

A Macro-level Analysis of Non-nationals' Fertility Response to the Great Recession in Italy¹

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Abstract:

Fertility responses to economic downturns not only react to structural conditions but also tend to vary widely among population groups. Whether and how the relationship between employment and fertility varies according to the ethnic origin are both arguments that have not been still sufficiently acknowledged on empirical studies. It is well known that economic conditions affect childbearing, but little is still known about how immigrants' fertility behaviors at the macrolevel have been affected by the recent economic crisis. This contribution will account for non-nationals fertility responses to the economic crisis, assessing the role played by compositional changes on the observed decline of non-nationals' fertility during and after the recession. It will also determine whether and how responses to economic conditions differently affect non-nationals fertility according to women's age. Our analyses will compare non-national and national fertility responses and include a temporal window long enough to evaluate not only short but also long-term trends and relations. To this end, we will build a regional-level panel dataset for the period 2006-2018 and estimate several ordinary least squares regression models with regional and calendar year fixed effects to control for unobserved region and period characteristics.

1. Introduction

The Great Recession, led to a severe economic downturn in Europe since 2008. While some countries experienced a recovery after 2010, in Southern European countries the slow improvement of the economic conditions experienced a delay of almost 3 years (Matysiak et al. 2021).

Two trends characterized the first years of the economic recession in Italy: the systematic increase of unemployment rates (which continued even after) and the further widespread of flexible contracts, which implied a deterioration of labor market opportunities and conditions for the population, overall. Consistent growth of unemployment rates in Italy led to a severe (per capita) income reduction, one of the strongest observed in Europe (De Rose and Strozza 2015), while the growing flexibility of working conditions negatively affected both adult and youth employment levels (Liotti 2020). Since 2010, after austerity measures were implemented, the economic recession in Italy got deeper and, while unemployment rates continued increasing, women were particularly affected by the rapid decline in public employment and the decreasing investment on public provision of services (such as child and elder care) which followed the implementation of such measures (Addabbo et al. 2015).

The great economic recession has had a strong impact also among immigrants in Italy (Bonifazi and Marini 2014). If compared to natives, immigrants are more likely to experience lower unemployment risks and a deeper penalization regarding the access to high-skilled jobs, with an exceptionally high occupational segregation. While geographic origin matters for unemployment risks, their occupational segregation seemed not to be dependent on their personal characteristics, including origin (Paterno et al. 2016, Fellini 2018).

Also, during the years of the economic recession, particularly since 2008, Total Fertility Rates (TFRs) in most European countries declined (Matysiak et al. 2021). This decrease has been particularly important among young women (Goldstein et al. 2013; Comoli 2017; Bellido and Marcén 2019) and more pronounced in Southern Europe, where the crisis hit stronger (Lanzieri 2013).

Italy was one of the countries in which fertility reached exceptionally low levels. In fact, around 1992, its situation was labelled as the "lowest low" fertility (Kohler et al. 2002) and, since then, its levels slightly recovered but still maintained

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what Catalbiano et al. (2009) have called “*persistent low fertility*”, with TFR below 1.5 children per woman. Since the strike of economic recession, the recovery of fertility stopped (Cazzola et al. 2016; Vitali and Billari 2017; Zambon et al. 2020) and, in the following years, TFR further declined (progressively) again to the lowest low levels (1.29 in 2018).

Fertility responses to economic downturns not only react to structural conditions (normative pressures, institutional contexts, among others) but also tend to vary widely among population groups, i.e.: by age, gender, socio-economic status, origin and ethnicity (Vignoli et al. 2012; 2019; Kreyenfeld 2016; Bellido and Marcén 2019; Seltzer 2019; Matysiak et al. 2021).

Whether and how the relationship between employment and fertility varies according to the ethnic origin are both arguments that have not been still sufficiently acknowledged on empirical studies (Wood and Neels 2017). It is well known that economic conditions affect childbearing, but little is still known about how immigrants’ fertility behaviors (at the macrolevel) have been affected by the recent economic crisis. Few studies have recently stressed the role played by international migration, and/or ethnicity, on fertility during the Great Recession (see for example Seltzer, 2019 in the U.S., and Sabater and Graham, 2019 in Spain). However, most studies on the macro-level relationship between fertility and economic downturns has not specifically considered differences between fertility rates of immigrants and natives neither in Italy (Cazzola et al. 2016; Zambon et al. 2019) nor in Europe (Bellido and Marcén 2019; Matysiak et al. 2021; Comoli 2017; Kotzamanis et al. 2017; Hiilamo 2017). Moreover, most of previous research somehow neglected the importance of both the “tempo” and “quantum” of immigrants’ fertility on overall levels of fertility.

This paper is aimed at contributing to recent literature on the subject in different ways. Firstly, to account for non-nationals (individuals without Italian citizenship) fertility response to the economic crisis, considering that most previous studies were only focused on overall fertility. Second, to assess the role played by compositional changes (as to say, geographic origin and share of mixed unions) on the observed decline of non-nationals’ fertility during and after the recession. Therefore, we analyze the effect of the economic and contextual factors on the “quantum” of fertility. Third, to determine whether and how responses to economic conditions differently affect non-nationals fertility according to women’s age, analyzing their effects on the “tempo” of fertility. Moreover, we compare non-national and national fertility responses, including a temporal window long enough to evaluate trends and relations.

The remainder of the paper is organized as follows. Section 2 presents the theoretical background and research hypotheses. In Section 3, we describe data used and the methodology. Section 4 presents results of panel analyses divided according to “quantum” fertility responses and “tempo” fertility responses for both non-national and nationals. Section 5 concludes.

2. Theoretical background and research hypotheses

Several studies demonstrated that the relationship between fertility and economic downturns can be pro-cyclical or counter-cyclical. There is a pro-cyclical pattern when fertility is reduced in times of economic hardship and births are postponed or forgone. This response has been explained by Morgan et al. (2011) through the higher difficulty faced to afford the elevated costs of having a child during an economic crisis (or times of economic uncertainty). Dixit and Pindyck (1994) and Ranjan (1999) have referred to this childbearing standby – in which individuals wait for better times in economic terms – as the income effect. On the contrary, if the relationship is counter-cyclical, fertility increases despite the economic downturn. Authors have supported this pattern stating that the rearing cost of children decrease when women are out of the labor market (substitution effect), thus, given the gendered division of household chores, women, having more time to spend in care, may choose to become a mother (Butz and Ward 1979; Friedman et al. 1994; Alderotti et al. 2021).

Recently, studies on the European case have expanded. Goldstein et al. (2013) showed a negative effect of unemployment on fertility rates, which was stronger at younger ages. Authors also stressed that the combination of deeper impacts of recession and weaker institutional arrangements converged stimulating a stronger fertility decline in Southern Europe. This result is in line with the study of Bellido and Marcén (2019) in which authors stated that the negative effects of economic downturns can be reduced if welfare systems are generous. Comoli (2017) extended both the period and the countries under analysis (2000-2013, 31 European countries plus the U.S.) to confirm that a decrease on TFRs is associated to increasing unemployment rates, and that this effect was also observed when analyzing female unemployment. Focused exclusively on Finland, Hiilamo (2017) studied fertility responses to periods of economic recession between 1992 and 2015. During the whole period, increases in unemployment led to decreasing fertility, independently of the measure of unemployment used (total, male, female), but the stronger effect was found during the Great Recession (2008-2014).

About the relationship between the timing of fertility and economic conditions, overall fertility responses tend to vary depending on women’s age (Bellido and Marcén 2019; Matysiak et al. 2021). The reduction of fertility rates was more

pronounced among younger women, indicating postponement rather than forgoing, and in those countries/regions where the increase of unemployment was sharper and more rapid. Schneider (2015) also reported that the effect of macro-economic conditions on fertility differs by age, having a greater impact at younger ages (age 20-24, 30-34). Moreover, it was showed a positive fertility response to increasing unemployment for age groups in which childbearing decisions cannot be further postponed (biological clock) even in times of economic crisis. Also, Seltzer (2019) showed that when examining ethnic groups of women, the reduction of fertility rates linked to the increase of unemployment was more pronounced at younger ages. The most recent study on European regions conducted by Matysiak et al. (2021) has estimated a 0.04 decrease on the TFR given a 10 percentage points increase on unemployment rates. This fertility decline was observed for all reproductive ages but was even more significant among women under 30. The negative impact of unemployment on fertility got stronger after 2008. Authors have attributed this finding to both the accumulation of negative economic developments and the rise in uncertainty about the future.

Focusing on the Italian case, recent analyses have found that the impact of the recession follows gender-specific responses, being fertility levels much more dependent on male economic conditions but also sensitive to female unemployment (Vitali and Billari 2017). Regarding non-nationals, heterogeneous fertility responses to male or female unemployment might be mainly due to occupational differences. Non-national men have been those hit harder by the crisis, being overrepresented on more cyclical positions (employed in sectors such as construction and manufacturing) when compared to non-national women (mainly employed in care-related sectors) (Bonifazi and Marini 2014; Del Boca and Venturini 2016; Paterno et al. 2016; Fellini 2018).

Cazzola et al. (2016) have analyzed aggregated data on fertility and unemployment between 1995 and 2012. Embedded in a broader European context, Italy lowest-low fertility experienced a slight recovery between 2003 and 2008 - which was mostly due to the contribution of the fertility of foreign women in Northern regions - but continued decreasing thereafter. Innocenti et al. (2021) confirmed the negative association between unemployment and fertility, even when considering the positive effect on fertility of economic complexity among Italian provinces.

Recent research has stated the importance of considering that fertility responses to economic downturns might differ among population subgroups showing compositional effects (Vignoli et al. 2012; 2019; Kreyenfeld 2016; Bellido and Marcén 2019; Seltzer 2019; Matysiak et al. 2021). This might be particularly relevant when analyzing the Italian case, given four reasons. First, almost half of the recovery of overall period fertility has been attributed to immigrants' fertility (Ferrara et al. 2009; Goldstein et al. 2009; ISTAT 2010; Strozza 2019); second, period-fertility indicators are following divergent trends when comparing nationals' and non-nationals' figures; third, the timing of reproduction between groups is also different, having non-national women their children generally at younger ages; and, lastly, non-nationals' contribution to overall fertility varies according to the national origin and the gender of who is heading the migratory project (Mussino and Strozza 2012; Giannantoni et al. 2018; Impicciatore et al. 2020).

With reference to the different reproductive behaviors among non-nationals and nationals and, in particular, to compositional effects, Mussino and Strozza (2012) and Fellini (2018), highlighted that despite a stable general trend, the number of non-nationals coming from East-Europe has increased after the start of the economic crisis. Authors highlighted also that the intensity of non-nationals' fertility varies greatly according to their citizenship (Sobotka 2008; Mussino and Strozza 2012; Giannantoni et al. 2018), and that in some groups, as women coming from Eastern European countries, fertility levels are basically equal to those of Italians (Impicciatore et al. 2020; Mussino and Cantalini 2021).

Fertility behaviors of non-nationals in Italy are also linked to the type of union that has been established. Differential fertility behaviors have been found between endogamous and mixed couples in Italy, having the latter lower and later fertility, and lesser conjugality (Maffioli and Paterno 2008; Maffioli et al. 2012; Guetto and Azzolini 2015).

Bearing in mind the existing literature, we observe non-nationals' fertility responses to economic conditions during the 2006-2018 period. In particular, we examine non-nationals' fertility responses (TFR) based on three main determinants. The first one is the unemployment rate, that we consider both overall (as to say, for both genders together - OUR) and disaggregated by gender (as to say separately for men - MUR - and women - FUR). The second determinant corresponds to compositional effects, that we consider through two variables: the share of non-national women coming from Eastern European countries and the type of union (as to say the proportion of mixed unions on the total of non-nationals' unions). The third determinant is represented by the trend of the economic downturn, that we divided in three phases (first: 2006-2008, second: 2009-2013 and third: 2014-2018). Whenever possible, empirical analyses were aimed at comparing non-nationals' and nationals' fertility responses at the macrolevel. We built the following Research Hypothesis:

- H1 “quantum” of fertility (TFRs). Non-nationals' TFR has a negative relationship respect to unemployment rates, in particular to MUR, since the men were more penalized by the recession (H1a). We also expect that the sharp decline of non-national TFRs be reflecting two compositional effects: the area of origin of non-nationals

(more specifically, the increasing share of non-national women coming from Eastern European countries) and the growing share of mixed unions (H1b). Also considering that non-national unemployment rates have increased sharply, especially after 2013, remaining high and having not reach pre-recession levels in 2018, we expect to observe a stronger negative fertility response to economic conditions after this year (2013) among non-nationals' (H1c).

- H2 “tempo” of fertility (ASFRs), based on the former literature and given that, predominantly, foreign women tend to have children at a relatively young age, we assume to observe a clear postponement of childbearing before age 30 responding to raising unemployment rates.
- H3 “quantum” (TFR) and “tempo” (ASFRs) in a comparative perspective, we suppose that non-nationals' fertility responses to economic shocks might be more strongly dependent on recession trends than those of nationals since the first are more vulnerable on socioeconomic basis and given their more precarious job conditions (H3a). We also we expect to find a pro-cyclical response of non-national women in contrast with a counter-cyclical response of national women at the end of their reproductive ages, considering that the process of delaying childbirth has been more pronounced among Italian women -reaching older ages at childbirth- and given that they cannot delay fertility decisions much longer (H3b).

3. Data and methods

Our analytical strategy was based on the exploitation of data coming from different sources, collected by the Italian National Institute of Statistics (ISTAT), to build a panel dataset for each year included in the observation period (2006-2018) and for each one of the twenty Italian regions.

Data on fertility were drawn from vital statistics. The main variable to observe the “quantum” effect of recession on fertility is the TFR, that we disaggregated by mothers' citizenship (splitting information on nationals -nTFR- and non-nationals -nnTFR-) since available data unfortunately do not allow to further distinguish non-nationals by country of citizenship (and/or origin) at the regional level. In adding, utilizing macro-data, we have no information neither the age at arrival of the women nor their length of stay in Italy. Despite these limitations, as stated by Sobotka (2008), TFR remains - in the absence of alternative estimates - an accurate indicator accounting for regional differences on fertility levels.

We have also calculated age-specific fertility rates (ASFRs) for Italian regions, clustered in five-year age groups (15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45-49) by dividing the number of births occurred in a year to women of the given age at the time of the birth by mean number of females of that age in the reference year. With reference to the reliability of the available basic data needed for our estimations, we are aware that, when computing ASFR for non-nationals from vital statistics, there could have been, especially in the past, difficulties due to incomplete accounting in the estimations of live births (numerator) and the number of women (denominator). Although, the stock of non-nationals in Italy has gained stability over time (Giannantoni et al. 2018), then reducing the probability of result bias. Moreover, the stock of registered non-nationals has been the most stable and numerous during the last years (around 90% of total presences) and the irregularity rate has reached its minimum steadying around 6-7% (Blangiardo 2017). Therefore, our results can be considered sufficiently realistic.

In a further step of empirical analyses performed, the ASFRs of each one of five-year age groups and for each population subgroup considered (non-nationals - nnASFRs - and nationals - nASFRs-) substitute TFRs as dependent variables of model specifications to account for the “tempo” effect of recession on fertility and test for delayed or forgone childbearing (Schneider 2015; Seltzer 2019).

The economic and occupational context is represented in our analyses by unemployment rates, calculated from Labor Force Survey microdata and computed annually as the number of persons without a job but available for and seeking employment divided by the number of persons in the labor force. These variables aim to measure changing working and economic conditions of nationals and non-nationals during the observed period. In the following step of our analyses, replacing overall unemployment rates (OUR) with male (MUR) and female unemployment rates (FUR), allowed us to examine discrepancies in the impact of the recession following gender-specific responses (Comoli 2017; Hiilamo 2017; Bellido and Marcén 2019).

With reference to the relationship between aggregated measures of economic downturns and fertility, previous studies usually lag economic measures on their analyses, but there is not a clear indication regarding duration of the lag. Some authors use one-year lags (Goldstein et al. 2013; Schneider 2015; Comoli 2017; Hiilamo 2017; Bellido and Marcén 2019; Seltzer 2019; Matysiak et al. 2021), while others apply lags of 2 years (Cherlin et al. 2013; Bellido and Marcén 2019). Following the most widespread empirical approach, we include lags of one year when examining the impact of

unemployment rates on both TFRs and ASFRs. Therefore, our regional-level dataset merges unemployment rates (OURs, MURs and FURs) for the years 2005-2017 with fertility indicators for the period 2006-2018 and other controls.

In multivariate analyses we included, as independent variables, besides the URs and the share of Eastern European women among non-nationals' population (PFWEastern), also the annual share of mixed marriages (MM) that is aimed to test for the impact of changes in union formation patterns among non-nationals on period fertility reduction and delay (Mussino and Stozza 2012; Giannantoni et al. 2018; Impicciatore et al. 2020; Maffioli and Paterno 2008; Maffioli et al. 2012; Cherlin et al. 2013; Guetto and Azzolini 2015; Seltzer 2019; González-Ferrer et al. 2017). The two compositional factors were built as time-varying measures to control for changes in the regional composition of non-nationals that might have affected fertility patterns.

As in previous studies on the influence of worsening economic conditions on fertility at the macro-level (Goldstein et al. 2013; Schneider 2015; Comoli 2017; Hiilamo 2017; Bellido and Marcén 2019; Seltzer 2019), we have estimated ordinary least squares regression models with entity and time fixed effects. Modelling cross-sectional times-series as panel data allow us to account for unobserved heterogeneity, that is, to account for the effects of factors not included in the analyses that might influence both the “quantum” and the “tempo” of macro-level-fertility. Thus, regression models estimated include calendar year fixed effects and region fixed effects (Kohler and Kreuter 2005; Bartels 2008; Bartolucci et al. 2015).

The first set of models is aimed at accounting for the “quantum” effects of economic conditions on non-nationals' fertility and testing our first research hypothesis. Within this set, we use nnTFR, as dependent variable, and overall unemployment rates (nnOUR) as the main independent variable (Table 1). The second sets of models use nnTFR, as dependent variable, and consider separately male and female unemployment rates (MURnn and FURnn) (Table 2), as the main independent variables. Both models also include variables aimed at controlling for compositional effects. Among them, the share of Eastern European women among non-nationals' population (PFWEastern) and the annual share of mixed marriages (MM) as time-varying measures.

The model also includes period-differential effects (interaction terms between recession stages and unemployment measures used). To compare fertility responses during different phases of the observation period, we have empirically built dummy variables to identify three recession phases (first phase: 2006-2008, second phase: 2009-2013 and the third phase: 2014-2018). Including interactions terms between these recession stages and unemployment rates allowed us to test for period-differential effects on economic conditions and fertility responses and to control for region-specific period developments in unobserved variables that might bias results.

The second set of models, instead, is intended to approximate “tempo” effects of economic conditions on non-nationals' fertility and test our second research hypothesis. Here, the first groups of models were estimated including non-nationals' ASFRs (divided in seven five-year age groups, each one treated as the dependent variable in single models) and each one of the employment measures considered (OUR, FUR, each one treated as the independent variable, respectively), controlling for composition effects (PFWEastern and MM) and period-differential effects (interaction terms). This set was then organized in three different tables (Tables 3 and 4) with seven specifications-each².

A third set of models repeated analyses for nationals-only. Models to measure “quantum” effects were run including nTFR -dependent variable- and overall (nOUR), male (MURn) and female (FURn) unemployment -independent variable, respectively- considering interaction terms between recession stages and the respective unemployment measure (Table 5). The second group of models accounts for age-specific-fertility-responses of nationals and, thus, analyses the relationship between fertility levels of the seven five-years age groups and overall unemployment rates (Table 6). Models include, as control variable, also the dummy variables that considers the three recession phases (first phase: 2006-2008, second phase: 2009-2013 and the third phase: 2014-2018) and include interactions terms between these recession stages and unemployment rates.

4. Multivariate results

4.1 “Quantum” effects

The results of the main models on the relationship between overall unemployment (lagged by one year) and nnTFRs in Italy during the period 2006-2018 are presented in Table 1. In M1 as non-nationals overall unemployment rate increases by one-percentage-point, the respective TFR decreases by 0.027.

² Robustness checks including per capita gross domestic product at current prices to control for economic growth at the regional level were performed showing similar results respect to those obtained considering unemployment rates only and are available on request.

As stated by previous studies (Sobotka 2008; Mussino and Strozza 2012; Giannantoni et al. 2018), given the highly dependent nature of the intensity of non-nationals' fertility to their citizenship, the sharp decline of TFRs might be reflecting changes occurred in its composition by national origin. As shown, a one-percentage-point increase in the share entails a decrease of nnTFR of almost 0.069.

The share of mixed marriages (as percentage of total marriages) is relevant because differences in fertility behaviors by couple type may also be reflecting differences in fertility responses to unemployment. Previous studies (Maffioli and Paterno 2008; Maffioli et al. 2012) have shown that marriages in which husband and wife have different citizenships (one Italian and one foreigner or both foreigners) tend to have lower fertility than those sharing the same citizenship (both Italian or both foreigners). As expected, the higher the share of mixed marriages, the lower the TFR ($b = -0.0303$).

M2 tests for changes on the unemployment-fertility link during different phases of the Great Recession after controlling for compositional changes of both population and marriages. Interaction terms between recession periods and unemployment are negative and highly significant, suggesting that the unemployment rate between 2009-2013 and 2014-2018 was negatively associated to fertility, and not positive as it was during the pre-recession period (2006-2008). It is interesting to note that fertility response to unemployment is stronger in the last period under study (M5: 2009-2013*nnOUR $b = -0.037$ vs. 2014-2018*nnOUR $b = -0.026$). Coefficients summarizing the relationship between unemployment and fertility are indicating a pro-cyclical fertility response of non-nationals after 2009³.

Table 1. Fixed-effects regression models of non-nationals' Total Fertility Rate (nnTFR) with overall unemployment rates (nnOUR) between 2006-2018 for Italian regions.

VARIABLES	M1	M2
nnOUR	-0.0270*** (0.00406)	0.0165* (0.00840)
PFWEastern	-0.0686*** (0.00463)	-0.0347*** (0.00660)
MM	-0.0303** (0.0109)	-0.0250*** (0.00573)
2009-2013*nnOUR		-0.0261*** (0.00475)
2014-2018*nnOUR		-0.0374*** (0.00602)
Constant	4.314*** (0.148)	3.332*** (0.154)
Region FE	YES	YES
Year FE	YES	YES
Observations	256	256
R-squared	0.737	0.824
N	20	20

Notes: Robust Standard Errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Going beyond the overall unemployment rate and to disentangle gender differentiated responses, we have also investigated the role played by male (nnMUR) and female unemployment rates (nnFUR). Re-estimating models for each one of these measures, we have found that there was a significant negative relationship between both male and female unemployment and fertility between 2006 and 2018 (Table 2). The influence of both the shares of Eastern European women and mixed marriages on nnTFR remains negative and significant, regardless of the employment measure adopted. These coefficients are showing a much more sensitive response of fertility to non-nationals' male unemployment than to non-nationals' female unemployment. In fact, as non-nationals male unemployment rate increases by one-percentage-point, the TFR decreases by 0.0225, instead, a percentage-point rise in female unemployment rates is associated to a smaller decrease in the TFR ($b = -0.0157$).

When controlling for differences on the fertility-unemployment association according to the recession period, the link between male unemployment and fertility is pretty much similar (in terms of the magnitude of the coefficients of the interactions) to the one found when using the overall unemployment rate. Fertility response of non-nationals to female unemployment is also negative, but coefficients are smaller than those observed when using overall and male unemployment as independent variables. Findings suggest a pro-cyclical behavior of non-nationals fertility after 2009, and particularly after 2013, but a much more sensitive response of fertility to non-nationals' male unemployment than to non-nationals' female unemployment.

Table 2. Fixed-effects regression models of non-nationals' Total Fertility Rate (nnTFR) by gender-specific unemployment rates (nnMUR and nnFUR) between 2006-2018 for Italian regions.

³ Robustness checks were performed geographically disaggregating the analysis of the "quantum" show pretty similar results for non-nationals despite of the macro-area of residence (North, Center, South) and are available on request.

Variables	M1	M2	M3	M4
Unemployment Rate				
nnMUR	-0.0225*** (0.00304)	0.0226*** (0.00507)		
nnFUR			-0.0157*** (0.00388)	0.00114 (0.00394)
PFWEastern	-0.0685*** (0.00465)	-0.0296*** (0.00645)	-0.0732*** (0.00468)	-0.0480*** (0.00741)
MM	-0.0333*** (0.0110)	-0.0288*** (0.00599)	-0.0382** (0.0148)	-0.0228*** (0.00698)
2009- 2013*nnMUR/nnFUR		-0.0364*** (0.00505)		-0.0122*** (0.00416)
2014- 2018*nnMUR/nnFUR		-0.0457*** (0.00545)		-0.0226*** (0.00344)
Constant	4.246*** (0.141)	3.279*** (0.140)	4.363*** (0.163)	3.650*** (0.153)
Region FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	256	256	256	256
R-squared	0.736	0.841	0.689	0.790
N	20	20	20	20

Notes: Robust Standard Errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

4.2 “Tempo” effects

Following previous studies (Schneider 2015; Bellido and Marcén 2019; Seltzer 2019), we verified if fertility responses to unfavorable economic conditions vary according to women’s age. We estimated the influence of non-nationals’ unemployment on their age-group-specific fertility rates. Each one of the seven models displayed in Table 3 examine the relationship between the respective ASFR for that group and the overall unemployment rate, controlling for composition effects of population and marriages and adding period-unemployment interaction terms.

As can be seen, these effects are highly significant for non-national women between 15 and 34 years old. However, there are important differences regarding its magnitude that deserve to be highlighted. The largest influence of unemployment on fertility is observed among women aged 20-24: more specifically, negative and highly significant interaction terms are indicating that the relationship between overall unemployment and age-specific fertility was negative after 2009, and even stronger in the last period (2014-2018) (M2: 2009-2013*nnOUR: $b = -2.095$; 2014-2018*nnOUR: $b = -2.976$). These effects were also present but smaller for women aged 25-29 (M3: 2009-2013*nnOUR: $b = -0.380$; 2014-2018*nnOUR: $b = -0.774$) and 30-34 (M4: 2014-2018*nnOUR: $b = -0.465$). Less important but still significant associations are found for youngest women (15-19).

These results seem to be pointing out to a stronger childbearing discouraging effect of unemployment for women aged 20-29. This effect appears particularly strong after the Great Recession (Table 3, M2-M3), getting even stronger between 2014-2018 not only for women aged 20-24 ($b = -2.976$) and 25-29 ($b = -0.774$) but also for those age 15-19 (M1: $b = -0.109$) and 30-34 (M4: $b = -0.465$). There has been a clear postponement of fertility for these women in response to the worsening economic conditions, but results are not yet showing signs of a recovery on its “tempo”.

Table 3. Fixed-effects regression models of Non-Nationals’ Age-Specific Fertility Rates (ASFR_{nn}) with overall unemployment rates (nnOUR) between 2006-2018 for Italian regions.

Variables	M1 15-19	M2 20-24	M3 25-29	M4 30-34	M5 35-39	M6 40-44	M7 45-49
nnOUR	0.0259 (0.0288)	1.887* (0.944)	0.512* (0.497)	0.548** (0.198)	0.227** (0.105)	-0.0522 (0.0926)	0.0144 (0.0289)
PFWEastern	-0.0107 (0.0384)	-0.470 (0.556)	-0.637 (0.408)	-0.351* (0.198)	-0.476*** (0.165)	-0.123 (0.129)	-0.00590 (0.0239)
MM	-0.0258 (0.0353)	-1.192*** (0.400)	-0.361 (0.476)	0.171 (0.280)	0.495** (0.179)	0.327*** (0.0862)	-0.128 (0.0975)
2009- 2013*nnOUR	-0.0729*** (0.0155)	-2.095*** (0.378)	-0.380* (0.217)	-0.151 (0.126)	0.0568 (0.113)	0.00720 (0.0794)	-0.00937 (0.0170)
2014- 2018*nnOUR	-0.109*** (0.0175)	-2.976*** (0.546)	-0.774** (0.338)	-0.465*** (0.150)	-0.0188 (0.0704)	0.0456 (0.0826)	0.00795 (0.0161)
Constant	4.253*** (0.715)	145.1*** (14.00)	136.1*** (11.64)	89.70*** (4.491)	50.38*** (2.985)	12.83*** (3.247)	2.122** (0.745)
Region FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Observations	256	256	256	256	256	256	256

R-squared	0.446	0.674	0.298	0.200	0.126	0.055	0.086
N	20	20	20	20	20	20	20

Notes: Robust Standard Errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

We also tested the deferral of non-nationals' fertility due to the economic recession using gender-specific unemployment rates. As those of MURs are like fertility responses to OURs, results displayed in Table 4 regards non-nationals' female unemployment. Non-nationals' age-specific responses to female unemployment are also negative between 2009 and 2018, being once more women aged 20-24 those showing the strongest fertility response (M2: 2009-2013*MUR b = -1.009 and 2014-2018*MUR b = -1.649).

Table 4. Fixed-effects regression models of Non-Nationals' Age-Specific Fertility Rates (nnASFR) by female unemployment rates (nnFUR) between 2006-2018 for Italian regions.

Variables	M1 15-19	M2 20-24	M3 25-29	M4 30-34	M5 35-39	M6 40-44	M7 45-49
nnFUR	0.00503 (0.0164)	0.140 (0.245)	-0.194 (0.337)	0.213 (0.126)	0.169** (0.0678)	0.0126 (0.0905)	-0.00591 (0.00852)
PFWEastern	-0.0319 (0.0415)	-1.505** (0.565)	-1.037*** (0.306)	-0.580*** (0.148)	-0.498*** (0.160)	-0.122 (0.123)	-0.0140 (0.0223)
MM	-0.0132 (0.0326)	-0.986** (0.457)	-0.308 (0.508)	0.207 (0.323)	0.505** (0.186)	0.314*** (0.0883)	-0.129 (0.0992)
2009- 2013*nnFUR	-0.0438*** (0.0112)	-1.009*** (0.273)	-0.00806 (0.178)	0.0304 (0.0842)	0.0565 (0.0821)	0.00213 (0.0710)	-0.000438 (0.0103)
2014- 2018*nnFUR	-0.0849*** (0.0156)	-1.649*** (0.266)	-0.279 (0.197)	-0.185** (0.0784)	0.0226 (0.0587)	0.0240 (0.0757)	0.0181*** (0.00616)
Constant	4.621*** (0.817)	175.8*** (9.255)	149.0*** (9.080)	95.61*** (4.921)	50.89*** (3.007)	12.19*** (3.203)	2.475*** (0.854)
Region FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Observations	256	256	256	256	256	256	256
R-squared	0.445	0.633	0.291	0.184	0.135	0.056	0.080
N	20	20	20	20	20	20	20

Notes: Robust Standard Errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

4.3 A comparative overview of fertility responses

Nationals' (with Italian citizenship) "quantum" fertility response to unemployment measures (overall, male and female) are displayed in Table 5. Baseline models (M1, M3 and M5 that consider respectively nOUR, nMOU and nFUR) confirm the negative association between TFR and unemployment measures among nationals during the observed period, being nationals' fertility more sensitive to male unemployment (M3: b = -0.00826) than to female unemployment (M5: b = -0.00642). M2 (that include the calendar period effects) shows that in the whole period 2006-2018 a one percent increase in nationals' overall unemployment rate was associated to a reduction of 0.00521% in their TFRs the following year, after adding interactions terms between unemployment and recession periods. Results for male unemployment are showing a slightly sharper response of fertility to calendar period (M4: b = -0.00615). Period interactions are only statistically significant when considering female unemployment (M6), being negative after 2013. This is indicating a stronger negative response of nationals' fertility rates to female unemployment during 2014-2018 (M6: b = -0.00321) if compared to previous periods under examination (2006-2008 and 2009-2013).

Table 5. Fixed-effects regression models of nationals' Total Fertility Rate by overall (nOUR) and gender-specific (nMUR and nFUR) unemployment rates between 2006-2018 for Italian regions.

Variables	M1	M2	M3	M4	M5	M6
Unemployment Rates						
nOUR	-0.00866*** (0.00190)	-0.00521* (0.00254)				
nMUR			-0.00826*** (0.00166)	-0.00615*** (0.00186)		
nFUR					-0.00642*** (0.00152)	0.000775 (0.00191)
2009- 2013*nOUR/nMUR/nFUR		0.00131 (0.00102)		0.00143 (0.00130)		0.000381 (0.000648)
2014- 2018*nOUR/nMUR/nFUR		-0.00114 (0.000717)		-0.000733 (0.000992)		-0.00321*** (0.000534)
Constant	1.335*** (0.0178)	1.304*** (0.0219)	1.324*** (0.0140)	1.305*** (0.0135)	1.322*** (0.0161)	1.261*** (0.0201)
Region FE	YES	YES	YES	YES	YES	YES

Year FE	YES	YES	YES	YES	YES	YES
Observations	256	256	256	256	256	256
R-squared	0.239	0.278	0.261	0.290	0.142	0.268
N	20	20	20	20	20	20

Notes: Robust Standard Errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Taking into account age-specific fertility, we re-estimated model specifications for the first population subgroup (Table 6). Unemployment levels positively influence fertility responses of national women aged 40-44 (M6: OUR b = 1.238) and 45-49 (M7: OUR b = 0.139), respectively, not showing signs of deferral in any age group. The impact is stronger for the same ages (40-44 and 45-49) when considering nationals' female unemployment rate (M6: FUR b = 1.163; M7: FUR b = 0.130) instead of male unemployment rate (M6: MUR b = 1.031; M7: MUR b = 0.117) as independent variable. This is showing a noticeably different picture if compared to age-specific fertility responses of non-nationals to unemployment where the postponement of childbearing as a effect to unemployment is clear-cut.

Table 6. Fixed-effects regression models of Nationals' Age-Specific Fertility Rates (nASFR) by overall unemployment rates (nOUR) between 2006-2018 for Italian regions.

Variables	M1	M2	M3	M4	M5	M6	M7
	15-19	20-24	25-29	30-34	35-39	40-44	45-49
nOUR	-0.0184 (0.0153)	-0.0982 (0.559)	0.795 (2.142)	3.797 (4.200)	3.661 (2.834)	1.238* (0.687)	0.139** (0.0522)
Constant	0.820*** (0.143)	23.37*** (5.221)	62.78*** (20.01)	78.75* (39.23)	41.04 (26.47)	6.289 (6.418)	-0.0773 (0.487)
R-squared	0.024	0.000	0.002	0.013	0.027	0.053	0.112
Region FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Observations	256	256	256	256	256	256	256
N	20	20	20	20	20	20	20

Notes: Robust Standard Errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

5. Discussion and concluding remarks

This paper (which might be considered a work-in-progress) examines the relationship between non-nationals' fertility behavior (in terms of "quantum" and "tempo") and economic downturns at the macro level in Italy between 2006 and 2018. As expected, we found a pro-cyclical relationship between non-nationals' total fertility and unemployment rates. This finding is in line with Seltzer (2019), one of the few studies that have directly examined this link for ethnic groups. Fertility responses of non-nationals to male unemployment have been much stronger than those to female unemployment, thus confirming our H1a research hypothesis. Our results also confirm that non-nationals' fertility behaviors also respond to compositional effects (H1b). The increase in the stock of non-national women coming from Eastern European countries and in the share of mixed marriages has been negatively affecting nnTFRs, which is in line with previous research (Impicciatore et al. 2020; Mussino and Cantalini 2021; Maffioli and Paterno 2008; Maffioli et al. 2012).

Regarding changes on the intensity of the relationship between the "quantum" non-nationals' fertility and unemployment over the observed period, there is a pro-cyclical response for the period as whole but, as hypothesized (H1c), we observe that the negative effect has been stronger in the second phase (2009-2013) and even stronger in the third (2014-2018), if compared to the first phase (2006-2008) -before the kickoff of the recession. This outcome is in accordance with the results of Matysiak et al. (2021), that have demonstrated that the reduction of total fertility in Europe due to the worsening of economic conditions was much stronger during the economic recession than during the prerecession period.

Another important finding was the varying nature of non-nationals' fertility responses according to women's age. As suggested by our hypothesis of postponement of births (H2), the greatest reduction of fertility linked to unemployment is observed among women aged 20-24, followed by those age 25-29. Moreover, as reported for the "quantum" effect, this negative "tempo"-response was higher in the third stage of the recession. There are similarities between the age-specific fertility pattern found in this study and the one described by Seltzer (2019), who reported the largest effect sizes for all racial/ethnic groups among women in their 20s.

When comparing fertility responses of non-nationals and nationals to their respective unemployment rates we can highlight three main findings. Firstly, confirming our H3 research hypothesis, we have found significant differences between non-nationals and nationals. Secondly, regarding "quantum" and in line with our expectations (H3a), the influence of all measures of unemployment is smaller for nationals than for non-nationals (as shown by differences in the magnitude of coefficients and R2 values of model specifications). Thirdly, "tempo" effects, in line with our H3B research hypothesis, show a pro-cyclical response of younger non-national women and a counter-cyclical response of national women in their 40s and no effects for younger ages. This result is in line with previous studies (Bellido and Marcén 2019;

Schneider 2015) which observed a reversal on the relationship between fertility and economic conditions (from pro-cyclical to counter-cyclical) with the ticking of women's biological clock.

One of the greatest limits of our study is due to data shortcomings. The lack of availability of estimated births of non-national women by citizenship and birth order at the regional level, did not allow us to calculate neither stratified TFRs nor stratified age-specific fertility rates. Having access to this information should be crucial for understanding how differential impacts of economic shocks according to the origin affects fertility behaviors of non-nationals. In addition, available data do not let us to control for any of the following aspects: age at migration, length of the stay, birth order, number of children had on arrival and the migratory model (family reunification or work) which are well known determinants of fertility behaviors on destination countries (Toulemon 2004; Toulemon and Mazuy 2004; Impicciatore et al. 2020; Mussino and Strozza 2012). Unfortunately, we are not able to verify if, as demonstrated by recent studies based on individual data, non-national women who arrived after their thirties have the lowest likelihood of having a child in Italy given that they generally became mothers before living their countries of origin, and that women whose migratory project is signed by working reason rather than familiar ones tend to postpone or even forgoing their reproductive choices (Giannantoni and Gabrielli 2015; Gabrielli et al. 2017). At the same time, we couldn't observe, among other aspects, the effect of the duration of stay in Italy on fertility "quantum" and "tempo". However, in our opinion, there aren't reasons to doubt that observed age-specific fertility responses (stronger at young ages) seem to be further stressing the postponement rather than the forgoing of childbirth among non-national women.

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