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# RIVISTA ITALIANA DI ECONOMIA DEMOGRAFIA E STATISTICA



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VOLUME FUORI COMMERCIO – DISTRIBUITO GRATUITAMENTE AI SOCI

**INDICE**

# FEMALE EMPLOYMENT AND REPRODUCTIVE BEHAVIOR IN ITALY[1]

Francesco D. d'Ovidio, Pietro Iaquinta

## 1. Introduction

In Europe, female employment performance is generally worse than male one, but in Italy this gap is much greater. Eurostat highlights that the total employment rate in 2011 was 64.2% (women: 58.2%) within the EU, while in Italy it was 57.2% (women: just 46.7%). According to ISTAT, a lack of support services for families (kindergartens, nursery schools, etc.) is a barrier imposed on access to the labour market for nearly 500,000 unemployed women. Indeed, in 2011 less than 1.4% of Italian GDP was allocated to households' contributions, services and tax deductions: far lower than 1.8% of the other OECD countries with low fertility[2].

The evolution of fertility in Italy was characterized by significant structural changes, which led to the current situation. Assuming the aftermath of World War II as a baseline for modern fertility, it is easy to observe severely conflicting periods of time, associated with many socio-economic changes.

Starting with the economic boom, a time characterized by a strong development, fertility gradually increased in our country until it reached a peak (the so-called *baby-boom*) in the mid-sixties, where economic and social factors led to a significant growth in terms of births and a drastic reduction of infant mortality, inducing the Total Fertility Rate to reach a value of 2,69 (1964).

This phase was followed by a long period of crisis, known as lowest-low fertility, associated with both *i)* the stormy economic changes that led to the great oil crisis of the seventies and eighties, and *ii)* factors of social nature, including a new role for women in the labour market, a higher education level, and a radical change in lifestyle in the post-oil crisis society. These changes have prompted a strong delay in the entrance of women in their reproductive life, causing a collapse of the reproduction rate.

[1] The Authors jointly designed and realized the work here described. However, P. Iaquinta wrote sections 1, 3 and 4, while F. D. d'Ovidio wrote the section 2.

[2] Cf. Senato della Repubblica Italiana, 2014, p. 5.

In this context, a very interesting question arises: is it realistically possible for women to reconcile their family expectations with their socio-economic reality?. Although cross-sectional analysis can provide a negative response, noting a systematic reduction of the TFR with a level of 1.2 children per woman (1.18 in 1995), the longitudinal analysis shows that the collapse of the synthetic index of fertility is the result of the later entry into reproductive life of Italian women and not a real deterioration of their breeding perspective, as in other countries (see, by example, Sobotka 2004).

Indeed, by observing the specific fertility rates by age from 1952 to 2015 (ISTAT, referring to all orders, without discrimination on birth order), the figures clearly show how Italian women's entry into the reproductive life has shifted forward, showing at the same time a recovery of fertility in adult age.

On the other hand, since the early 1980s in Italy Nora Federici, Carla Bielli and other scholars have worked on the Easterlin Theory (1968) on the reverse relationship between female work and fertility.

Is this relationship still working? And if it is, does it work in the same way for all ages? In this study, the most recent data (available by ISTAT data warehouse, May 2017) will be used in the attempt to answer these questions.

## 2. Relation between Occupation and Fertility

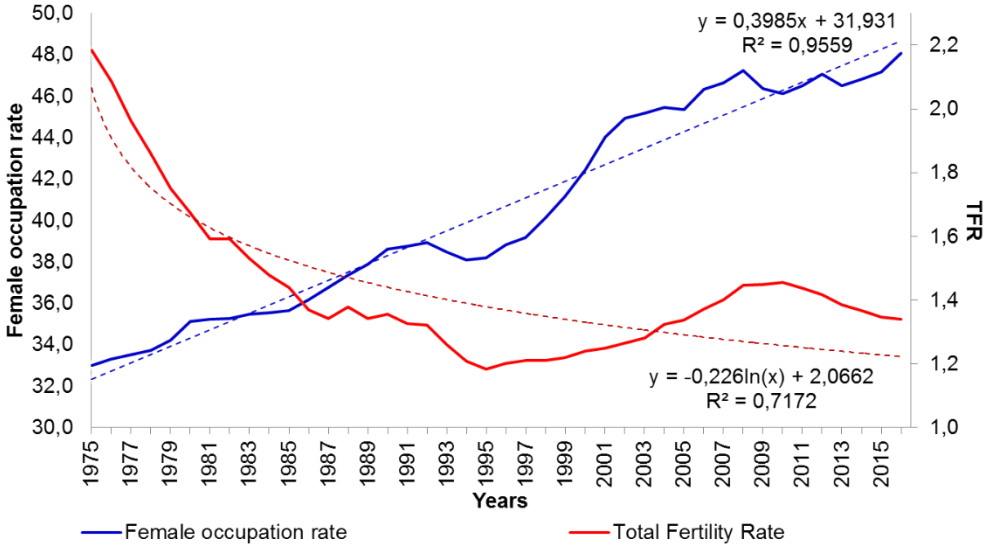
Depending on the data availability, the first analysis proposed in this paper ranges between the years 1975 to 2015. Figure 1 shows clearly that the Female Occupation Rate (FOR) increases in quite constant way from 33% in 1975 to 48% in 2015, while the Total Fertility Rate quickly decreases from 2.18 in 1975 to its minimum value (1.18) in 1995 (see the right scale in Figure 1); in the last two decades, TFR fluctuates slightly over this minimum, but no more than 1.46 (2010), and in 2015 it is worth approximatively 1.35. Therefore, apparently the Easterlin theory is still current… but the relationship shown may be spurious, depending by the different kind of the underlying phenomena.

We must analyze data series after eliminating their trends. Excluding polynomial functions (that are the best, determining $R^2$ indices around 97%, but may also eliminate the cyclic part of the time series), best interpolation functions are shown in the same Figure 1: the identified trends are given by a linear function in the case of FOR data and by a logarithmic transformation for TFR.

After the trends elimination (by simple difference), cyclic dynamics of the residual series result very different each other (see Figure 2), and this seems to exclude any relationship, direct as well as inverse, between the series.

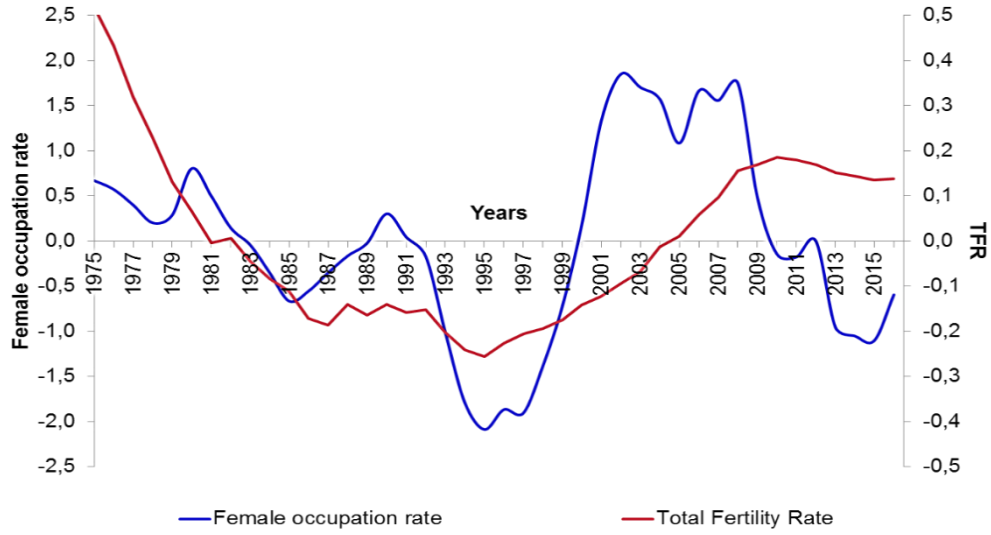
However, some strange behavior of the cyclic dynamics persists.

**Figure 1** – *TFR and FOR in Italy, 1975-2015, and their interpolating functions.*




*Source: Authors' elaborations on Istat data*

**Figure 2** – *Time series of FOR and TFR with no trends, Italy 1975-2015.*




*Source: Authors' elaborations on Istat data*

In order to explore the joint behavior of the cyclic time series, Pearson correlation coefficients between them were computed, lagging from 0 up to 9 years in two ways: first under the hypothesis that Female Occupation Rate at time *t* is influenc-

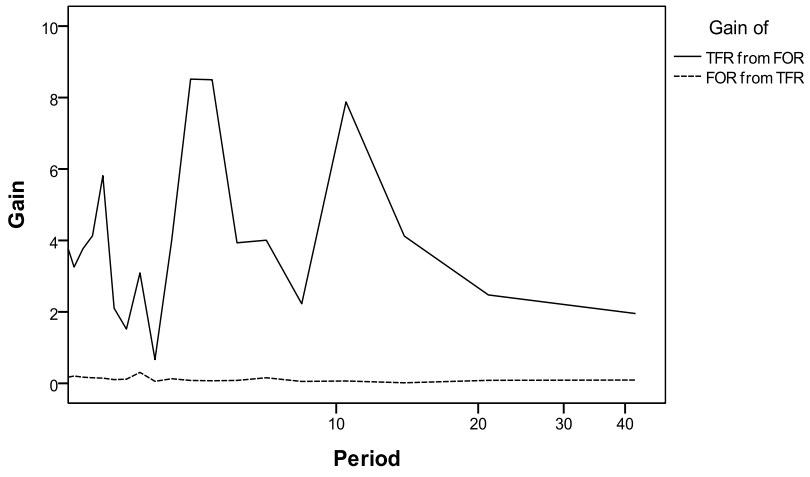
ing TFR at time $t+k$, then under the opposite – that is, TFR at time $t$ influencing FOR at time $t+k$. Table 1 shows that the 1st relationship increases for time gaps up to 4 years, while the 2nd becomes irrelevant. Because data are not from samples, inference tests cannot be applied, but $R^2$ (easy computable) highlights that at lag 0 just 14% of variability of one variable is explained by the other, while at lag 4 this percent becomes almost 20%.

**Table 1** - *Pearson cross-correlation coefficients between FOR and TFR, lagged from 0 to 9 years.*

| k | $r(FOR_t;TFR_{t+k})$ | Std.err. | $R^2(FOR_t;TFR_{t+k})$ | $r(TFR_t;FOR_{t+k})$ | Std.err. | $R^2(FOR_t;TFR_{t+k})$ |
|---|---|---|---|---|---|---|
| **0** | 0.375 | 0.154 | 0.141 | 0.375 | 0.154 | 0.141 |
| **1** | 0.405 | 0.156 | 0.164 | 0.284 | 0.156 | 0.081 |
| **2** | 0.430 | 0.158 | 0.185 | 0.192 | 0.158 | 0.037 |
| **3** | **0.433** | 0.160 | **0.187** | 0.103 | 0.160 | 0.011 |
| **4** | **0.436** | 0.162 | **0.190** | 0.038 | 0.162 | 0.001 |
| **5** | 0.402 | 0.164 | 0.162 | -0.032 | 0.164 | 0.001 |
| **6** | 0.373 | 0.167 | 0.139 | -0.125 | 0.167 | 0.016 |
| **7** | 0.339 | 0.169 | 0.115 | -0.189 | 0.169 | 0.036 |
| **8** | 0.284 | 0.171 | 0.081 | -0.218 | 0.171 | 0.048 |
| **9** | 0.193 | 0.174 | 0.037 | -0.238 | 0.174 | 0.057 |

*Source: Authors' elaborations*

**Figure 3** – *Gain of FOR and TFR in Spectral Analysis, Italy 1975-2015.*




The co-spectral analysis of the two series leads to similar conclusions (Figure 3). The gain of FOR from TFR is very close to zero in all periods, while the gain of TFR from FOR is high in almost every period. Unfortunately, results from spectral

and co-spectral analysis are much too long and complicated to be reported here, but they highlight that the higher phase peak is located at lag of 4 years between FOR and "subsequent" TFR variations, followed by harmonics at lag of 9 and 15 years[3].

## 3. Age specific analysis

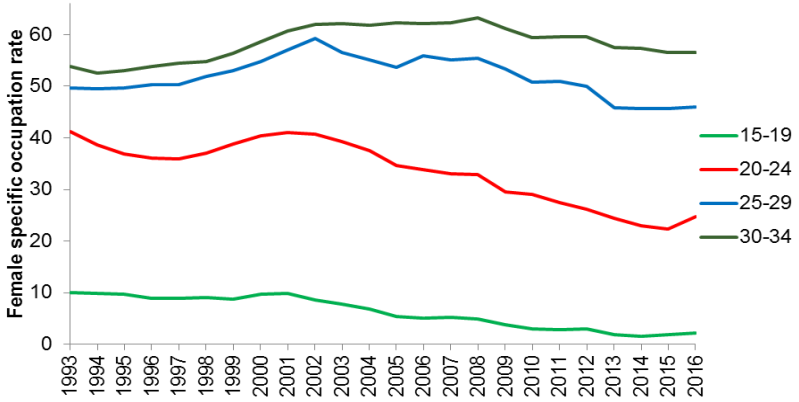
Further step of this analysis is the study of the female occupation rate, specific by age group, as well as the age specific TFR. Indeed, labour market dynamics act in very different ways for young women than they do for mature ones, and this could have some reflect on specific fecundity.

The trend in female occupation at young ages is decreasing or stable between 1993 and 2016 (Figure 4.a), while occupation rates of older ages increase almost constantly until 2006 (Figure 4.b). The overall FOR increase that was shown in the previous section is therefore due ony to the older age dynamics.

The analysis by age group of fecundity dynamics (measured by the sum of age specific quotients of fecundity, divided by 100) leads to similar conclusions. Fecundity in young ages is stable or decreases between 1993 and 2015, but increases in the group aged 30-34 and still more in that aged 35-39 (as shown in Figure 5.a-5.b).

Additionally, the late fecundity rates increase by a small percentage fraction.

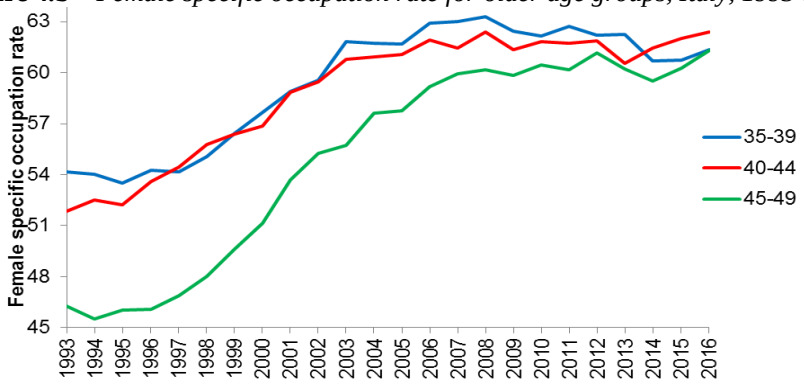
**Figure 4.a** – *Female specific occupation rate for younger age groups, Italy, 1993-2016*




*Source: Authors' elaborations on Istat data*

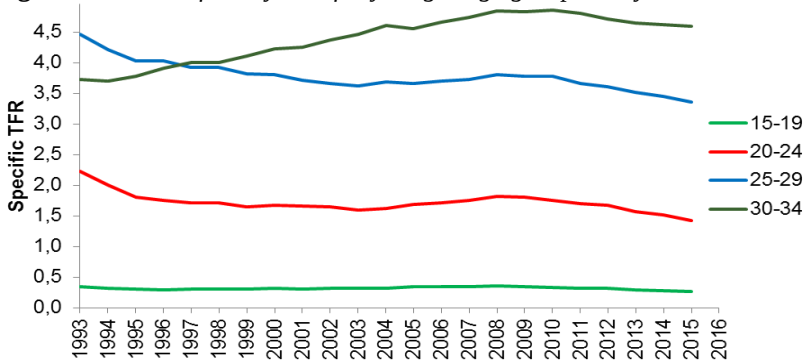
[3] Spectral analysis allows estimating the variance of one or more time series, explained by various cycles of different frequency, whose combination generates the series. It acts within the so-called "frequency domain", far different from the "temporal domain" in which data are defined. See, for example, Malinvaud, 1971; Vajani, 1980; Delvecchio. 1974.

**Figure 4.b** – *Female specific occupation rate for older age groups, Italy, 1993-2016*



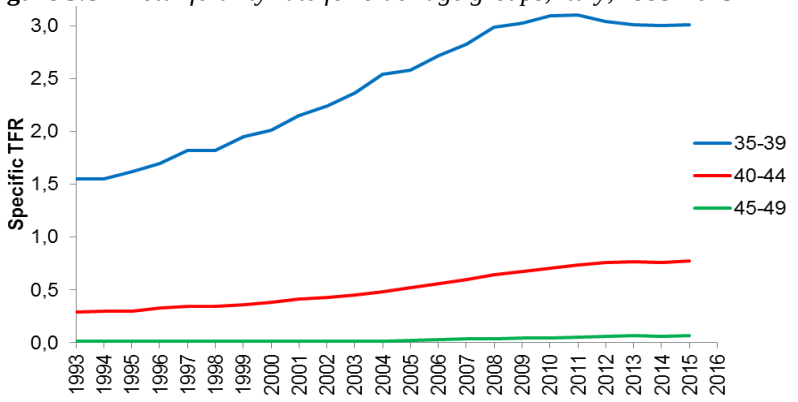

*Source: Authors' elaborations on Istat data*

**Figure 5.a** – *Total fertility rate for younger age groups, Italy, 1993-2015*



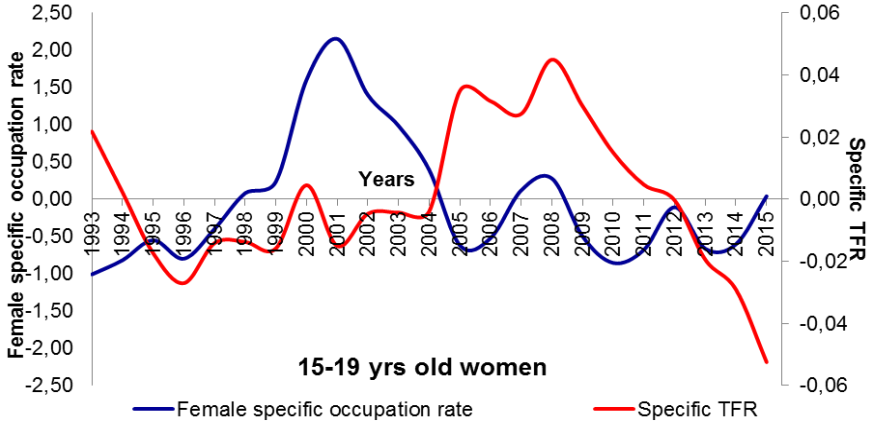

*Source: Authors' elaborations on Istat data*

**Figure 5.b** – *Total fertility rate for older age groups, Italy, 1993-2015*



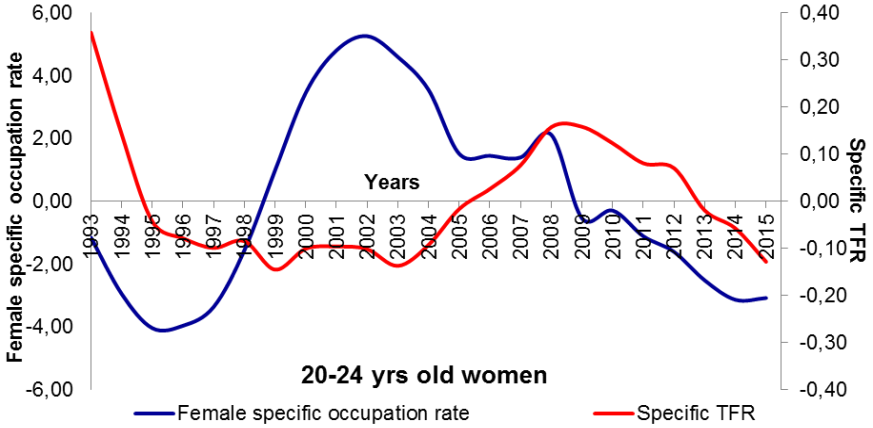

*Source: Authors' elaborations on Istat data*

**Figure 6** – *FOR and TFR cycles for 15-19 age groups, Italy, 1993-2015.*




*Source: Authors' elaborations on Istat data*

**Figure 7** – *FOR and TFR cycles for 20-24 age groups, Italy, 1993-2015.*



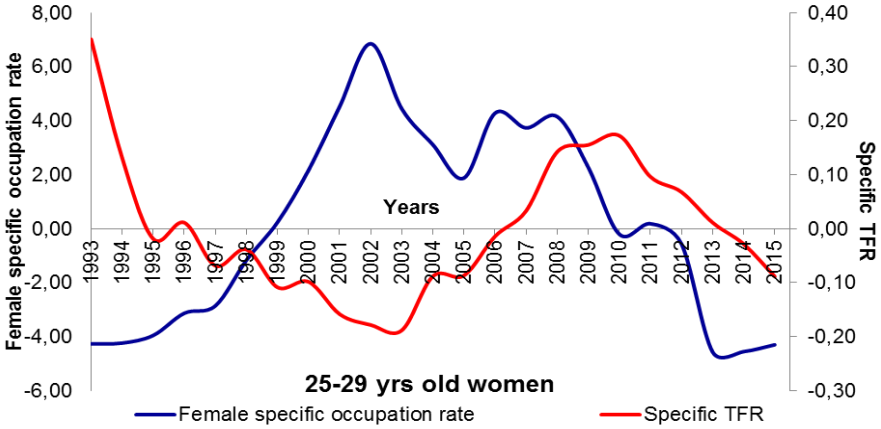

*Source: Authors' elaborations on Istat data*

Removing trends by the data series, the residual series show various compositions and some similarity in the behaviour of cyclic elements: indeed, curves in groups of 15-19 yrs and 20-24 yrs follow paths somewhat similar, particularly in the positive cusps of occupation rate as well as those of TFR. These classes show minimum TFR when occupation rate is maximum, and vice-versa (Figures 6-7).

Cyclic dynamics of women in the 25-29 yrs group seem to be similar to those of the previous series, but with more relevant fluctuations (Figure 8). The previous observations suggest that, at younger ages, job tasks often exclude or reduce fecundity (as Easterlin hypotized). Moreover, this phenomenon is more evident in the

groups where both variables have a higher number of observations, while the lower number of cases in the group 15-19 yrs seems less reliable, since small absolute variations can imply an overestimate of the phenomenon itself.

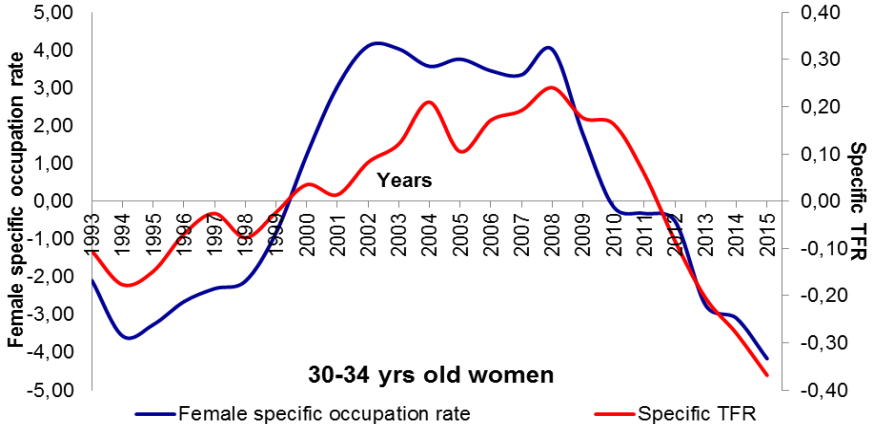
**Figure 8** – *FOR and TFR cycles for 25-29 age groups, Italy, 1993-2015.*




*Source: Authors' elaborations on Istat data*

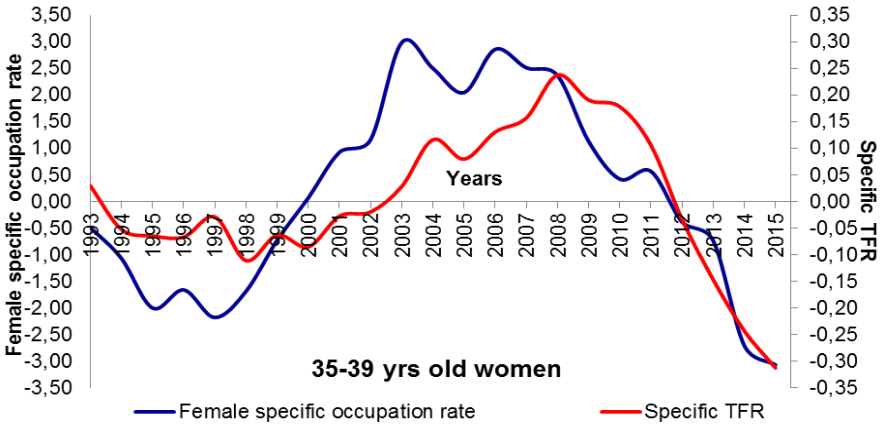
Instead, cyclic dynamics of occupation rate and TFR in groups of 30-34 yrs and 35-39 yrs seem to be similar each other: both show their minimum values in the first and in last years, and maximum values in their median section. Indeed, in this figure we can see that increase and decrease of TFR appear some year later than those of occupation rates (Figures 9-10).

**Figure 9** – *FOR and TFR cycles for 30-34 age groups, Italy, 1993-2015.*



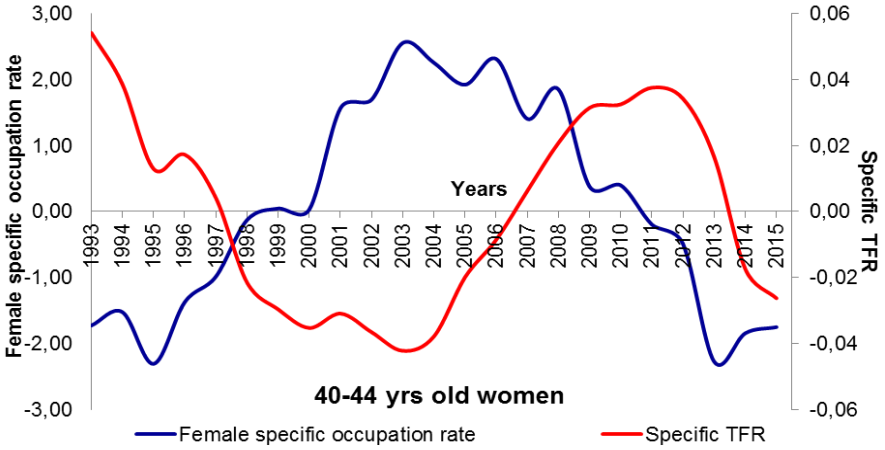

*Source: Authors' elaborations on Istat data*

**Figure 10** – *FOR and TFR cycles for 35-39 age groups, Italy, 1993-2015.*




*Source: Authors' elaborations on Istat data*

**Figure 11** – *FOR and TFR cycles for 40-44 age groups, Italy, 1993-2015.*

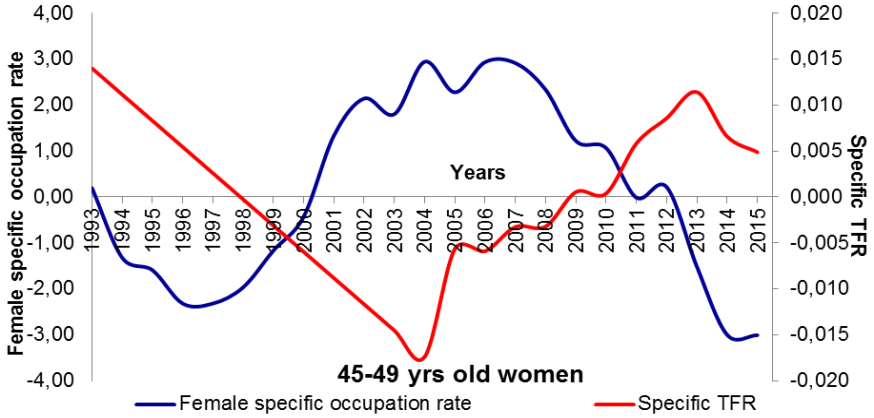



*Source: Authors' elaborations on Istat data*

In the age group 40-44, cyclic dynamics of TFR and occupation rate approximately replay those of one of younger groups: 20-24 years old (cf. Figure 11 and Figure 7).

Additionally, the group of older women (45-49 yrs) seems to repeat the same dynamics, as shown in Figure 12. However, we must keep in mind that the specific TFR values are very low in this age group, and therefore the variations shown seem stronger than their real relevance, as well as in the 15-19 yrs age group.

**Figure 12** – *FOR and TFR cycles for 45-49 age groups, Italy, 1993-2015.*




*Source: Authors' elaborations on Istat data*

## 4. Conclusions and next steps

In this study a simple explorative analysis was performed, highlighting the different behavior of women in different age groups facing problems related to keeping a job and having/raising children at the same time.

Obviously, for contemporaries this analysis could just be a proxy of the real behavior of women, but the co-variation dynamics of feminine occupation rates and TFR (particularly by age) seem to be quite telling.

Further steps will require an analysis of the available data by transposing them from the time domain to the frequency domain by using spectral analysis (with Fourier transform).

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**SUMMARY**

## Female employment and reproductive behavior in Italy

In Italy in 2011, the employment rate for women between the ages of 25 and 54 was 64%, compared with an average of almost 76% in the EU-27. Furthermore, in the EU the total employment rate was 64.2%, with women at 58.2% - while in Italy the total employment rate was 57.2% and only 46.7% for women (Eurostat). Female employment performance in Europe is worse than the male one, but data shows in Italy this gap is significantly larger.

According to ISTAT, the lack of family support services (kindergartens, nursery schools, etc.) is an obstacle to the entry into the labor market for nearly 500,000 unemployed women. In Italy, less than 1.4% of the GDP is allocated to households' contributions, services and tax deductions: far lower than 1.8% of the other low fertility countries in OECD. An additional potential obstacle comes from Nora Federici's study (dated 1980s), which indicates that among the causes of the already substantial reduction in fertility, the objective necessity for women to choose between work and family plays a large role. This study hypothesizes a reverse relationship between feminine work and fertility, and this relationship has since found various experimental confirmations.

Is this relationship still working, in this new millennium undergoing heavy changes in the world of work? And if it is, does it work in the same way for all women? Some recent remarks suggest discordant behaviors: for example, a recent survey showed a greater employment of female graduates with children than those without children and women with lower or lower grades. This shows that the study of fertility, as well as of its determinants, must try to understand many different mechanisms. This essay (concerning the relationship between female occupation and fertility by age group) is a preliminary analysis to a much more complex and ambitious study, the completion of which will involve numerous analyzes of data from different sources - but already the results provide food for thought.

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