TRENDS IN LABOR MARKET PARTICIPATION AND FERTILITY BEHAVIOR: A FIRST LOOK TO THE ITALIAN EXPERIENCE IN RECENT YEARS

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1. INTRODUCTION

Over the last decades all European and other developed countries have experienced considerable changes in both labor market participation (first of all in female employment) and fertility trends. Particularly, they have been characterized by a dramatic fall of total fertility rates to previously unseen levels while women entered the labor market in large numbers.

With the massive entry of women into the labor market, balancing work and family became a central task for families and subsequently sociologists, demographers, economists and policymakers have studied much about the relationship between fertility and women's employment because of its social implications (Van de Kaa, 1987; Ahn and Mira, 2001; Lee 2003; Adsera, 2004; 2005).

The existence of an inverse relationship between fertility and labor market participation was theoretically established by Becker and Lewis (1973) and Willis (1973) and empirically documented by Butz and Ward (1979) for the U.S. and by Mincer (1985) on a cross-country basis. In accordance with this theory, unemployment for some women can be viewed as an opportunity to have a child in situations that reduce the opportunity costs of childbearing (Rindfuss *et al.* 2007). In this model decreasing fertility is thus associated with increasing female employment, and rising female employment is associated with falling fertility.

Recent studies on developed countries have shown that a simple cross-country correlation coefficient between total fertility and female labor force participation switched from a negative value before the 1980s to a positive value thereafter (O-ECD, 2007). This result suggests that women's work, rather than an obstacle to motherhood, can become a prerequisite if the context makes possible to reconcile the dual role of women (Brewster and Rindfuss, 2000; Del Boca *et al.,* 2003). In this regard, it is important to underline the meaning of public policies: countries that facilitate combining the worker and mother roles have higher fertility and higher female labor force participation rates (Hoem, 2000; Ermish, 2003; Gauthier, 2007; Rindfuss *et al.* 2007).

Finally, in the recent decades several economic crises have affected many developed countries, making more difficult to detect a clear relationship between fertility and labor market participation.

The aim of this paper is to verify the relationship between fertility and labor market participation of Italian men and women during the period 1995-2010 in the different geographic areas of Italy. Moreover, we wish to verify if the recent dramatic swings in the labor market have affected the Italians fertility behavior and if we can recognize distinct relations in the different geographic areas of the country.

2. LABOR MARKET PARTICIPATION AND FERTILITY: THEORETICAL FRAMEWORK

The relationship between economic fluctuations and demographic responses has been analyzed many times by different methods. Research on this topic differs in the gender approach (most analysis only refer to women's labor participation), in the economic indicators proposed and in the utilized data (individual or aggregate).

Many interesting analysis regard the relationships between U.S. labor market and demographic behavior. In an American study of first births, Rindfuss *et al.* (1988) found an inhibiting effect of unemployment during recent decades as well as during the Depression, without distinguishing between men's and women's unemployment. In a study, where no other variables were included, both men's and women's unemployment were found to reduce fertility (Macunovich and Easterlin 1988). Subsequently, Macunovich (1996) showed a negative correlation between American women's unemployment on their birth rate, based on a time series analysis. Furthermore, a recent analysis of Population Reference Bureau (Haub, 2009) discussed about the decline in births rates and fertility in several regions of the United States and experts linked this trend "to the uncertain economic outlook and high unemployment rate" (Cohn and Livingston, 2010).

Many scholars have analyzed the relationship between economic fluctuations and demographic responses in European countries too.

As for the United States, similar effect of men's unemployment on first births in the post-war period was reported from Great Britain (De Cooman *et al.,* 1987; Ermisch, 1988). Tzannatos and Symons (1989) carried out a dynamic economic approach to examine movements in fertility in Britain since 1860, and results indicate that fertility has responded positively to change in incomes, and that unemployment to a large extent was responsible for the low British fertility during the Depression.

Although the research emphasis of economic demographers has shifted towards investigations of the fertility choices of individuals (Hotz *et al.*, 1997), interest in fluctuations in aggregate fertility remains.

Ryder (1980) views fertility as a "collective property" that requires examination at the aggregate level. Some variables, when measured at the micro level reflect each person's relative position within society, and such effects may be absent at

the macro level. Conversely, social contagion may encourage aggregate reaction to changes that are not reflected in individual variability.

Results from time series analysis for European countries indicate a significant negative effect of unemployment on fertility in the last decades (Ahn and Mira, 2001; Kravdal, 2002).

As many scholars have observed (Andersson, 2000; Kravdal, 2002), general unemployment levels may lead to a substantially reduced income, depending on the country's compensation system, and may also generate emotional reactions.

The impact of economic uncertainty on fertility in the developed countries has been addressed in a relatively few empirical studies, especially for Central and Eastern Europe (Sobotka *et al.,* 2010) and results suggest the existence of strong negative correlation between unemployment and family formation.

Finally, with respect to labor market position, unstable or temporary work has a detrimental effect on fertility (Kumar Bhaumik and Nugent, 2002; Adsera, 2005; Blossfeld *et al.*, 2005; Lundström, 2009).

Research on the effect of economic recessions on fertility is then usually linked to the idea that fertility reacts negatively to the downturns of the business cycle. In contrast, sociologists have argued that unemployment for some women is an opportunity to have a child. Economists have asserted that periods of high unemployment reduce the opportunity costs of childbearing (Rindfuss *et al.,* 2007). This is true in particular in presence of generous unemployment benefits and relatively high parental leave allowances, as verified for example for Finland (Sobotka *et al.*, 2010).

3. FERTILITY AND LABOR BEHAVIOR IN EUROPE

Since 1970, within the general downward trend, fertility has varied significantly across developed countries. Table 1 shows the trends in the total fertility rates (TFR) for selected European countries in the last four decades.

TABLE 1

Total fertility rate for selected European countries, 1970-2009

	1970	1980	1990	2000	2009
Finland	1.83	1.63	1.78	1.73	1.86
France	2.47	1.95	1.78	1.89	2.00
Germany	2.03	1.56	1.45	1.38	1.36
Greece	2.40	2.22	1.40	1.26	1.52
Ireland	3.87	3.24	2.11	1.89	2.07
Italy	2.43	1.64	1.36	1.26	1.46
Netherland	2.57	1.60	1.62	1.72	1.79
Norway	2.50	1.72	1.93	1.85	1.98
Portugal	3.01	2.25	1.56	1.55	1.32
Spain	2.88	2.20	1.36	1.23	1.40
Sweden	1.92	1.68	2.13	1.54	1.94
U. K.	2.43	1.90	1.83	1.64	1.96

Source: 1970 and 1980: Council of Europe (1998); 1990-2009: Eurostat online database (2011).

In 1970, only some Northern countries presented a fertility little above the replacement level. Since 1980 data highlight a higher variability among selected

countries which in the following decades show different trends towards either the replacement level (France, Sweden, Norway, Ireland, United Kingdom) or a stability on low values of fertility. In Southern countries and in Germany the fertility rate has decreased to about 1.4 or below.

During the same period, more and more European women entered the labor market. Female labor force participation rates in the EU-15 increased from 39% in 1970 to 60% in recent years. The entry of women into the labor force remained stable since the mid-1980s in Northern Europe, where it first started, but accelerated in Southern Europe, where it had historically been fairly low (Adserà, 2004).

Table 2 shows data on female employment rates and the gender gap[1]; we find the persistence of a high heterogeneity among the selected countries in both indicators. The same heterogeneity also characterizes other European countries (Eurostat, 2010).

TABLE 2

Female employment rate (FER) and gender ratio (GR) in employment rates. Selected European countries, 1970-2009*

	1970		1980		1990		2000		2009	
	FER	G R	FER	GR	FER	GR	FER	GR	FER	GR
Finland	61.5	77.2	66.1	87.5	71.5	91.8	64.5	91.5	67.9	98.5
France	46.4	56.2	50	63.9	50.3	72.2	54.3	79.7	60.0	87.7
Germany	46.3	51.9	49.6	61.2	52.2	69.0	58.1	79.7	65.2	86.4
Greece	-	-	34.4	44.6	37.5	51.1	41.3	57.9	48.9	66.5
Ireland	30.5	37.1	31.9	42.6	36.6	54.2	53.8	70.7	57.8	85.9
Italy	27.4	35.2	33.4	44.4	36.2	52.3	39.6	58.1	46.4	67.6
Netherland	29.7	35.7	34.2	46.1	47.5	62.7	62.7	77.2	70.6	87.4
Norway	47.9	59.1	60.8	73.1	67.2	85.5	74.0	90.6	74.4	94.9
Portugal	47.3	53.3	45.8	54.5	55.4	69.2	60.5	79.3	61.6	86.6
Spain*	29.5	33.8	28.5	36.9	31.8	44.2	42.0	57.8	53.5	79.3
Sweden	58.3	67.9	73.3	85.0	81	95.1	72.2	94.8	70.2	94.7
U.K.	-	-	54.5	70.4	62.8	76.5	65.6	83.1	65.6	86.7
EU-15	39.3	49.4	42.9	54.8	48.7	65.5	54.2	74.3	59.8	82.9

* The first value not always corresponds to 1970 or 1980. Source: OECD online database, 2011.

The rate of female employment varies in 1970 within the range less than 30% in Italy and Spain and values between 50% and 60% in the Nordic countries and United Kingdom. In the following decades female employment rates have increased in each country, but in 2009 we found nearly the same countries' ranking, where Southern countries still present lower rates; Italy presents the lowest value.

In all the EU-15 member states women are more likely than men to be outside the labor force (table 1.A in appendix), but the gender gap in employment rates is lower in the Nordic countries while in Italy, Greece, Ireland and Spain the gender difference presents higher values. These differences among countries persist over the considered period. In the most recent year Northern countries have overcome the gender gap in employment rates.

The high heterogeneity in female labor participation among countries characterized by analogous levels of economic development can be ascribed to a num-

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[1] Ratio between female and male employment rates (%).

ber of factors, usually interrelated. Among them we can cite first of all cultural and social norms, that may induce a rigid division of tasks related to housework (Esping Andersen, 1990; Gornick, 1999: Pissarides *et al.*, 2005).

Other important factors are represented by the characteristics of available jobs (both in terms of quality and of capacity to consent the reconciliation between work obligations and individual needs) and national welfare systems, in terms of care services for elderly and children and maternity leaves' duration (Ciccarone and Raitano, 2006).

In 2009, the highest fertility levels are found where the proportions of employed women are the largest and the employment gender ratios are more favorable.

As introduced, Italy is situated in the last places in the rankings based on fertility and female labor indicators. It can be said that in our country both employed women and those who do not work have few children: the first more easily dispose of economic opportunities for raising children, but are time poor and the latter are rich in time for their children, but are poor in economic resources (Tanturri, 2010).

Although all advanced industrial nations make some type of provision for working families, states' orientations toward families and family policies differ markedly (table 2.A in appendix) and represent different regimes that induce various socio-demographic outcomes[2] (Esping-Andersen, 1990; Chesnais, 1996; Hantrais, 1997; Bettio and Villa, 1998). Differences in childcare institutions and child benefit policies are potentially associated with the variation in the effect of motherhood on employment. In particular Northern countries assure the highest levels of social protection expenditure, which can also play a role in reinforcing a system where the childbearing and business cycles are positively correlated with each other (Andersson, 2002).

In the Mediterranean countries (Italy, Greece and Spain) the prevailing institutional regime relies on family ties rather than on social insurance. The lack of public services, in conjunction with pronounced gender inequality and bad economic conditions, has created a situation in which women bear the burden of ensuring the welfare of extended family members, precluding labor force participation and limiting the time available for child rearing (Bettio and Villa, 1998; Boeri, 2002). In such situations, typified by weak social protection, for women having a child often means to leave work or to give up the career ladder (Camolese, 2009).

4. THE ITALIAN CONTEXT IN RECENT YEARS

In the last decades, Italy experienced many deep changes in the field of several socio demographic behaviors including fertility, labor market performances and in the field of economic reforms too.

Italy has long been a country where there are few children (Figure 1).

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[2] Scholars have identified four models: Northern, Western, Eastern and Southern model.
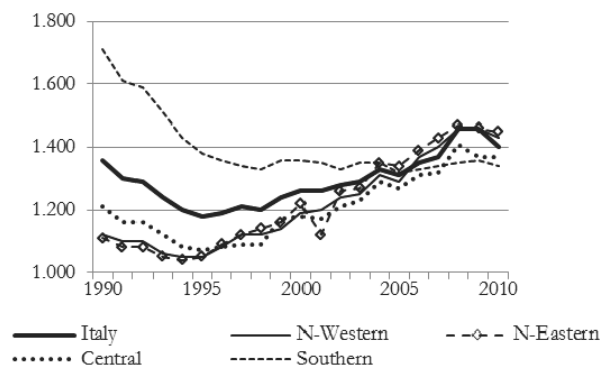
Figure 1 – Total fertility rate in Italian regions, 1990-2010.

The decline in births that began in the '70s had its peak in 1995, when the average number of children per woman was 1.18 at the national level. Until the 1990s a great variability was still evident between Southern and other areas. After 1995 a slow revitalization began in North and Center Italy, with large regional differences due to the recovery of fertility over 35 years and the contribution of foreign couples (Mencarini, 2010).

About labor market participation, in recent years Italy, as some other Southern European countries, shows a series of negative performances, such as the highest rate of long-term unemployment, the highest youth unemployment rate, the lowest participation rates of women and older workers and, finally, the lowest employment rate, which is very far from the target of 70% of the working age population that the European Union has set for 2010 (Dell'Aringa, 2003). In a labor market as small as the Italian market (evidenced by male and female employment rates lower than the European average), both enterprises and the institutions of labor regulation have traditionally favoured male employment and job opportunities for women have always been small (Righi, 2003).

Other important characteristics of the Italian labor market are the regional disparities and the diffusion of undeclared work in the underground economy. A large black economy distinguishes especially Southern Italy, an area which is traditionally poorer and structurally weaker; hence the problem may be not only unemployment, but also the quality of employment (Battisti, 2008). The presence of a large quantity of black economy validates that the Italian situation can also represent a clear example of dualism in the industrialized countries. As introduced by Piore (1980) dualism in the labor market may be considered as linked to the variability and uncertainty of modern industrial economies.

The employment rate reached the lowest level in 1995, and then both labor force participation and employment increased substantially. Employment began to grow faster in 1998, and the total number of people in employment has risen by 6.8% in the period 1998-2002, while unemployment has decreased by 21.2%. Despite the growth, in 2009 the Italian employment rates are lower than the average of the EU-15 for both male and female (Table 1.A).

Reform efforts, such as the 1997 Treu measures and the 2003 Biagi reforms, contributed to the growth in aggregate employment, but their focus on reform "at the margin" and a further proliferation of fixed-term contracts, and for older workers as well, also led to an increasing dualism of the labor market (Censis, 2003; Schindler, 2009).

A relevant part of the employment gains since 1995 was in fact in temporary and part-time employment. Between 1995 and 2007, the share of temporary employment increased from 7.2 percent to 12.4 percent, and the share of part-time employment from 10.5 percent to over 15 percent. In absolute terms, the number of workers in temporary work arrangements more than doubled during that time, while permanent employment increased by only 7 percent.

Employment growth is starting to exhibit signs of a slowdown, but the level of employment is still substantially below that in most other European countries (Schindler, 2009). This result, as Censis (2003) suggests, has been due less to greater mobility and openness of the labor market than to consolidation in the sense of less movement in or out of employment and unemployment (named as 'coagulation' and 'immobilism').

In Italy, as in other European countries, there is a considerable variation in labor market participation across regions (figure 2). Over the period 1993-2009 both male and female employment rates are higher in Northern and Central regions than in Southern area. The differences are very strong among women: nowadays, in South female employment rate is less than over 20 points the rate of the other country areas.

Probably North is characterized by a widespread network of services and support policies for families more effective as a result of a greater availability of resources. In the Southern regions, even more than elsewhere in Italy, the responsibility for care of minor children is left to the family because of low uptake of services, so women as well as having fewer job opportunities often are forced to leave their work (Camolese, 2009).

Unemployment rates are higher in Southern regions, reflecting the unsatisfactory general economic conditions of this area. Other indicators of the labor market reveal the importance of this mismatch: long-term unemployment is very high in the South and at a very low level in the North. In the South, unemployment seems to be concentrated among younger labor force. The underground economy is probably the most important problem of these regions. Although present everywhere in Italy, it is much more widespread in the South, as the "official" statistics of the National Institute for Statistics seem to indicate (Istat, 2010b).

In the same manner, the diffusion of not standard work too has not been homogeneous among the Italian regions: some of them have pioneered the adoption of these contracts, while others show lower percentages of not typical workers in their employment. Temporary workers represent a higher percentage of total employees in the South than in the North-West, while the opposite holds with regards to part time workers. The job flows, on the contrary, show that both kinds of contracts are spreading more rapidly in Southern regions (Marelli and Porro, 2000).
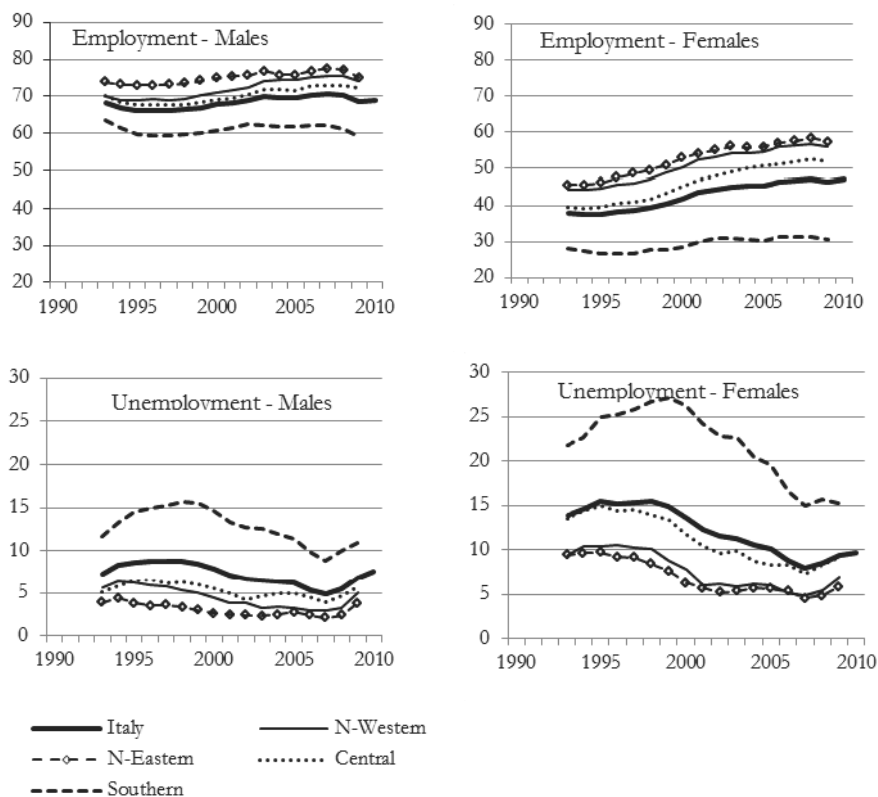
Figure 2 – Male/female employment[3] and unemployment[4] rates in Italian regions, 1990-2010.

The increased presence of women in the labor market from 1993 to nowadays was certainly large. But this increase in female employment was neither uniform throughout the country (1,731 million increase in the Centre North against only 244,000 in the South) or qualitatively stable, the amount attributable largely once more to the growth of part-time (Isfol, 2011).

Jointly considering fertility and labor market behavior, it is possible to observe that Southern regions show a persistent negative relationship between female employment and fertility, while in Central and Northern regions the relationship is positive and therefore in line with developments at the European level.

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[3] Male/female employment rate as a percentage of employed men/women on men/women aged 15- 64 years. Workers who are on temporary lay-off (*Cassa Integrazione Guadagni*) are considered as employed if they are entitled to a compensation equivalent to at least 50% of wages lost (Istat, 2010a). This assumption can weak the official indicator.

[4] Male/female unemployment rate as a percentage of unemployed men/women on all men/women currently in the labor force (employed, unemployed and first-time job-seekers).

5. DATA AND METHODS

As said above, we wish to verify if the labor market behavior can help to explain the fluctuations in births which Italy has experienced in the last years and to evaluate the effect of recent economic crisis (here sinthesized by labor market participation trends) on fertility. To this purpose, we have characterized an economic model of fertility and labor market behaviour, applying contemporary time series methods to aggregate data from Italian geographic areas over the period 1995-2010.

A standard way of assessing the functioning of a labor market is to look at a few indicators that are intended to capture the efficiency in using and allocating the available human resources (Dell'Aringa, 2003). The usual indicators are the unemployment and the employment rates. So, we synthesize labor market trends by information on unemployment and employment rates, for men and women. Data are official estimates from the Labor Force Surveys carried out by National Institute of Statistics.

North Eastern and North Western regions show the same trends in labor market participation for men and women (figure 2). When we consider female data, we also note the same levels of indicators. Trends in fertility present the same similarity (see again figure 1). For this reason, in the following elaborations we consider all Northern regions together.

We refer to the population aged 15-64 years, and not only to young people, with the assumption that general trends in labor market may create a feeling of trust or distrust to the future which can influence demographic behaviors. We refer to quarterly data[5], and then to synthesize fertility in the same periods we utilize general fertility rates[6] time series which represent a proxy of fertility behavior.

Of course, we are aware that the relationship between labor market participation and fertility is not univariate and unidirectional, and that to better highlight the determinants of both childbearing choices and labor participation many variables might be included; among them gender roles within the family and intergenerational relationships (Rampichini and Salvini, 1999; Del Boca, 2002).

The first step in our analysis is represented by the research of the possible presence of structural changes in the series, that are individually examined. Then, fertility and labor market participation series are jointly considered to verify an eventual relationship between them. Estimation and testing are performed using dynamic regression models, taking into account the presence of the estimated structural breaks in the involved series.

We found that the best labor participation indicator for the model is represented by unemployment rates both for men and women; in the following pages only the results based on the unemployment rates are reported.

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[5] The use of quarterly data is due to the nature of the Labor Force Surveys; furthermore this choice allows us to get a high number of observations, as required by time series analysis.

[6] As during the considered time period the structure by age of reproductive women has changed – even if not considerably – a better indicator should be the standardized fertility rate, but currently data on births by mother's age are not available for 2009 and 2010.

As Sobotka, Skirbekk and Philipov (2010) pointed out, the measure of unemployment appears to be more suitable indicator to closely reflect the impact of the crisis on individuals and repeatedly appeared related to fertility swings. Higher and increasing unemployment levels might create an atmosphere of insecurity also among those who have not lost their job, affecting the propensity to give birth (Andersson, 2000).

Literature on the effects of unemployment on childbearing suggests that experiencing unemployment leads to different childbearing propensity for men and women. Among the childless men, being unemployed or being out of the labor force negatively affects the propensity to become a father (Kravdal, 2002; Simó Noguera *et al.*, 2003; Mills and Blossfeld, 2005 and Lundström, 2009). In contrast, for women being unemployed sometimes is associated with elevated first birth rates (Andersson, 2000; Francesconi and Golsch, 2005; Schmitt, 2008), because males' 'breadwinning capacity' remains of paramount importance for couples' childbearing decisions (Oppenheimer, 1994); on the contrary, in some countries (Norway and France, for example) a negative relationship has been found (Kravdal, 2002; Meron and Widmer, 2003; Schmitt, 2008).

6. EMPIRICAL FINDINGS

In Figures 3, 5, 7 are presented male and female unemployment rates by geographic areas (Northern, Central and Southern regions), observed from first quarter 1995 to third quarter 2010. Figures 4, 6, 8 show fertility rates in the same geographic areas and in the same period. Both unemployment and fertility rate series are adjusted by Tramo-Seats procedure[7] (Gòmez and Maravall, 1996) to remove the seasonal component from the original series and to correct outliers and missing observations[8].
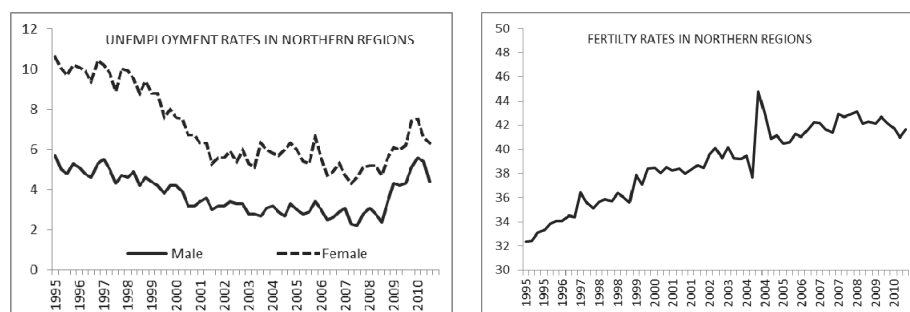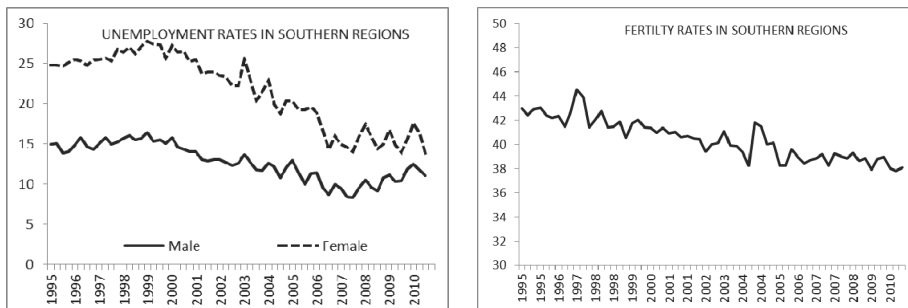

Figures 3, 4 – Unemployment and fertility rates in Northern regions.

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[7] Time series Regression with Arima noise, Missing values and Outliers - Signal Extraction in Arima Time Series.

[8] On the contrary, the removal of the trend from the original series should be useful to underline decrease in both series in the last period, but inappropriate when we study the relation between fertility and unemployment.
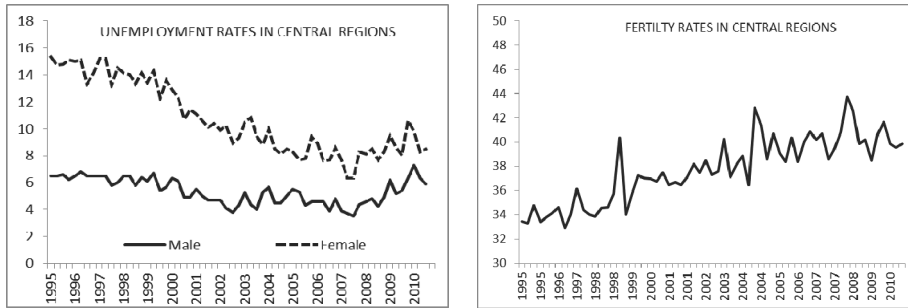
Figures 5, 6 – Unemployment and fertility rates in Central regions.

Figures 7, 8 – Unemployment and fertility rates in Southern regions.

Differences in the levels of the observed series reflect the well-known different social and economic conditions among the three regional areas; in particular, Southern area is characterized by higher levels of unemployment and, until about 2004, also by higher fertility rates. After 2004, fertility rates become higher in the Northern regions and lower elsewhere, largely due to the higher levels of fertility of immigrants, more numerous in the Northern areas of the country.

Another feature to deal with is the possible presence of a structural change in the series. At a first visual inspection it seems that a structural break occurs in many series. In particular, a structural change is evident for the unemployment rates series since 2007. Some occurrence of a later break seems visible in the fertility data also. Of course, proper identification tests will be carried out to check the presence of a structural break in the regional series of unemployment and fertility rates.

Since the break seems to occur in the final period of observation, i.e. in a recent period, standard tests for the identification of the break cannot be used, because their application requires that the post-break series size is enough large in order to ensure the convergence of the statistics to their limit distributions. Therefore, the method we adopt for the identification is the so-called monitoring approach (Chu *et al.*, 1996; Leisch *et al.*, 2000; Zeileis *et al.*, 2005), which consists

in carrying out repeated sequential tests in order to verify if new observations are coherent with the model previously adopted, as they become available. This method does not require large post-break series sizes, so it is useful for the identification of recent observed breaks.

Table 3 reports the estimated break dates for unemployment rates by the monitoring approach: for Northern regions it is the last quarter of 2007, while for Central and Southern areas the estimated dates are the previous quarters (2th and 1th quarter 2007, respectively). Unfortunately, precise estimated break dates for fertility rates are not so simple to find, because these estimates are largely dependent on the pre-break interval choice. Fertility break estimations seem to be included into a range varying from near the unemployment break to three or more quarter after; despite this inaccuracy, these values are compatible with the hypothesis of a delay on family projects in case of uncertainty due to a declining or instable social context.

TABLE 3

Estimated break dates by monitoring test approach in unemployment rates

Regions	Series	Structural break (year: quarter)
Northern	Male, female and total unemployment rates	2007:4
Central	Male, female and total unemployment rates	2007:2
Southern	Male, female and total unemployment rates	2007:1

Once an unemployment structural break has been identified, it may be shifted to the fertilty rates by an appropriate transfer function, since our aim is to analyze unemployment and fertility rates in order to underline the connections between economics and demographic indicators' variations.

In a further step, in order to assess if a significant relationship between fertility and unemployment rates holds, we jointly consider economic and demographic indicators. For each geographic area a dynamic regression model will be estimated separately, taking into account the presence of a link beetwen these two indicators. In other words, we assume a dynamic linear regression model which connects fertility to unemployment by a properly estimated lag and shifts the unemployment structural break, as detected by monitoring approach, to fertility rates. In addition, we also insert other auxiliary explanatory variables to improve the estimated fertility values.

The fundamental question to deal with concerns the choice of the most appropriate key covariates for the models we are going to specify. For example, trends in fertility rates in the Northern regions are better explained by male, female or total unemployment rate? This could seem a trivial question, since female unemployment rates are thought to be the most natural indicator in explaining variations in women's choices to have children. However women's participation in Italian labor market is still limited and, especially in Southern regions, male work can still represent the main source of family income. The other issue concerns the length of the period necessary to induce a significant variation in the levels of the fertility rate after a variation in the unemployment rate.

From the methodological point of view, the appropriate choices of the covariates to insert into the models are made estimating all possible models and choosing the one which better fits data; this result can be achieved by comparing the models on the basis of adjusted R-square indices[9] and Akaike Information Criterion (AIC)[10]. But the variations of these indicators are not so great to assess a strong or unique guideline and a more empirical and logical point of view sometimes could be more appropriate. In this context we use a reasonable compromise between these two approaches.

We specify the model as follows for each Geographic Area (*GA* = Northern, Central and Southern regions of Italy):

$$FR\_GA_t = \beta_0 + \beta_1 FR\_GA_{t-1} + \beta_2 UR\_GA_{t-k} + \beta_3 I(\hat{t}_b) + \epsilon_t \qquad (1)$$

where FR_GA_t and FR_GA_{t-1} are the values of the fertility rate for each geographic area at time *t* and *t*-1, respectively; UR_GA_{t-k} is the value of (male, female or total) unemployment rate for the same area *k* quarters before; $I(\hat{t}_b)$ is an auxiliary indicator of the event $t \geq t_b$ (dummy variable), where $\hat{t}_b$ is a convenient date near *k* quarter after unemployment break. When we consider male/female unemployment rates, *UR* becomes *MUR/FUR*.

In this model the fertility rates (FR_GA_t) depend on a key variable (UR_GA_{t-k}) and on two other instrumental covariates: the fertility previous values (FR_GA_{t-1}) and the dummy variable $I(\hat{t}_b)$, that adjust the unemployment induced break effect. In fact, the effects of socioeconomic variables are rarely instantaneous; it is not unusual in macroeconomics for a variable to be affected by its own past behavior. Consequently, the relationship between fertility and labor participation should be viewed not only in a dynamic manner but also as an autoregressive process (Heckman and Willis, 1976; Cheng, 1999).

Furthermore, it is natural to expect that higher unemployment rates are followed, after a certain period, by lower fertility rates. A reasonable hypothesis could be that a variation in the levels of unemployment rates has an effect in changing the attitudes of women to have children after a certain period, which could vary from 9 months to 24 months, assuming 9 months of pregnancy.

To choose the most appropriate number of quarters (*k*) and of the indicator to use (male, female or total unemployment rate), several models have been estimated using different lags. A lot of models perform in a good way, in particular assuming *k* from 4 to 8 quarter, as summary reported in table 4.

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[9] Adjusted R^2 is a modification of R^2 that increases only if the new term we introduce improves the model performance more than would be expected by chance.

[10] The Akaike information criterion is a measure of the relative goodness of fit of a statistical model. According to Akaike's theory, the most accurate model has the smallest AIC.

TABLE 4

Adjusted R^2 indices and AICs of several estimated models for the Northern regions

	Lag (*k*):	4 Quarters (12 Months)	5 Quarters (15 Months)	6 Quarters (18 Months)	7 Quarters (21 Months)	8 Quarters (24 Months)
Unemployment rate:						
TOTAL						
Adj. R^2		0.86	0.86	0.86	0.84	0.83
AIC		177.81	170.77	165.64	167.24	165.04
MALE						
Adj. R^2		0.86	0.86	0.87	0.85	0.82
AIC		176.60	173.57	162.08	163.25	166.84
FEMALE						
Adj. R^2		0.85	0.86	0.86	0.83	0.82
AIC		182.59	171.48	167.53	169.87	167.12

As we can see, in correspondence of different values of the lag there are no strong difference in adjusted R^2 and AIC. For this reason, afterwards only the results for *k*=4 quarters (12 months) are presented. This lag represents a reasonable length of the period required to induce a significant variation in the level of the fertility rate after a variation in the unemployment rate.

In Northern area, both male and female unemployment rates appear as good indicators and therefore we consider two distinct models to identify the best. Including male unemployment rate, we specify the Northern model as follows:

$$FR\_N_t = \beta_0 + \beta_1 FR\_N_{t-1} + \beta_2 MUR\_N_{t-4} + \beta_3 I(\hat{t}_b) + \epsilon_t \tag{2}$$

Results are shown in table 5. The relationship is globally significant as *F*-test suggests ($\alpha = 0$) and also all covariates are significant.

TABLE 5

OLS in Northern regions of Italy (adj. $R^2 = 0.86$)

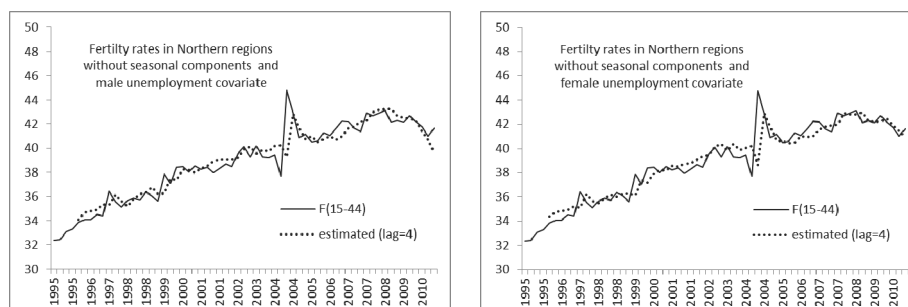|	Coefficient	Std. Error	*t*-ratio	*p*-value	
Const	23.8078	5.0773	4.689	1.85E-05	***
Tbr_N	1.02313	0.432308	2.367	0.0215	**
MUR_N_4	-1.18465	0.303119	-3.908	0.0003	***
FR_N_1	0.501394	0.105875	4.736	1.57E-05	***

The estimated coefficient of main variable MUR_N_{t-4} is -1.18: *coeteris paribus,* a unit increase in the levels of MUR_N_{t-4} induces a decrease of 1.18 units in the levels of FR_N_t and this is coherent with the hypothesis of an inverse relationship between unemployment and fertility rates.

Comparison between estimated and empirical data is reported in figure 9 and the model seems to fit enough well. Residuals do not show any autocorrelation structure and, when plotted against the dependent variable and/or the covariates included in the model, do not exhibit any systematic structure, confirming the adequacy of the linear function linking the response variable and the predictors. However, the null hypothesis of normally distributed residuals is rejected, as shown by the results of the Jarque-Bera test (p-value ~ 0).

If we consider female unemployment as covariate (Model 3), the relationship is still significant (figure 10 and table 6), but *FUR_N_4* has a role much less impor-

tant than male unemployment (-0.508 *vs* -1.185) and adjusted R^2 assumes a lower value (0.65 *vs* 0.86).

$$FR\_N_t = \beta_0 + \beta_1 FR\_N_{t-1} + \beta_2 FUR\_N_{t-4} + \beta_3 I(\hat{t}_b) + \epsilon_t \qquad (3)$$

Figures 9, 10 – Fertility rates in Northern regions. Empirical and estimated values (models 2-3).

TABLE 6

OLS in Northern regions of Italy (adj. $R^2 = 0.65$)

	Coefficient	Std. Error	t-ratio	p-value	
Const	21.7181	6.02375	3.605	0.0007	***
Tbr_N	0.517457	0.424186	1.22	0.2277	
FUR_N_4	-0.50818	0.178208	-2.852	0.0061	***
FR_N_1	0.536487	0.125925	4.26	8.05E-05	***

For the series related to Central regions, as in the case of Northern regions, the most appropriate values of *k* and of the indicator (male, female or total unemployment rate) have been selected according to the data trying different models but, generally speaking, the Central regions offer worst performances in terms of global indicators (R^2 indices and AICs) and, consequently, more problems for a clear detection of a set of better models.

In any case, the previous estimated delay (*k=4*) beetween fertility and unemployment holds, but the model seems to fit empirical data worse when we introduce as covariate male unemployment rates compared to female unemployment rates (Model 4 *vs* Model 5). In the case of male unemployment rates the model becomes:

$$FR\_C_t = \beta_0 + \beta_1 FR\_C_{t-1} + \beta_2 MUR\_C_{t-4} + \beta_3 I(\hat{t}_b) + \epsilon_t \qquad (4)$$

Again all the coefficients are significant (table 7) with sign and magnitude like those for Northern regions, but now the global explicative performance is worse (adjusted $R^2 = 0.65$ *vs* 0.86).

TABLE 7

OLS in Central regions of Italy (adj. $R^2 = 0.65$)

	Coefficient	Std. Error	t-ratio	p-value	
Constant	37.0304	6.14047	6.031	1.44E-07	***
Tbr_C	1.31313	0.616389	2.13	0.0376	**
MUR_C_4	-1.57955	0.349979	-4.513	3.41E-05	***
FR_C_1	0.240003	0.124625	1.926	0.0593	*

Residuals do not show any systematic structure, confirming the adequacy of the linear function linking the response variable and the predictors, though some outliers are present. Even in this case, the null hypothesis of normally distributed residuals is rejected.

If we consider female unemployment rates, it is possible to derive a particular and more parsimonious model, because the usually auxiliary variables FR_C_{t-1} and $I(\hat{t}_b)$ are not significant:

$$FR\_C_t = \beta_0 + \beta_1 FUR\_C_{t-4} + \epsilon_t \tag{5}$$

The FUR_C_{t-4} coefficient (-0.808) results highly significant (p=2.08E-017) and adjusted R^2 reaches 0.72[11]. These results demonstrate the best performance of the "reduced female model" in comparison with the "complete male model". In the female model, unemployment seems to be sufficient for a first prediction of fertility: when a unit increase in unemployment occurs, the levels of fertility rate have a decrease of about 0.81 units 4 quarters after. Figure 11 includes a graphical inspection of the real and estimated values of fertility rates.

Of course, this is a very elementary model, that provides a basic indication about the hypothetical relationship between unemployment and fertility rates and it does not confirm this relation.
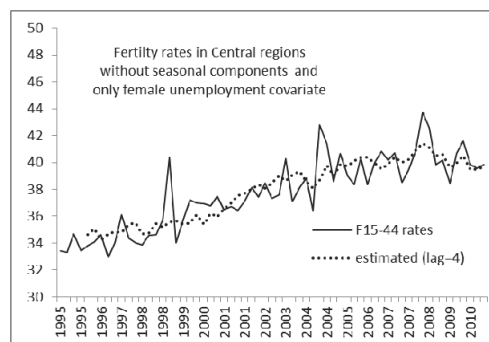

Figure 11 – Fertility rates in Central regions. Empirical and estimated values (model 5).

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[11] Results of this model are not presented in a table.

For Southern regions the situation is unlike to the rest of Italy and the previous linear link between unemployment and fertility has not the same empirical basis: the fertility rate is continuously decreasing, with some assessments in the period 2004-2007, and the unemployment rate does not reflect the real situation because the irregular unemployment is extremely high in this area.

In Southern area, male unemployment rate seems to be the best predictor of fertility rate, since AICs and adjusted R^2 are, respectively, lower and higher than those of the model including total and female unemployment rates. However, the differences in the values of adjusted R^2 and AICs can be considered only indicative on the choice of the best model. A possible compromise between goodness of fit and simplicity may be the following model:

$$FR\_S_t = \beta_0 + \beta_1 FR\_S_{t-1} + \beta_2 MUR\_S_{t-4} + \epsilon_t \tag{6}$$

The absence of the time break is connected to the fact that no impact is evident on Southern fertility. Another striking result is the sign of the estimated coefficient of the variable MUR_S_{t-4}, equal to 0.267 (Table 8).

TABLE 8

OLS in Southern regions of Italy (adj. R^2 = 0.73)

	Coefficient	Std. Error	t-ratio	p-value	
Const	15.5604	3.74188	4.1584	0.00011	***
MUR_S_4	0.26714	0.08048	3.3191	0.00159	**
FR_S_1	0.52742	0.11163	4.7246	0.00002	***

The positive coefficient suggests that variations in the levels of the unemployment rate determine variations of the same way in the levels of fertility rate, and this is not coherent with our expectations about the relationship, but coherent with the data. It can also be noted that, unlike the models previously estimated, the coefficient is small in absolute values, though it is significant.

These results may be also affected by the bad quality of unemployment indicator: in Southern areas it is likely to overestimate the real unemployment rate, because of the high percentage of hidden work in the informal sector; also socio-economic determinants of fertility seem to be different in comparison with the determinants in other Italian regions. So it is not a surprise that the previous conceptual relations, tested for North and Center, may not be proposed for the South of Italy in the same way.

7. DISCUSSION

Understanding the relationship between fertility and labor supply is a very critical question. Most recent analysis used individual data, investigating then the fertility choices of individuals, but interest in fluctuations in aggregate fertility remains, and a lot of analysis have been also performed on aggregated data.

Furthermore, most of research only considers female labor force participation which has often been associated with low fertility and delayed childbearing.

In the same way it is well documented that the correlation between female labor participation rate and total fertility rate in OECD countries changed from negative (where countries with higher female labor participation rate had lower TFR) to positive during the 1980s, but it has been unknown whether this implies a change in the causal relationship between the two variables.

Macro-level studies of fertility variations have suggested the importance of changing macro-economic conditions both when it comes to the determinants of overall fertility levels (Butz and Ward, 1979; Devaney, 1983) and the timing of first births (Rindfuss *et al.*, 1988; Santow and Bracher, 2001). In this context, also men's labor force participation is important to underline changes in fertility choice.

In this paper we have tried to capture the effect of labor market participation on fertility behavior in the different Italian regions. We propose an economic model of fertility and labor market behavior applying contemporary time series methods to aggregate data from Italian geographic areas over the period 1995-2010, that also includes a period of "employment crisis". General fertility rate has been considered as a proxy of fertility behavior and we have verified that labor market trends may be well synthesized by information on male and female unemployment rates.

The results of our research seem to underline both the impact of unemployment rates on general fertility rate trends and the great variability of the relationship within the country. We can recall that labor force participation before the crisis was different in each area, and so variations in employment and unemployment levels have not the same importance and the same trend in all the regions.

It is evident that the link between female labor force participation and fertility is to a large extent dependent on the degree of compatibility of work and family for women, which in Italy differs a great deal among regions in consideration of the different local public welfare, that differently help women and couples to moderate the conflict between work and family roles; for these reasons too, in Italy does not exist a common environment for childbearing. Male labor force participation will not then conflict to the same extent as female labor force participation, and the higher earnings of working men can even be expected to have a positive effect on fertility since they are considered good providers for their families (Kingsbury and Greenwood, 1992; Rindfuss and Brewster, 1996; Brewster and Rindfuss, 2000).

In Italian Northern regions, characterized by higher levels of employment rates both for men and women, male unemployment appears as the most important variable which affects fertility. Our result may be linked to trends in labor market participation (figure 2) which shows in this area a higher stability for women in comparison with men. Moreover it may be partly consistent with the framework proposed by many scholars who have stressed the fact that poor employment opportunities and increasing marginalization of young men have influenced the timing of births, both directly through increased difficulties in achieving stable labor market attachment and income, and indirectly through women's relatively

stronger economic position and earnings potential. Among the others, we can cite Easterlin (1987), Macunovich (1998), Oppenheimer (1994, 2003).

The idea that the loss of a man's income is a central factor in couples' childbearing decision is supported by Schmitt (2008), who finds that the negative impact of unemployment on the likelihood of becoming a father in France, Finland and Germany was eliminated when net monthly income, welfare transfers and education attainment were controlled for.

In Italian Central regions the model better fits trends in fertility when female unemployment is considered. This result suggests that female work participation represents a key factor for families' wellbeing. In fact in this area male employment rates are lower than in Northern regions, and so variations in female unemployment rates seem to assume a more important role within the family and then on childbearing decision.

Finally, as we introduced, results related to Southern areas are less clear and evident. A factor that contributes to the weak link between fertility and labor participation can be represented by the presence of an informal sector of the labor market and consequently a large participation of men and women in irregular works. This behavior leads to an underestimation of the effective employment activity.

In summary, our results confirm that "employment crisis" had a certain negative influence on fertility decisions in Italy; in particular, in Northern and Central regions crisis has reduced at least part of fertility. Furthermore, unemployment had an impact differentiated by gender in the distinct areas of the country.

The economic recession in the last years has probably affected the dynamics of fertility because of raising uncertainty about the future. This assumption is coherent with results of many studies from other European countries, where a marked relationship between rising unemployment rate on one side and partnership formation and fertility on the other side has been repeatedly found.

In Italy, as observed for other European countries, general unemployment levels may lead to a substantially reduced income depending – in different regions – on the local compensation system too, and may also generate a climate of negative reactions also among those who have not lost their job. Studies performed on other European countries give a special emphasis to situations where (as in Spain and in Eastern Germany too) high youth unemployment occurs together with a rising proportion of temporary contracts (Ahn and Mira, 2000; Andersson, 2000; Kravdal, 2002; Kumar Bhaumik and Nugent, 2002).

Naturally, because of relatively short-term impact, our research – as most of the studies – cannot distinguish between changes in fertility level and changes in fertility timing; in fact, short-term fertility movements have improbably a measurable impact on the number of children couples will have at the end of their reproductive lives.

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APPENDIX

TABLE 1.A

Female and male employment rates for selected European countries, 1970-2009

	1970		1980		1990		2000		2009	
	F	M	F	M	F	M	F	M	F	M
Finland	61.5	79.7	66.1	75.5	71.5	77.9	64.5	70.5	67.9	68.9
France	46.4	82.5	50	78.2	50.3	69.7	54.3	68.1	60	68.4
Germany	46.3	89.2	49.6	81.1	52.2	75.7	58.1	72.9	65.2	75.5
Greece	-	-	34.4	77.2	37.5	73.4	41.3	71.3	48.9	73.5
Ireland	30.5	82.2	31.9	74.9	36.6	67.5	53.8	76.1	57.8	67.3
Italy	27.4	77.8	33.4	75.2	36.2	69.2	39.6	68.2	46.4	68.6
Netherland	29.7	83.3	34.2	74.2	47.5	75.7	62.7	81.2	70.6	80.8
Norway	47.9	81	60.8	83.2	67.2	78.6	74	81.7	74.4	78.4
Portugal	47.3	88.8	45.8	84.1	55.4	80.1	60.5	76.3	61.6	71.1
Spain*	29.5	87.2	28.5	77.2	31.8	71.9	42	72.7	53.5	67.5
Sweden	58.3	85.9	73.3	86.2	81	85.2	72.2	76.2	70.2	74.1
U. K.	-	-	54.5	77.4	62.8	82.1	65.6	78.9	65.6	75.7
UE-15	39.3	79.6	42.9	78.3	48.7	74.3	54.2	72.9	59.8	72.1

TABLE 2.A

Female Public Expenditure on Social Services (PESS) and public expenditure on family (PEF)
as percentage of gross domestic product (GDP)

	1980		1990		2000		2007	
	PESS	PEF	PESS	PEF	PESS	PEF	PESS	PEF
Finland	18.1	1.9	24.3	3.2	24.3	3.0	24.9	2.8
France	20.8	2.4	24.9	2.5	27.7	3.0	28.4	3.0
Germany	22.1	2.0	21.7	1.7	26.6	2.1	25.2	1.8
Greece	10.2	0.3	16.5	0.7	19.2	1.0	21.3	1.1
Ireland	16.7	1.1	14.9	1.6	13.3	1.8	16.3	2.6
Italy	18.0	1.1	20.0	0.8	23.3	1.2	24.9	1.4
Netherland	24.8	2.5	25.6	1.7	19.8	1.5	20.1	2.0
Norway	16.9	1.8	22.3	2.7	21.3	3.0	20.8	2.8
Portugal	9.9	0.6	12.5	0.7	18.9	1.0	22.5	1.2
Spain	15.5	0.5	19.9	0.3	20.4	1.0	21.6	1.2
Sweden	27.2	3.9	30.2	4.4	28.4	3.0	27.3	3.4
U. K.	13.2	2.3	13.5	1.9	14.5	2.7	16.2	3.2
OECD	15.6	1.6	17.6	1.6	18.9	1.9	19.3	2.0

REFERENCES

A. ADSERÀ (2004), *Changing fertility rates in developed countries. The impact of labor market institutions*, "Journal of Population Economics", 17, pp. 17-43.

A. ADSERÀ (2005), *Where are the babies? Labor market conditions and fertility in Europe*, IZA Discussion Paper n. 1576.

N. AHN, P. MIRA (2001), *Job bust, baby bust? Evidence from Spain*, "Journal of Population Economics", 14(3), pp. 505-521.

G. ANDERSSON (2000), *The impact of labour-force participation on childbearing behaviour: Pro-cyclical fertility in Sweden during the 1980s and the 1990s*, "European Journal of Population", 16(4), pp. 293-333.

G. ANDERSSON (2002), *Fertility developments in Norway and Sweden since the early 1960s*, "Demographic Research", 6(4), pp. 67-86.

M. BATTISTI (2008), *Reassessing segmentation in the Italian Labour Market*, Quaderno n. 149 Dipartimento di Scienze economiche e aziendali, LUISS Guido Carli, DPTEA, Roma.

G.S. BECKER (1960), *An Economic Analysis of Fertility*, "Demographic and Economic Change in Developed Countries", NBER conference series 11, Princeton, pp. 209-231.

F. BETTIO, P. VILLA (1998), *A Mediterranean perspective on the breakdown of the relationship between participation and fertility*, "Cambridge Journal of Economics", 22, pp. 137-171.

H.P. BLOSSFELD, E. KLIJZING, M. MILLS, K. KURZ (eds.) (2005), *Globalization, Uncertainty and Youth in Society*, London/New York.

T. BOERI (2002), *Let Social Policy Models Compete and Europe Will Win*, Paper presented at a Conference hosted by the Kennedy School of Government, Harvard University, 11-12 April.

K.L. BREWSTER, R.R. RINDFUSS (2000), *Fertility and women's employment in industrialized nations*, "Annual Review of Sociology", 26, pp. 271-296.

C. BÜHLER, E. FRĄTCZAK (2005), *Learning from others and receiving support. The impact of personal networks on fertility intentions in Poland, MPIDR* Working Papers 2005-017, Max Planck Institute for Demographic Research, Rostock.

W. BUTZ, M. WARD (1979), *The emergence of counter-cyclical US fertility*, "American Economic Review", 69(3), pp. 318-328.

V. CAMOLESE (2009), *Maternità e lavoro femminile, una scelta possibile?,* "Neodemos", (www.neodemos.it).

CENSIS (2003), *37° rapporto sulla situazione sociale del paese/2003*, FrancoAngeli, Milano.

B.S. CHENG (1999), *Cointegration and Causality Between Fertility and Female Labor Participation in Taiwan: A Multivariate Approach*, "Atlantic Economic Journal", 27(4), pp. 422-434.

J.C. CHESNAIS (1996), *Fertility, family, and social policy in contemporary Western Europe,* "Population and Development Review", 22(4), pp. 729-739.

CS.J. CHU, M. STINCHCOMBE, H. WHITE (1996), *Monitoring Structural Change*, "Econometrica", 64, pp. 1045-1065.

G. CICCARONE, M. RAITANO (2006), F*lexicurity in Italy*, "European Employment Observatory", (http://eu-employmentobservatory.net).

COUNCIL OF EUROPE (1998), R*ecent demographic developments in Europe,* Council of Europe Publishing, Strasbourg.

D.V. COHN, G. LIVINGSTON (2010), *U.S. birth rate decline linked to recession*, (http://pewsocialtrends.org).

E. DE COOMAN, J. ERMISCH, H. JOSHI (1987), *The next birth and the labour market: a dynamic model of births in England and Wales*, "Population Studies", 41(2), pp. 237-268.

C. DELL'ARINGA (2003), *The Italian labour market: problems and prospects, "*Quaderni dell'Istituto di economia dell'impresa e del lavoro", n. 33, Università cattolica del Sacro Cuore, Milano.

D. DEL BOCA (2002), *The effect of child care and part time opportunities on participation and fertility decisions in Italy, "*Journal of Population Economics", 15, pp. 549-573.

D. DEL BOCA, R. AABERGE, U. COLOMBINO, J. ERMISCH, M. FRANCESCONI, S. PASQUA, S. STROM (2003), *Labour market participation of women and fertility: The effect of social policies,* Paper presented at the FRDB Child conference, Alghero (June).

B. DEVANEY (1983), *An analysis of variation in U.S. fertility and female labor force participation trends*, "Demography", 20, pp. 147-161.

R.A. EASTERLIN (1987), *Birth and Fortune. The impact of number on personal welfare* (2nd Edition), The University of Chicago Press, Chicago & London.

J. ERMISCH (1988), *Econometric analysis of birth rate dynamics in Britain*, "Journal of Human Resources", 23, pp. 563-576.

J.F. ERMISCH (2003), *An Economic Analysis of the Family*, Princeton University Press, Princeton, USA.

G. ESPING -ANDERSEN (1990), *The Three Worlds of Welfare Capitalism,* Princeton University Press, Princeton, USA.

EUROSTAT (2010), *Labour market participation by sex and age*, European Commission, (http://epp.eurostat.ec.europa.eu/).

F. FRANCESCONI, K. GOLSCH (2005), *The process of globalizaton and transitions to adulthood in Britain*, in H.P. BLOSSFELD, E. KLIJZING, M. MILLS, K. KURZ (eds.), "Globalization, Uncertainty and Youth in Society", Routledge, London/New York, pp. 249-276.

A.H. GAUTHIER (2007), *The impact of family policies on fertility in industrialized countries: a review of the literature*, "Population Research and Policy Review", 26, pp. 323-346.

V. GÒMEZ, A. MARAVALL (1996), *Programs TRAMO and SEATS. Instructions for the User (with some updates),* Working paper 9628, Servicio de Estudios, Banco de España.

J. GORNICK (1999), *Gender equality in the labour market*, in D. SAINSBURY (ed.), "Gender and welfare state regimes", Oxford University Press, New York.

L. HANTRAIS (1997), *Exploring relationships between social policy and changing family forms within the European Union*, "European Journal of Population", 13, pp. 339-379.

C. HAUB (2009), *The U.S. recession and the birth rate*, Population Reference Bureau, (http://www.prb.org).

J. HECKMAN, R.J. WILLIS (1976*), Estimation of a Stochastic Model of Reproduction. An Econometric Approach*, in N.E. TERLECKYJ (ed.), "Household Production and Consumption", National Bureau of Economic Research, pp. 99-146.

B. HOEM (2000), *Entry into motherhood in Sweden: the influence of economic factors on the rise and fall in fertility, 1986-1997*, "Demographic Research", 2(4), (www.demographic-research.org).

V.J. HOTZ, J.A. KLERMAN, R.J. WILLIS (1997), *The economics of fertility in developed countries*, in M.R. ROSENZWEIG, O. STARK (eds.), "Handbook of population and family economics", Elsevier, Amsterdam, pp. 275-347.

ISFOL (2011), *Mercato del lavoro e politiche di genere 2009-2010. I Rapporto sull'occupazione femminile in Italia,* (ww.isfol.it).

ISTITUTO NAZIONALE DI STATISTICA (anni vari), *Rilevazione sulle forze di lavoro*, ISTAT, Roma.

ISTITUTO NAZIONALE DI STATISTICA (2010a), *Rilevazione sulle forze di lavoro. Questionario,* (www.istat.it).

ISTITUTO NAZIONALE DI STATISTICA (2010b), *La misura dell'economia sommersa secondo le statistiche ufficiali*, "Statistiche in breve", ISTAT, Roma.

A.M. JENSEN (1995), *Gender gaps in relations with children: closing or widening*?, in K.O. MASON, A.M. J ENSEN (eds.), "Gender and fertility change in industrialized countries", Clarendon, Oxford, United Kingdom, pp. 223-242.

N.M. KINGSBURY, L. GREENWOOD (1992), *Fertility expectation and employment across three female co-horts,* "Journal of Family and Economic Issues", 13, pp. 73-93.

O. KRAVDAL (2002), *The impact of individual and aggregate unemployment on fertility in Norway*, "Demographic Research", 6, pp. 263-294.

S. KUMAR BHAUMIK , J.B. NUGENT (2002), *Does Economic Uncertainty Have an Impact on Decisions to Bear Children? Evidence From Eastern Germany,* William Davidson Working Paper N. 491.

R. LEE (2003), *The Demographic Transition: Three Centuries of Fundamental Change*, "Journal of Economic Perspectives" 17(4), pp. 167-190.

F. LEISCH, K. HORNIK, C. M. KUAN (2000), *Monitoring Structural Changes with the Generalized Fluctuation Test.*, "Econometric Theory", 16, pp. 835-854.

K.E. LUNDSTRÖM (2009), *Labour market status and fertility behaviour for Swedish and foreign-born men and women*, Paper presented at the workshop on "Economic uncertainty and fertility dynamics," Berlin, 3-4 July.

D.J. MACUNOVICH (1996), *Relative income and price of time: exploring their effects on fertility and female labor force participation*, "Population and Development Review" (Supplement), 22, pp. 223-257.

D.J. MACUNOVICH (1998), *Fertility and the Easterlin hypothesis: An assessment of the literature*, "Journal of Population Economics", 11(1), pp. 53-111.

D.J. MACUNOVICH, R. EASTERLIN (1988), *Application of Granger-Sims causality test to monthly fertility data*, "Journal of Population Economics", 1, pp. 71-87.

E. MARELLI, G. PORRO (2000), *Flexibility and innovation in regional labour markets: The case of Lombardy,* presented at the 40th Congress of the European Regional Science Association, Barcelona, August 29th - September 1st.

L. MENCARINI (2010), *L'Italia nella trappola. Ovvero poco lavoro femminile e pochi figli,* "Neodemos", (www.neodemos.it).

M. MERON, I. WIDMER (2002), *Unemployment leads women to postpone the birth of their first Child*, "Population", 57(2), pp. 301-330.

M. MILLS, H.P. BLOSSFELD (2005), *Globalization, uncertainty and the early life course. A theoretical framework*, in H.P. BLOSSFELD, E. KLIJZING, M. MILLS, K. KURZ (eds.), "Globalization, Uncertainty and Youth in Society", Routledge, London/New York, pp. 1-24.

J. MINCER (1985), *Trends in Women, Work, and Education,* "Journal of Labour Economics", Special Issue.

OECD (2007), *Babies and Bosses - Reconciling Work and Family Life: A Synthesis of Findings for OECD Countries*, (www.oecd.org).

V.K. OPPENHEIMER (1994), *Women's rising employment and the future of the family in industrialized societies,* "Population and Development Review", 20, pp. 293-342.

V.K. OPPENHEIMER (2003), *Cohabiting and marriage during young men's career development process*, "Demography", 40, pp. 127-149.

D. PHILIPOV (2003), *Fertility in times of discontinuous societal change*, in I. KOTOWSKA, J. JÓŹWIAK (eds.), "Population of Central and Eastern Europe. Challenges and Opportunities", Statistical Publishing Establishment, Warsaw, pp. 665-689.

M.J. PIORE (1980), *Dualism as a response to flux and uncertainty*, in S. BERGER, M.J. PIORE (eds.), "Dualism and Discontinuity in Industrial Societes", Cambridge University Press, Cambridge.

C. PISSARIDES, P. GARIBALDI, C. OLIVETTI, B. PETRONGOLO, E. WASMER (2005), *Women in the Labor Force: How Well is Europe Doing?* in T. BOERI, D. DEL BOCA, C. PISSARIDES (eds), "Women at Work: An Economic Perspective", Oxford University Press, New York, pp. 7-120.

C. RAMPICHINI, S. SALVINI (1999), *A Dynamic Study of the Work-Fertility Relationship in Italy,* proceedings of IUSSP seminar on "Women in the Labor Market in Changing Economies: Demographic Issues", Rome, 22-24 september.

A. RIGHI (2003), *Le tendenze di fecondità e di partecipazione femminile al mercato del lavoro*, Seminario "Maternità e partecipazione al mercato del lavoro: tra vincoli e strategie di conciliazione", Cnel, Istat, Roma, 2 dicembre.

R.R. RINDFUSS, S.PH. MORGAN, G. SWICEGOOD (1988), *First births in America: changes in the timing of parenthood,* University of California Press, Berkley, Los Angeles.

R.R. RINDFUSS, K.L. BREWSTER (1996), *Childrearing and fertility,* "Population and Development Review", 22 (suppl), pp. 258-289.

GUZZO (2007), *Child care availability and first-birth timing in Norway,* "Demography", 44(2), pp. 345-372.

N.B. RYDER (1980), *Where do babies come from?,* in H.M. BLALOCK (ed.), "Sociological theory and research: a critical appraisal", Free Press, New York, pp. 189-202.

G. SANTOW, M. BRACHER (2001), *Deferment of first birth and fluctuating fertility in Sweden,* "European Journal of Population", 17, pp. 343-363.

M. SCHINDLER (2009), *The Italian labor market: recent trends, institutions and reform options,* International Monetary Fund Working Paper n. 47.

C. SCHMITT (2008), *Gender-specific effects of unemployment on family formation: A cross-national perspective,* DIW Berlin, Discussion Papers 841.

C. SIMÓ NOGUERA, K. GOLSCH, N. STAINHAGE (2003), *Increasing uncertainty in the Spanish labour market and entry into parenthood,* "Genus", 58(1), pp. 77-119.

T. SOBOTKA, V. SKIRBEKK , D. PHILIPOV (2010), *Economic recession and fertility in the developed world. A literature review,* Note produced for the European Commission, Vienna Institute of Demography.

M.L. TANTURRI (2010), *Demografia e lavoro femminile: le sfide della conciliazione,* in M. LIVI BACCI (a cura di), *"*La demografia del capitale umano", Il Mulino, Bologna, pp. 95-122.

Z. TZANNATOS, J. SYMONS (1989), *An economic approach to fertility in Britain since 1860,* "Journal of Population Economics", 2, pp. 121-138.

D. VAN DE KAA (1987), *Europe's Second Demographic Transition,* "Population Bulletin", 42, pp. 1-57.

R. WILLIS (1973), *A New Approach to the Economic Theory of Fertility Behavior,* "Journal of Political Economy", 81, pp. 514-64.

A. ZEILEIS, F. LEISCH, C. KLEIBER, K. HORNIK (2005), *Monitoring Structural Change in Dynamic Econometric Models,* "Journal of Applied Econometrics", 20, pp. 99-121.

SUMMARY

Trends in labor market participation and fertility behavior: a first look to the Italian experience in recent years

The aim of this paper is to analyze the relationship between fertility and labor market participation in the different geographic areas of Italy. Moreover, we wish to explore if the recent economic crisis has affected the Italians fertility behavior. To this purpose we have characterized an economic model of fertility and labor market participation, applying contemporary time series method to aggregate data from Italian regions over the decades 1995-2010.

Results show that the economic recession in the last years has probably influenced the dynamics of fertility because of raising uncertainty about the future, even if in different way in the three areas of the country.