expectations about future labour market conditions and project these expectations into their fertility decisions. The high unemployment rate in Italy may affect fertility in a significant manner. The experience of unemployment not only reduces current income but also affects the level of income families consider necessary for the well-being of the children.

Empirical studies employing cross-country data discuss the possibility that the emergence of high and persistent rates of unemployment in Europe might have contributed to the acceleration of the fertility decline and might have been responsible for the reversal in the sign of the correlation between fertility and participation (Anh and Mira 2002). They found that a strong difference in fertility rates for countries characterized by high participation (such as Sweden and Denmark) and countries characterized by low participation such as Italy, Spain and Greece. While Spain, Italy and Greece in the late seventies were ranked among the most fertile countries, they became the least ones in the late nineties. The opposite

happens in the Northern countries. (Table 3). They also consider the case of Spain and found that individuals who experience unemployment or part time are likely to delay family formation. Del Bono (2001) test directly the hypothesis that expectations of future labour market outcomes affect current fertility decisions. Their results show that unemployment is one of the variables that most significantly affect the expectations of future wages and job opportunities and therefore may be responsible for the decline in fertility.

Table 3. Fertility Rates and Female Participation rates in selected countries.

Country	Fertility rates		Participation rates	
	1977	**1997**	**1977**	**1997**
Italy	*1.98*	*1.22*	*37.6*	*44.1*
France	1.86	1.71	53.0	59.8
Spain	2.65	1.15	33.0	47.1
Greece	2.27	1.30	33.3	47.5
Denmark	1.66	1.75	64.7	75.1
Sweden	1.65	1.52	70.0	74.5
U.K.	1.69	1.71	56.3	67.5

Source: OECD Eurostat (1999), Statistics in Focus.

Another important characteristic of the labor market concerns the availability of part time jobs. Comparative studies have found a high correlation between the proportion of part time jobs and the participation rates of women, in particular married women with children (Meulders and Plasman 1994). The low proportion of part-time does not seem to be coherent with self-reported preferences. A large number of Italian women who are unemployed or out of the labor force report that they would actually prefer to work part-time: surveys at different points of time and different areas of the country have reported similar results. Even among workers more people would like to work fewer paid hours than would like to work more hours at the given hourly wage (European Economy 1995).

Other studies focus more on education characteristics of Italian women. Bratti (2001) explains woman's participation decision in the period surrounding a birth event estimating the effect of education and several economic variables on the decisions to give birth and to participate in the labour market. He found that education raises the job attachment of women. In particular highly educated women work also in the period surrounding a birth event and therefore education induces fertility postponement. His results imply that policies aiming at increasing women education would have a positive effect on participation but uncertain effect on fertility given evidence of a U shaped pattern of fertility with education (interpreted in terms of the prevalence of income over substitution effects due to education and by more access to private child care for highly educated women).

Other studies have analyzed the various ways in which the extended family acts as a substitute for the lack of market opportunities. Family networks seems to compensate for the lack of flexibility of the service system. For example, extended family members, most often grandparents, very often provide child care services which complement the limited services provided by publicly-funded day care facilities. Financial support as well as potential help in child care has been shown to significantly increase the probability of the mother's working, and especially has an important effect on the probability of mothers' working full-time (Del Boca, 1997).

Several limitations also characterize the credit market. The mortgage market is very small, partially because the maximum amount, which can be financed, is quite limited, as is the duration of the loan. Del Boca and Lusardi (1997) have shown that Italian households in the period 1987-1993 have overcome financial market limitations and the high burden of the mortgage debt repayment by increasing

wives's labor supply. Imperfections in the Italian credit market such as strict limitations on the size and duration of mortgages, have also resulted in parents largely assuming responsibility for providing loans also for housing purchases (Guiso and Jappelli 1991, 1995, Della Zuanna 1995, Cigno et al., 1997).

Demographic studies have pointed out that in the last fifteen years in Western countries, the lower the fertility, the higher the proportion of people aged 20-30 living in the parental home. This correlation suggest that stronger the traditional family ties the lower the fertility rates. (Della Zuanna 2000). The data for 1987 and 1995 show that the proportion of 20-29 years old living with their parents is highest in Italy (as high as Greece and Spain) and has increased during the period of observation, while in most other countries has decreased (Table 4).

Table 4. Percentage of Children 20-29 living with their parents in 1987 and 1995

Country	*Italy*	France	Spain	Greece	Denmark	Sweden	UK
Year							
1987	*60*	34	49	41	32	29	30
1995	*71*	33	59	49	29	23	31

Source: Eurostat, 1997

The role of the family extends in support of children often extends far beyond the completion of schooling by the children. Because of the limited access to credit and housing markets to individuals without stable employment, the Italian family traditionally provides income support to its children during their usually lengthy search for a stable, "protected" job. This support includes both direct monetary transfers, as well as the provision of housing and other necessities (Guiso and Jappelli 1991, 1995; Cigno et al 1998, Giannelli, Monfardini1998, Martinez Granado and Ruitz Castillo 1998).

Imperfections in the Italian credit market such as strict limitations on the size and duration of mortgages, have resulted in parents largely assuming responsibility for providing loans for housing purchases. In addition to financial transfers from parents to their adult children, parents also provide support by having their mature children live in their home.

Econometric Methods

In our analysis of fertility and female labor supply, we want to take into account some of the relevant characteristics of the institutional environment, indicators of levels of family support available to the household, and standard demographic characteristics, as well as other factors assumed unobservable to the analyst. One of the limitations of the economic analysis of fertility is the omission of factors such as fecundity, tastes, and other individual and marriage-specific traits which are important factors in explaining the decision to have children. Many, or most, of these individual-specific factors affecting the decision to have a child are unobservable to the researcher. To take into account and isolate these effects we use a fixed-effect model with panel data which is consistent with simple behavioral framework outlined above.

The fixed effects logit estimator allows us to isolate the effects of a subset of the variables included in the analysis on the probabilities of work and fertility allowing for unobserved individual-specific effects which have an unrestricted relationship with the included regressors. We use the conditional logit estimator proposed by Chamberlain (1980) to analyse jointly the decisions of having children and working. The cost of using this rather flexible estimation method is the inability to determine the effect of variables which do not vary over time (at the individual household level) on the probability of

having a birth or working in any given period. The conditional maximum likelihood estimators are consistent no matter what the form of the dependence between individual's characteristics and the value of her unobserved type, and will also be consistent if the "error terms" are correlated across sample members in many manner (Moulton, 1990).

When analyzing one binary choice variable, let individual i experience the event in period t with probability given by:

$$p(d_{it}=1|X_{it},\eta_i=\exp(X_{it}\beta+\eta_i)/1+\exp(X_{it}\beta+\eta_i) \quad i=1,...,N;t=1,...,T;$$

where X_{it} is a vector of covariates associated with individual i in period t, β is an (unknown) associated parameter vector, η_i is an individual-specific, time-invariant error term which is unobservable to the analyst, T is the number of observations available for each household, and there are N households in the sample. The form of the dependence between the scalar random variable η_i and the covariates X_{it} is not specified; in particular, the estimator for β proposed by Chamberlain is consistent no matter what the form of the conditional distribution of $\eta_i \mid X_{it}$

The idea behind the estimator is to find distributions of the data which are functions only of β and not the problematic η_i. Define the total number of periods in which the individual experiences the event by D_i. This conditioning method to eliminate the fixed effects can be used for any set D which is greater than 0 and less than T.

In our application, we actually are modelling two decisions simultaneously, the participation decision and the fertility decision. Let $d_{it}^{\,j}$ be an indicator variable which takes the value 1 for individual i where j = f, for a birth and j = p, for labor market participation. We specify the probability that $d_{it}^{\,f} = 1$, and that $d_{it}^{\,p} = 1$ as

$$p(d_{it}^{\,f} = 1 \text{ and that } d_{it}^{\,p} = 1 \mid X_{it}^{\,f},\eta_i^{\,f}, X_{it}^{\,p},\eta_i^{\,p} = p(d_{it}^{\,f} = 1, \mid X_{it}^{\,f},\eta_i^{\,f})\, p(d_{it}^{\,p} = 1 \mid X_{it}^{\,p},\eta_i^{\,p})$$

$$= [\exp(X_{it}^{\,f}\beta_f+\eta_i^{\,f})/(1+\exp(X_{it}^{\,f}\beta_f+\eta_i^{\,f})]*[\exp(X_{it}^{\,p}\beta_p+\eta_i^{\,p})/(1+\exp(X_{it}^{\,p}\beta_p+\eta_i^{\,p})]$$

where $X_{it}^{\,j}$ are the exogenous variables in the index function for decision j, β_j is the coefficient vector associated with the exogenous variables $X_{it}^{\,j}$,and $\eta_i^{\,j}$ is the individual specific constant term in the index function for decision j.

Just as we do not restrict the form of dependence between and $X_{it}^{\,j}$,and $\eta_i^{\,j}$, we also do not make any assumption concerning the relationship between $\eta_i^{\,f}$ and $\eta_i^{\,p}$. Given the independence of the decisions f and p conditional on the X's and the η' s,and given that the fixed effects estimator defined below conditions on the X's and eliminates the η' s, the estimator for each decision j is independent of the estimator for the decision j'.

This simple functional form can be used to build likelihood functions which yield consistent maximum likelihood estimators of identified elements of β for each D between 1 and T-1. In our application of the fixed effects logit estimator, T is at most equal to 3. In this case, subsamples of individuals who experience the event once or twice can be used to estimate β consistently using this method. Chamberlain proved that the conditional likelihood estimator is consistent and asymptotically normally distributed under standard regularity conditions.

The Data

The empirical analysis utilizes a three-year panel from the Bank of Italy's Survey of Household Income and Wealth (1991-1995). The Bank of Italy survey contains detailed information on the incomes and wealth of family members, several characteristics of the workplace (such as wages and hours of work), and socio-demographic characteristics of the households (age of the members of the family and the number of children). The sample design of the Bank of Italy panel, which is somewhat unorthodox, is described in detail in Trivellato (1997).

For purposes of our analysis of fertility and labor market participation we have selected sample households with married women in the age range 21-45 so as to exclude those who might be enrolled in school or in retirement or semi-retirement (which occurs at relatively young ages because of the historically generous Italian pension system). For the analysis of fertility, the age restriction serves to ensure that women included in the final sample will have a high probability of being fecund. The sample size after excluding women who didn't meet the age criteria or who had missing information on the variables included in the analysis was 1708.

In order to use the conditional likelihood estimator we need to limit our analysis to the women who changed states over the observation period. For the participation analysis, this sample includes wives who worked at least one period and less than three periods (227 women). For the fertility analysis, there were 201 women who had a least one birth and less than three over the three periods. The dependent variables are whether the wife is working at the time of the interview and whether or not she had a child in the last two years. For each sample member, we have three observations on each of the two dependent variables.

Only a few of the independent variables are not time-invariant: We include in our analysis variables related to:

- Personal Characteristics: Wife's age, family income (total income minus wife's labor earnings), and the number of children living with the family.

- Family Support: Variable indicating the transfer the family has received from relatives during the year of the interview as well as a dummy variable indicating whether one of the parent is still alive.

In order to measure the impact of rigidities of the aggregate labor market and publicly-provided goods and credit market characteristics on household decisions we have merged our panel data with regional data on child care facilities and part-time jobs and mortgage rates. As indicators of environmental characteristics, we have introduced the following variables:

- Child Care System: As an indicator of the characteristics of the child care system, we use the ratio of the number of child care places available (for children under 3 years of age) to the number of children 3 years of age or less by area of residence in 1991, 1993, and 1995.

- Labor Market: As an indicator of the probability of locating a part-time job, we use the ratio of the number of part-time jobs to total employment in the region.

- Credit market : As an indicator of the credit market we use the regional interest rate used by the banks for mortgage loans.

Table 5 reports descriptive statistics for the variables used in the empirical analysis for the three years we have considered. The evidence from these data are in accordance with the premises of our earlier arguments. Fertility rates (the proportion of women who had a child in each of the three two-year periods) are very low and tend to decline during the period 1991-1995. Participation (proportion of women working) also declines over the period (from .48 to .47). The number of children living with the family is only 1.6 and increases to 1.7 in 1995. The amount of transfer income does not change much during the period (about 4 million lira on average, conditional on receiving any). The proportion of households in which one of the parents is still alive is 88 per cent and decreases slightly during the period.

Table 5. Descriptive Statistics of Variables Means and Standard Deviation

	1991	**1993**	**1995**
Fertility	0.99	0.95	0.94
	(.262)	(.261)	(.324)
Participation	48.5	48.0	47.8
	(.371)	(.367)	(.377)
Income	42.535	45.490	46.876
	(26.587)	(27.603)	(35.889)
Age	34.112	36.103	38.546
	(12.54	(12.46)	(12.65)
Transfers	4.536	3.149	4.232
	(1.58)	(1.067)	(1.856)
Schooling	10.331	10.488	10.434
	(4.40)	(4.56)	(4.40)
Child Care	7.08	8.43	9.45
	(7.61)	(7.71)	(7.84)
Parent Alive	88.5	87.7	86.2
	(37.64)	35.87	(37.78)
Part time	6.013	6.885	9.056
	(4.564)	4.576	(4.787)

We also considered the means of the “environmental" data by region. It exhibits quite a remarkable variability in child care availability across regions, with a far higher supply of facilities in the Northern regions compared with Southern regions. Part-time employment shows much less variability and does not appear to be significantly different in the North and South.

Empirical Results.

Table 6 reports the fixed effect estimates for both participation and fertility (respectively in the first and second column).The fixed effect estimate of the effect of household income on participation is negative. This is not true in the fertility equation, where the fixed effect estimate of the household income coefficient is positive (though not significant).

Table 6. Fixed Effect Estimates of Participation and Fertility

Variables	Participation	Fertility
Income	-.069	-.070
	(.054)	(.045)
Age	-.107	-.067
	(0.54)	(.031)
Transfers	0.056	0.038
	(.0321)	(0.017)
Schooling	-	-
Child Care	0.058	0.043
	(0.021)	(0.031)
Parents Alive	0.064	0.048
	(0.361)	(0.020)
Part time	0.021	0.035
	(0.013)	(0.028)
Mortgage	-0.022	-0.003
	(0.021)	(0.002)

The effects of personal characteristics conform to other findings reported in the recent literature on fertility and women's labor market participation using cross-sectional data (Del Boca 1997, Del Boca Locatelli and Pasqua 2000, Bettio and Villa 1998)). The wife's age has a negative effect on participation and fertility. Wife's schooling coefficient cannot be estimated using the fixed effects estimator since it does not vary overtime.

The variable that we have introduced as an indicator of potential family support (the amount of family transfers) has a positive effect on both the likelihood of women participating and having children. The estimated effects of transfers agrees with the results obtained in many previous studies. Studies of intergenerational transfers have shown that recipients are also more likely to have been denied credit than the rest of the population (50 per cent of transfer recipients have been denied credit from financial institutions), confirming an important role for the family as a system of household finance.

The positive effect of transfers on fertility also has an interpretation related to the characteristics of the transfers. Given that most transfers go from the parents to the children, relatives are more likely to transfer money to families with children (Mayer and Engelhardt 1994). We have analyzed the effect of other indicators of potential family support such as the presence of at least one parent of the wife. We believe that this variable can be interpreted as indicating a potential opportunity for informal child care in conditions of limited public child care facilities (or affordable private child care). Having one parent alive increases both the probabilities of child-bearing and labor market participation, though the effects on fertility are quite a bit larger. The fixed effect coefficient estimate of child care availability is positive in both equations, and is at least marginally significant in both.

According to a modeling framework developed in Del Boca (2002), the impact of child care availability on both fertility and participation is predicted to be positive, so that the fixed effects estimates are consistent with this hypothesis. Now we consider the other environmental variable, the availability of part-time employment. The fixed effects estimates of the coefficient are positive in both the fertility and participation equation, but are only significant in the participation equation. This result is consistent with

Del Boca (2002) framework, in the sense that the effect of a flexible labor market was more ‘‘direct” in the participation decision than in the fertility decision, although it was expected to be positive in both.

The elasticities computed using these parameters allow us to assess the importance of the changes in the time path of the regressor in question on the timing of events, but not on the number of them. For example, consider the variable child care availability. Beginning from a time-invariant environment [i.e., one in which all regressors are fixed over time], for an individual who works in one of two periods, The elasticity is the ratio of the percentage change in the probability of working in the second of the two periods with respect to a proportionate increase of 0.1 child care availability in period 2 with respect to period 1. We cannot address how the probability of working in either of the two periods responds to a proportionate change of .1 in the second period value of child care availability.

Using the parameters obtained in our estimates we compute elasticities of the time-varying factors, the regional variables, child care and part-time, mortgage rates, the family support variables (parents alive and family transfers), and family income. For example, increasing child care availability by 1 percent in the second period with respect to its first period level increases the relative odds of working in the second period to the first by 0.292, and changes the relative odds of having a child in the second period to having one in the first period by 0.195.

Increasing part time availability by 1 percent in the second period with respect to the first increases the relative odds of working in the second period by 0.234 and having a child of 0.122 (See Del Boca 2002 for a more complete discussion). In general, the elasticity estimates are not large, indicating that the responsiveness of life cycle decisions to changes in the timing of these exogenous variables is modest. The one exception is the elasticity of the timing of births with respect to the presence of parents (0.867). Aside from this elasticity, it is interesting to note that the largest elasticity estimates correspond to environmental variables, not variables characterizing the household’s characteristics.

Conclusions

In this paper we have argued that several institutional rigidities are among the factors explaining the coincidence of low fertility and low labour force attachment rates observed in Italy. The limited availability of part-time employment and the limited availability of affordable child care services increase the costs of working for mothers, making it difficult to participate in the labor market without other relatives’ support.

To capture the impact of environmental variables on household behavior, we have estimated married women labor supply and fertility using a fixed effect model. In estimating the model, we have included several variables reflecting levels of potential and actual family support as well as institutional characteristics of the regional child care system and local labor market in order to explicitly take into account relevant constraints that Italian households face when making their labor market and fertility decisions.

Our results indicate that labor force participation and fertility decisions are both affected by similar factors. The decisions to work and have a child are positively influenced by the available supply of public child care as well as the availability of part time jobs. The empirical results also indicate that the availability of family support, both in the form of transfers and in the form of the presence of parents, increases both the probability of market work and having children. Our empirical results also indicate that by increasing the flexibility of employment relationships, more women would find it attractive to enter the market. Of course, to analyze the welfare effects of such a change one require knowledge of the implications for wages and the employment status of other household members.

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APPENDIX

0.1 Appendix

In this appendix we describe the fixed effect estimator proposed by Chamberlain, for the case of modelling two decisions simultaneously, in our case, the participation decision and the fertility decision.

Let individual i experience the event in period t with probability given by

$$p(d_{it} = 1|X_{it}, \eta_i) = \frac{\exp(X_{it}\beta + \eta_i)}{1 + \exp(X_{it}\beta + \eta_i)}, \; i = 1, ..., N; \; t = 1, ..., T;$$

where X_{it} is a $(1 \times k)$ vector of covariates associated with individual i in period t, β is an (unknown) associated $(k \times 1)$ parameter vector, and η_i is an individual-specific, time-invariant error term which is unobservable to the analyst. Since the probability that an individual experiences the event in any period t, conditional on X_{it} and η_i is independent of the probability that she experiences the event in any other combination of periods, the probability of any given sequence $d_{i1}, ..., d_{iT}$ given $X_i \equiv (X_{i1}, ..., X_{iT})$ and η_i is

$$p(d_{i1}, ..., d_{iT}|X_i, \eta_i) = \frac{\prod_{t=1}^{T} \exp[d_{it}(X_{it}\beta + \eta_i)]}{F_i}, \qquad (1)$$

where $F_i = \prod_{t=1}^{T}[1 + \exp(X_{it}\beta + \eta_i)]$.

The form of the dependence between the scalar random variable η_i and the covariates X_i is not specified. The estimator for β proposed by Chamberlain is consistent no matter what the form of the conditional distribution of $\eta_i|X_i$. The idea behind the estimator is to find distributions of the data which are functions only of β and not the problematic $\eta_1, ..., \eta_N$. Define the total number of periods in which the individual experiences the event by $D_i = \Sigma_{t=1}^{T} d_{it}$. First, consider the event $D_i = 1$. The probability that $D_i = 1$ is given by

$$p(D_i = 1|X_i, \eta_i) = F_i^{-1}[\exp(X_{i1}\beta + \eta_i) + ... + \exp(X_{iT}\beta + \eta_i)].$$

This expression is the probability that the individual experiences the event in period one but not in the other periods plus the probability that the individual experiences the event in period two but not in the other periods, and so on. Now given that $D_i = 1$, the conditional probability that the individual experiences the event in period t is

$$\begin{aligned} p(d_{it} &= 1, d_{is} = 0, \forall s \neq t|D_i = 1, X_{it}, \eta_i) \\ &= \frac{p(d_{it} = 1|X_{it}, \eta_i) \prod_{s \neq t} p(d_{is} = 0|X_{is}, \eta_i)}{p(D_i = 1|X_i, \eta_i)} \\ &= \frac{\frac{\exp(X_{it}\beta + \eta_i)}{F_i}}{\sum_{s=1}^{T} \frac{\exp(X_{is}\beta + \eta_i)}{F_i}} \\ &= \frac{\exp(\eta_i)\exp(X_{it}\beta)}{\exp(\eta_i)\sum_{s=1}^{T}\exp(X_{is}\beta)} \\ &= \frac{1}{1 + \sum_{s \neq t}\exp((X_{is} - X_{it})\beta)}, \end{aligned}$$

Now consider the case for which $D_i = 2$, assuming that $T > 2$. The probability that the individual experiences the event in periods t and periods t' but not in any other period is given by

$$p(d_{it} = 1, d_{it'} = 1, d_{is} = 0 \; \forall s \neq t, t' | X_i, \eta_i) = F_i^{-1}[\exp(X_{it}\beta + \eta_i) \times \exp(X_{it'}\beta + \eta_i)].$$

The probability that individual i experiences the event in exactly two of the periods is given by

$$p(D_i = 2 | X_i, \eta_i) = F_i^{-1}[\sum_{j=1}^{T} \sum_{k>j} [\exp(X_{ij}\beta + \eta_i) \times \exp(X_{ik}\beta + \eta_i)],$$

which is the sum of the probabilities of the $T(T-1)/2$ ways in which the event can occur twice in T periods. Then the conditional probability that the individual experienced the event in period t and period t' given that she experienced the event twice in T periods is

$$\begin{aligned} p(d_{it} &= 1, d_{it'} = 1, d_{is} = 0 \; \forall s \neq t, t' | D_i = 2, X_i, \eta_i) = \\ &= \frac{\frac{\exp(X_{it}\beta + \eta_i)\exp(X_{it'}\beta + \eta_i)}{F_i}}{\frac{\sum_{j=1}^{T}\sum_{k>j}[\exp(X_{ij}\beta + \eta_i) \times \exp(X_{ik}\beta + \eta_i)]}{F_i}} \\ &= \frac{\exp(2\eta_i)\exp(X_{it}\beta)\exp(X_{it'}\beta)}{\exp(2\eta_i)\sum_{j=1}^{T}\sum_{k>j}^{T}[\exp(X_{ij}\beta) \times \exp(X_{ik}\beta)]} \\ &= \frac{\exp([X_{it} + X_{it'}]\beta)}{\sum_{j=1}^{T}\sum_{k>j}^{T}\exp([X_{ij} + X_{ik}]\beta)} \\ &= \frac{1}{\sum_{j=1}^{T}\sum_{k>j}^{T}\exp([(X_{ij} + X_{ik}) - (X_{it} + X_{it'})]\beta)}. \end{aligned}$$

This conditioning method to eliminate the fixed effects can be used for any set D which is greater than 0 and less than T. In particular, let $D_i = k$, $1 \leq k < T$, and let $E_i = (e_{i1}, ..., e_{ik})$, where the $\{e_i\}$ denote the k time periods in which individual i experiences the event. Then we have that

$$\begin{aligned} p(d_{ie_{i1}} &= 1, ..., d_{ie_{ik}} = 1, d_{is} = 0, \; s \notin E_i | D_i = k, X_i, \eta_i) \qquad (2) \\ &= \frac{1}{\exp(\sum_{j_1=1}^{T-k}\sum_{j_2>j_1}^{T-(k-1)}\cdots\sum_{j_k>j_{k-1}}^{T}\{(X_{ij1} + X_{ij2} + ... + X_{ijk}) - \sum_{s\in E_i} X_{is}\}\beta)} \end{aligned}$$

In our application, we actually are modeling two decisions simultaneously, the participation decision and the fertility decision. Given the independence of the decisions f and p conditional on the $X's$ and the $\eta's$,and given that the fixed effects estimator defined below conditions on the $X's$ and eliminates the $\eta's$, the estimator for each decision j is independent of the estimator for the decision j'.

Thus we are able to consistently estimate β_j using only the information on the outcomes d^j and the X^j, even though the probabilistic model allows for relatively general forms of dependence between the fertility and the participation decision. The brief discussion of the fixed effects estimator considers the univariate choice problem without any loss of generality.

This simple functional form can be used to build likelihood functions which yield consistent maximum likelihood estimators of identified elements of β for each D between 1 and $T-1$. In our application of the fixed effects logit estimator, T is at most equal to 3. In this case, subsamples of individuals who experience the event once or twice can be used to estimate β consistently using this method. Let the subsample for which $D_i = 1$ be denoted by S_1 and let S_2 denote the subset of sample members for which $D_i = 2$. Then we define the conditional maximum likelihood estimator as

$$\hat{\beta}_c = \arg\max_{\beta} \{L_1(\beta) + L_2(\beta)\},$$

where

$$L_1(\beta) = \sum_{i \in S_1} \sum_{t=1} d_{it} \{-\ln(1 + \sum_{s \neq t} \exp[(X_{is} - X_{it})\beta])\}$$

and

$$L_2(\beta) = \sum_{i \in S_2} \sum_{t=1} \sum_{t'>t} d_{it} d_{it'} \{-\ln(\sum_{j=1} \sum_{k>j} \exp([(X_{ij} + X_{ik}) - (X_{it} + X_{it'})]\beta))\}.$$

Chamberlain proved that the conditional likelihood estimator is consistent and asymptotically normally distributed under standard regularity conditions.

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