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Demographic dynamics, urban-rural divides and the (changing) mother's age at birth in Greece: a regional analysis, 1980–2016

Introduction

In modern societies, a longer lifespan coexists with spatially-heterogeneous population dynamics, resulting from a higher diversity in types of households and lifestyles (Martin, 1992; Lee, 2003; Blue and Espenshade, 2011; Lee and Reher, 2011). Demographic Transitions (DTs) have been increasingly considered 'a pathway to change' leading e.g. to a progressive decline in fertility and a delay in childbearing (Billari and Kohler, 2004; Rindfuss et al., 2004; Morgan and Taylor, 2006; Haase et al., 2010; Kreyenfeld et al., 2012; Balbo et al., 2013; Sobotka, 2017).

A rising literature has focused on spatial variations in fertility across Europe (Kohler et al., 2002; Andersson and Neyer, 2004; Frejka et al., 2008; Thornton and Philipov, 2009; Kulu et al., 2009). Fertility patterns – and especially changes in mother's age at

birth – are considered relevant indicators when assessing socioeconomic dynamics and metropolitan transformations in each area (Caldwell and Schindlmayr, 2003; Skirbekk, 2008; Livi Bacci, 2013). For instance, a generalized delay in childbearing has demonstrated to reflect multiple socioeconomic forces that impact fertility rates and household size (Castro Martin, 1995; Billari and Philipov, 2004; Rontos, 2007; Bongaarts, 2009; Sobotka et al., 2011; Neels and de Wachter, 2010; Ní Bhrolcháin and Beaujouan, 2012; Sobotka, 2017).

Theoretical approaches (Watkins, 1990; Bongaarts and Watkins, 1996; Montgomery and Casterline, 1996) and empirical studies (Goldstein et al., 2013; Simou et al., 2013; Van Nimwegen, 2013) have focused on the intrinsic relationship between demographic change and economic dynamics, demonstrating that economic downturns have shaped the size, composition and distribution of European populations. While having a child during a phase of economic expansion is related to the high 'opportunity cost' for women (Butz and Ward, 1979a, 1979b), recessionary shocks were considered a powerful factor influencing population dynamics over time and space (Goldstein et al., 2013). Fertility fluctuations are particularly intense under economic crisis and high unemployment rates, job instability and other forces may determine marriage postponement and consequently later childbearing (Adsera, 2004; Billari and Kohler, 2004; Sobotka et al., 2011; Kreyenfeld et al., 2012; Simou et al., 2013).

In Europe, negative population growth and low fertility rates have been recorded since the early 1990s, especially in Mediterranean countries (Kohler et al., 2002; Rontos, 2007, 2010) and were only partly counterbalanced by intense migratory flows (Blangiardo and Rimoldi, 2012). Additionally, fertility patterns in Southern Europe – and more specifically in Greece – have been strongly associated with the institution of marriage, since most childbearing takes place inside of marriage, contrary to what was observed in other areas, such as in Central and Northern Europe, where childbearing is relatively frequent outside marriage (Gavalas et al., 2014). The resulting demographic patterns have progressively altered the traditional density gap between urban and rural areas (Rontos, 2007; van Criekingen, 2010; Sobotka, 2017). More recently, it was demonstrated that fertility divides can be particularly intense between suburban and rural locations (Kulu et al., 2009). Under the hypothesis that recessions have represented a downturn point in population dynamics of the most affected countries, the present study investigates spatial changes in mother's age at birth in Greece with the aim to assess the differential impact of economic crisis along the urban-rural gradient. Spatio-temporal changes in mother's age at birth may represent a gross indicator of fertility trends under changing socioeconomic contexts at both regional and local scale (Gavalas et al., 2014). A comparative analysis of changes in the spatial distribution of relevant demographic indicators over sequential phases

of expansion and recession is appropriate to infer the role of local contexts and the underlying socioeconomic forces in specific population processes (Haase et al., 2010; van Criekingen 2010; Kroll and Kabisch, 2012).

Based on these premises, our study investigates the relationship between childbearing postponement and economic dynamics, controlling for the effect of territorial factors and social forces (Kotzamanis et al., 2017), with the aim to verify if the recent economic crisis has impacted regional fertility trends in Greece, as a result of the relationship between economic cycles and population dynamics. Greece was considered a paradigmatic context since it is one of the European countries that has been more heavily affected by economic recession since 2007 (Rontos, 2010; Bongaarts and Sobotka, 2012; Goldstein et al., 2013; Simou et al., 2013; Goldstein and Kluge, 2016). The study period (1980–2016) was reflective of different economic phases, including a rapid expansion wave (1998–2007) and a subsequent, recessionary outbreak between 2008 and 2016 (Salvati and De Rosa, 2014). Being one of the countries mostly affected by the recent crisis in Europe (Goldstein et al., 2013; Simou et al., 2013; Goldstein and Kluge, 2016; Kotzamanis et al., 2017), a comparative investigation of mother's age at birth allows a preliminary identification of (changing) fertility patterns and trends, outlining spatial convergence (or divergence) in population dynamics along urban-rural gradients that may indicate the distinctive impact of economic cycles and the role of social contexts in different regions of the country.

Methodology

Study area

The study area includes the whole of Greece (301,330 km^2), considering multiple spatial scales that reflect different administrative levels partitioning the country into homogeneous units of analysis. A time interval covering the last three decades, from 1980 to 2016, was investigated in this study, representing a relatively long temporal period with important demographic changes (Gavalas et al., 2014). Regardless of the low birth rate, the urban population in Greece has consolidated since the 1980s, with the mean age of women at birth overpassing 30 years (Rontos, 2007). Since the early 1990s, migration flows have been more frequently directed to peri-urban areas, with a stable (or slightly declining) population in strictly urban areas (Kotzamanis, 1997; Sayas, 2006; Rontos, 2010). More recently, the 2007 recession impacted local population structures determining higher unemployment rates and making labour markets particularly volatile (Goldstein et al., 2009, 2013; Rontos et al., 2016;

Kotzamanis et al., 2017). This complex framework reflects a particularly interesting background context to identify spatial variations in selected demographic indicators, as an indirect result of the relationship between economic cycles and population dynamics (Grigoriadis and Salvati, 2015).

Data sources

The multivariate dataset considered in the present study was based on computation on the spatially-disaggregated statistical data released by the Hellenic Statistical Authority (ELSTAT) and covering the whole of Greece. Four spatial scales were considered in the quantitative analysis (section 2.3) according to homogeneous statistical levels defined by Eurostat (Nomenclature of Territorial Statistical Units, NUTS): (i) the whole country (Greece), (ii) NUTS-2 administrative regions, (iii) NUTS-3 prefectures, and (iv) the largest metropolitan and/or tourism regions of Greece (including the Greater Athens area, the remaining peri-urban area of the Attica region, the metropolitan areas of Larissa, Salonika, Iraklio and the administrative province of the Kyklades islands, an archipelago in the Aegean sea including Mykonos, one of the most relevant touristic hotspots in the Mediterranean basin). A basic indicator defining the proportion of women having a child (irrespective of the parity) at 9 age classes (< 14 years old, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49 and over 50 years old) was calculated every 9 years from 1980 to 2016 (1980, 1989, 1998, 2007 and 2016). Although being considered a gross indicator of fertility in respect to more classical demographic variables considering birth parity (Rontos, 2010), changes over time in the percent composition of births by mother's age may provide a regional representation of short-term and long-term fertility trends for Greece (Kulu et al., 2009). Particularly, such an indicator provides an indirect assessment of the average women's attitude toward procreation – and especially childbearing postponement (Gavalas et al., 2014) – at disaggregated spatial scales, incorporating the implicit decline in the number of children per woman, observed in Greece since the 1980s (Rontos, 2007).

Statistical analysis

Births were classified according to mother's age into 9 categories. Annual change in percent composition of births by mother's age (distinguishing two-time intervals, 1980–2007 and 2008–2016) was considered reflective of long-term and short-term fertility patterns in Greece. A Multi-way Factor Analysis (MFA) that identifies relevant, uncorrelated dimensions associated to specific demographic variables,

was used to evaluate spatio-temporal trends in the percent composition of births by mother's age in the Greek provinces. The Multiway Factor Analysis is considered a generalization of the PCA aimed at identifying complex structures in higher-order datasets, where data have three or more dimensions (Kroonenberg, 2008). This statistical technique consists of 4 distinct steps: (i) comparing (and identifying the relationship between) data sets over time; (ii) combining them into a common multivariate structure called 'compromise', (iii) analysing the 'compromise' data matrix to reveal the common structure between the observations and, finally, (iv) projecting each of the original data sets into the compromise to analyse communalities and discrepancies (Rontos et al., 2016). Absolute eigenvalues > 1 define relevant factors, i.e. factors extracting a proportion of variance not smaller than the original variables (Salvati and De Rosa, 2014). Linking variables with a coherent spatio-temporal pattern, the MFA also provides an indirect measure of redundancy among input variables, allowing an honest evaluation of stability (or change) over time in the position of each variable (or spatial domain) in the same multivariate factor plane (Grigoriadis and Salvati, 2015).

Results

Descriptive statistics

Demographic dynamics and fertility trends in Greece were described using the indicator described in section 2.2 in a relatively long-time interval from 1980 to 2016. The analysis of spatial trends in the percent composition of births by mother's age in Greece outlines distinctive demographic patterns (Table 1) characterized by (i) young women under 24 years of age displaying a progressive childbearing postponement and (ii) a larger number of women between 35 and 44 years old having a child. The importance of an intermediate group in the sample (women having a child at an age between 25 and 34 years old) was relatively stable (or increasingly slightly) until the late 1990s and has declined quite rapidly in the last 20 years.

Considering only the beginning and the end of the study period (1980 and 2016), metropolitan areas, strictly rural districts and medium-sized towns/more accessible rural/tourism regions display important differences in childbearing postponement with an increasing variability over space (Table 2). The mean age at birth has increased, on average, more than 6 years in the most accessible regions of Greece such as Attica, the Ionian islands, Thessaly and Macedonia, being relatively low in rural contexts such as Trace (5.3 years).

Table 1. Percent composition of births by mother's age in Greece, selected years

Year	< 14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Mean age*
1980	0.13	12.46	36.55	29.03	14.88	5.20	1.54	0.18	0.03	25.4
1989	0.06	8.05	32.93	33.14	18.14	6.33	1.22	0.10	0.02	26.3
1998	0.07	4.07	20.30	35.44	28.32	9.86	1.76	0.15	0.03	28.3
2007	0.07	2.80	13.04	29.68	34.18	16.74	3.14	0.32	0.03	30.0
2016	0.08	2.60	8.23	21.84	36.43	24.23	5.66	0.80	0.12	31.6
Diff. (2016–1980)	*–0.04*	*–9.86*	*–28.32*	*–7.19*	*21.55*	*19.03*	*4.12*	*0.62*	*0.10*	*6.2*

* The mean age of women at birth

Source: own elaboration on ELSTAT data.

Table 2. Percent composition of births by mother's age and regions in Greece, selected years

Region	< 14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Mean age*
1980										
Attica	0.1	9.4	33.4	31.7	17.8	5.8	1.5	0.2	0.0	26.1
Central Greece	0.2	13.6	37.0	28.3	13.4	5.3	1.8	0.3	0.1	25.3
Peloponnese	0.1	13.8	37.7	27.3	13.6	5.2	2.0	0.3	0.0	25.3
Ionian islands	0.0	16.1	37.6	27.4	12.6	4.4	1.7	0.2	0.0	24.9
Epirus	0.0	14.0	38.1	29.5	12.4	4.4	1.4	0.2	0.0	25.0
Thessaly	0.1	14.6	40.3	26.4	12.6	4.4	1.4	0.2	0.0	24.8
Macedonia	0.1	14.0	39.5	27.8	12.7	4.4	1.3	0.1	0.0	24.9
Trace	0.5	16.4	41.4	25.5	11.1	3.8	1.3	0.1	0.0	24.4
Aegean islands	0.2	13.6	36.3	27.0	15.7	5.6	1.5	0.1	0.0	25.4
Crete	0.2	16.1	34.8	26.9	14.4	5.8	1.5	0.3	0.0	25.2
2016										
Attica	0.1	2.0	6.3	17.7	37.2	28.5	7.0	1.1	0.2	32.5
Central Greece	0.1	4.3	9.5	23.2	36.0	21.4	4.7	0.6	0.1	30.9
Peloponnese	0.1	4.0	9.2	22.9	35.6	22.2	5.2	0.8	0.1	31.1
Ionian islands	0.0	1.9	8.0	24.4	36.4	22.4	5.9	1.0	0.1	31.6
Epirus	0.0	1.8	7.6	22.8	38.4	23.3	5.0	0.9	0.2	31.7
Thessaly	0.3	4.0	8.5	23.3	36.5	21.7	5.1	0.6	0.1	31.0
Macedonia	0.0	2.1	8.4	23.5	36.9	23.2	5.1	0.6	0.1	31.4
Trace	0.1	6.7	12.0	26.9	33.6	17.1	3.3	0.2	0.1	29.7
Aegean islands	0.0	2.1	10.5	27.6	34.8	20.1	4.3	0.6	0.0	30.8

Region	< 14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Mean age*
Crete	0.0	2.4	10.8	25.4	35.2	20.7	4.6	0.6	0.1	30.9
Difference (2016-1980)										
Attica	0.0	–7.4	–27.1	–14.0	19.4	22.6	5.5	0.9	0.1	6.4
Central Greece	0.0	–9.3	–27.4	–5.1	22.6	16.0	2.9	0.3	0.1	5.5
Peloponnese	0.0	–9.8	–28.5	–4.4	22.0	17.0	3.2	0.5	0.1	5.8
Ionian islands	0.0	–14.2	–29.7	–2.9	23.8	18.0	4.3	0.8	0.1	6.7
Epirus	0.0	–12.2	–30.4	–6.7	26.1	18.9	3.6	0.7	0.1	6.7
Thessaly	0.2	–10.6	–31.9	–3.1	23.9	17.3	3.7	0.4	0.1	6.2
Macedonia	–0.1	–11.9	–31.2	–4.2	24.2	18.7	3.8	0.5	0.1	6.5
Trace	–0.4	–9.7	–29.4	1.4	22.5	13.2	2.1	0.1	0.1	5.3
Aegean islands	–0.1	–11.5	–25.7	0.6	19.1	14.5	2.8	0.5	0.0	5.4
Crete	–0.2	–13.6	–23.9	–1.5	20.8	15.0	3.1	0.3	0.1	5.7

* The mean age of women at birth

Source: own elaboration on ELSTAT data.

Spatial differences in the mean age of mothers having a child were also observed separately along two intermediate time spans, 1980–2007 and 2007–2016 (Table 3). The choice of these two intervals allows a specific comparison between long- and short-term demographic dynamics, also providing a comprehensive overview of the impact of 2007 recession on the demographic dynamics in Greece. The attitude toward childbearing of women residents in Attica, Epirus and Macedonia displayed a continuous postponement over the two time spans. The average age of women having a child increased on average by 1.6 years during the first time span (1980–2007). During the crisis time (2007–2016), postponement was more marked in Epirus, Thessaly and the Aegean islands (displaying a gross increase in the average age of women having a child > 1.8 years).

Table 3. Differences between composition of births by mother's age and regions in Greece, selected subperiods

Region	< 14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Mean age*
Difference (2007–1980)										
Attica	0.0	–2.5	–7.8	–2.0	6.5	4.8	0.8	0.1	0.0	1.6
Central Greece	0.0	–3.2	–7.1	0.5	6.3	3.1	0.4	0.0	0.0	1.4
Peloponnese	0.0	–3.4	–7.5	0.9	6.2	3.4	0.4	0.0	0.0	1.4
Ionian islands	0.0	–4.3	–7.2	1.3	6.3	3.3	0.6	0.0	0.0	1.5

Cont. from page 73

Region	< 14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Mean age*
Epirus	0.0	–4.0	–8.4	1.2	7.1	3.7	0.5	0.0	0.0	1.6
Thessaly	0.0	–3.6	–8.9	2.3	6.5	3.3	0.4	0.0	0.0	1.5
Macedonia	0.0	–3.9	–8.9	1.2	7.4	3.8	0.4	0.1	0.0	1.7
Trace	–0.1	–2.9	–7.1	2.8	5.0	2.1	0.2	0.0	0.0	1.1
Aegean islands	–0.1	–3.5	–6.9	2.2	5.0	3.0	0.3	0.1	0.0	1.3
Crete	–0.1	–4.2	–6.0	2.1	5.3	2.6	0.3	0.0	0.0	1.3
Difference (2016–2007)										
Attica	0.0	–0.2	–4.8	–7.8	2.2	7.5	2.5	0.5	0.1	1.6
Central Greece	0.0	0.0	–3.7	–8.0	–0.3	8.2	2.9	0.7	0.1	1.6
Peloponnese	0.0	0.4	–6.0	–6.6	3.7	6.6	1.6	0.3	0.1	1.4
Ionian islands	0.0	0.3	–5.9	–7.2	3.4	6.8	2.1	0.5	0.1	1.6
Epirus	0.0	–1.2	–8.2	–7.0	4.8	8.2	2.4	0.9	0.1	2.1
Thessaly	0.0	–0.1	–5.3	–10.2	4.7	7.9	2.3	0.7	0.2	1.8
Macedonia	0.1	0.2	–5.1	–9.9	4.4	7.4	2.6	0.2	0.1	1.6
Trace	0.0	–0.1	–4.5	–7.9	2.1	7.4	2.5	0.3	0.1	1.5
Aegean islands	–0.2	–0.9	–8.2	–6.9	7.5	7.1	1.4	0.1	0.1	1.9
Crete	0.0	–0.9	–5.1	–6.0	4.2	5.4	2.0	0.3	0.0	1.5

* The mean age of women at birth

Source: own elaboration on ELSTAT data.

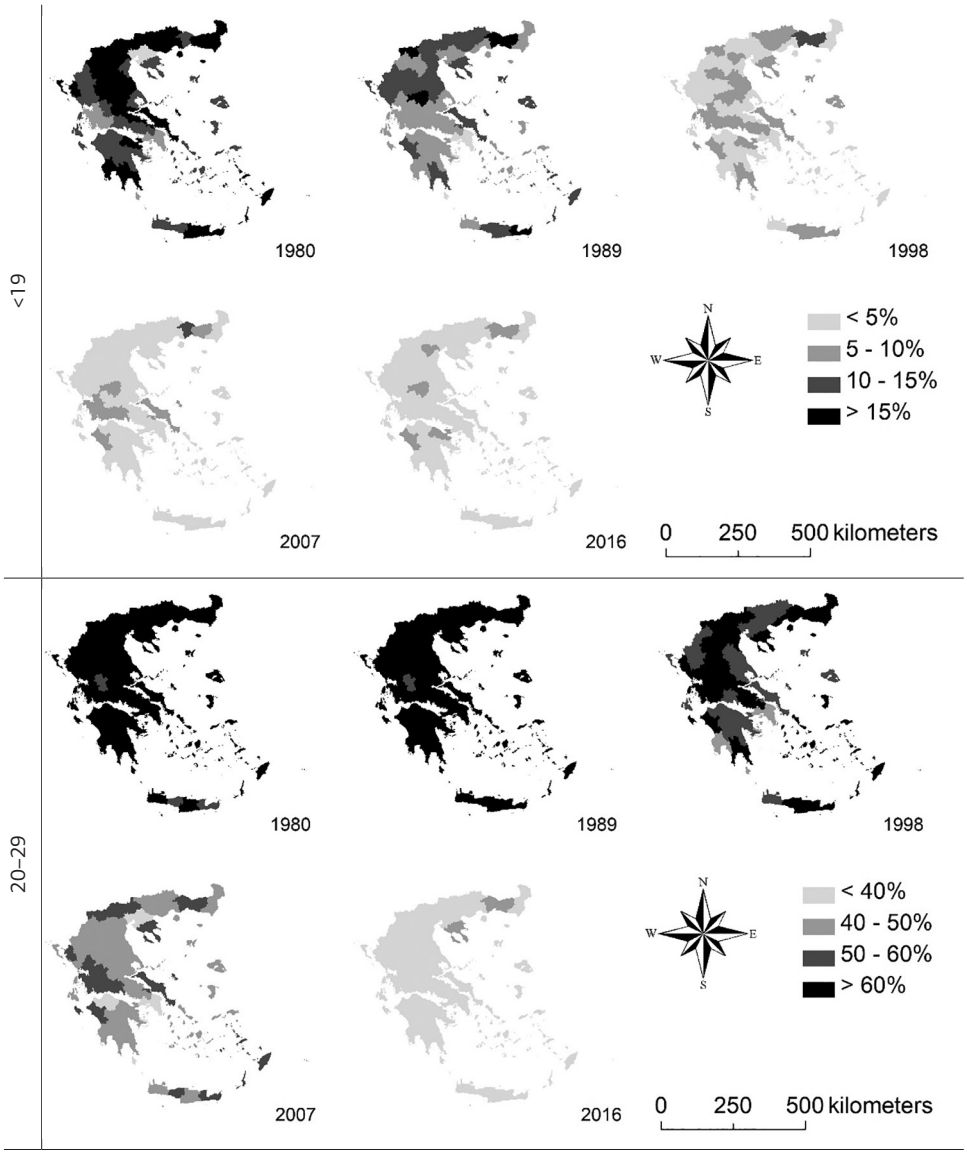
Mapping births by mother's age in Greek prefectures

The spatial distribution of the percent composition of births by mother's age class in Greek provinces was shown in Figure 1. Until 1989, there was a relevant incidence of females who became mothers at a very young age (< 20 years old), reaching in certain areas 10% of the contingent of women having a child. The same pattern was observed for the age class of 20–29, which was the dominant class in the sample with proportions above 60% up to the late 1990s, and then declining in the two last decades down to 40% in almost all Greek regions. The urban region of Attica (including Athens) was likely the first region experiencing a prolonged history of childbearing postponement in Greece. In 2016, the proportion of women > 40 years having a child was above 4%, being particularly high in urban areas.

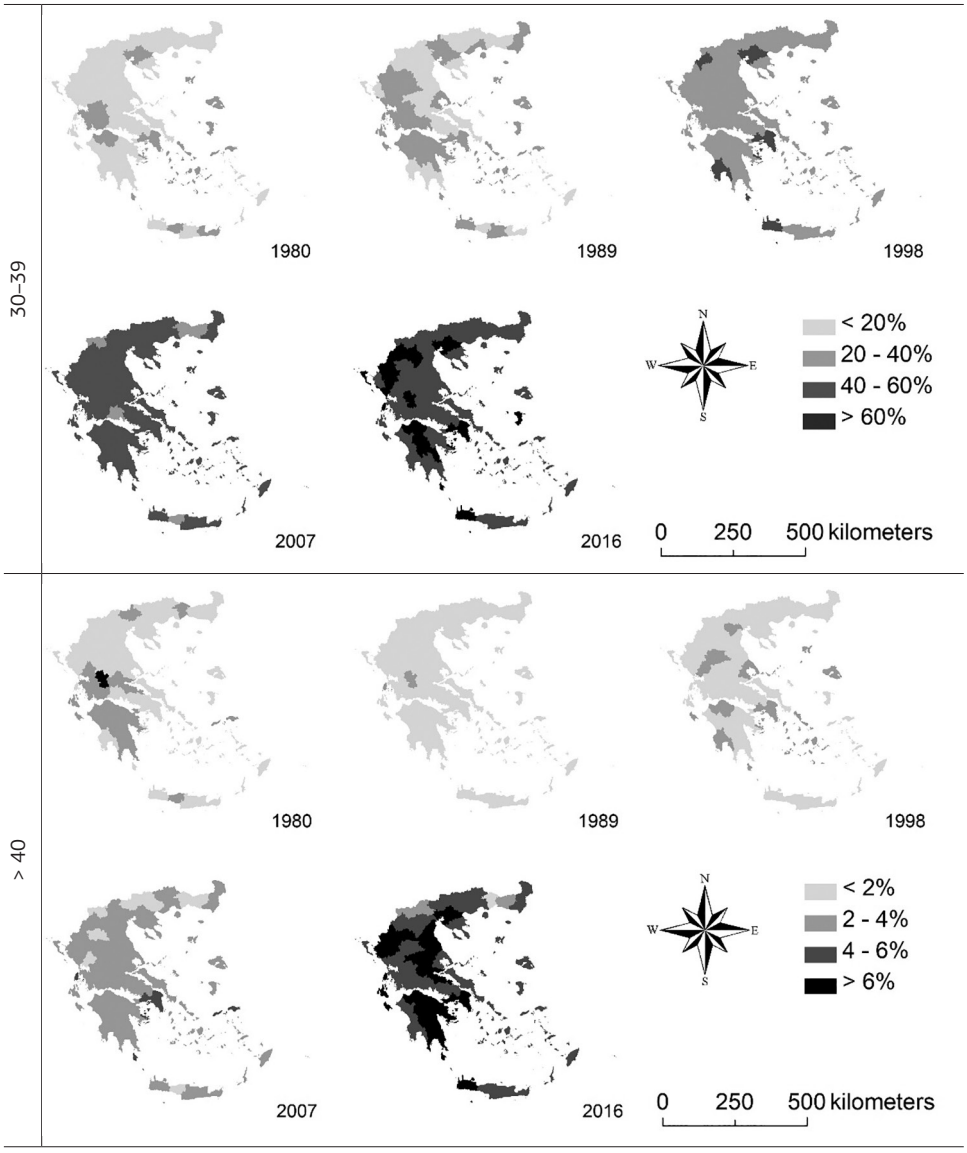
Table 4 summarizes the percent composition of births by mother's age in 6 large metropolitan (or tourism-specialized) regions of Greece; in addition to the 5 time points studied above, the percent differences between the beginning and the end of the time period were also calculated. A generalized postponement in the procreation

age was observed in the 6 areas considered in the present study. The metropolitan areas with the greatest rate of postponement were Greater Athens and Larissa; the lowest variation over time was recorded for Iraklion and the Cyclades, two coastal rural areas with high tourism attractiveness.

Figure 1. Spatial distribution of the percent composition of births by mother's age in Greek provinces



Cont. from page 75



Source: own elaboration on ELSTAT data.

Table 4. Percent composition of births by mother's age in the largest metropolitan and touristic regions of Greece, selected years

District	< 14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Mean age*
1980										
Greater Athens	0.1	8.9	33.1	32.0	18.2	5.9	1.6	0.1	0.0	26.2
Rest of Attica	0.2	14.7	36.6	28.5	13.5	4.7	1.5	0.3	0.1	25.1
Larissa	0.0	15.1	41.8	26.2	12.1	3.5	1.0	0.2	0.0	24.6
Salonika	0.1	9.3	37.6	31.0	15.2	5.4	1.3	0.1	0.0	25.7
Iraklio	0.3	16.4	34.9	26.8	14.1	5.7	1.6	0.2	0.0	25.1
Kyklades	0.2	10.7	37.3	26.5	17.0	6.4	1.7	0.1	0.1	25.8
1989										
Greater Athens	0.0	3.8	25.4	36.5	23.8	8.7	1.7	0.1	0.0	27.7
Rest of Attica	0.1	10.0	34.3	31.7	16.8	5.8	1.3	0.0	0.0	25.9
Larissa	0.1	10.9	40.1	30.4	13.2	4.3	0.9	0.1	0.0	25.1
Salonika	0.1	5.8	32.8	35.1	19.2	6.0	1.1	0.1	0.0	26.5
Iraklio	0.3	12.2	36.1	27.3	16.3	6.4	1.2	0.2	0.0	25.6
Kyklades	0.0	7.5	36.5	33.1	15.8	6.3	0.8	0.0	0.0	26.0
1998										
Greater Athens	0.0	2.0	13.2	34.6	34.3	13.3	2.4	0.2	0.0	29.6
Rest of Attica	0.3	5.5	23.1	35.7	24.7	8.9	1.6	0.1	0.1	27.7
Larissa	0.1	5.2	22.5	37.2	26.7	7.2	0.9	0.1	0.0	27.6
Salonika	0.0	3.2	16.7	36.8	31.2	10.1	1.9	0.1	0.0	28.7
Iraklio	0.0	5.7	25.4	35.3	24.3	7.8	1.2	0.3	0.0	27.4
Kyklades	0.0	2.8	25.4	35.6	25.4	8.6	2.0	0.2	0.0	27.9
2007										
Greater Athens	0.0	1.4	8.9	25.0	38.5	21.4	4.4	0.4	0.1	31.2
Rest of Attica	0.1	4.6	14.9	29.3	32.7	15.4	2.7	0.3	0.0	29.4
Larissa	0.2	3.3	13.4	34.2	32.6	13.5	2.4	0.3	0.0	29.4
Salonika	0.0	2.0	10.4	28.9	37.5	17.9	3.0	0.3	0.0	30.5
Iraklio	0.1	3.7	16.1	32.7	31.1	13.6	2.4	0.2	0.0	29.1
Kyklades	0.0	2.8	13.7	33.2	32.4	15.5	2.1	0.3	0.0	29.6
2016										
Greater Athens	0.0	1.3	5.4	17.3	37.8	29.4	7.3	1.1	0.2	32.8
Rest of Attica	0.2	4.5	9.4	19.4	34.8	24.9	5.8	0.8	0.1	31.4
Larissa	0.2	4.0	8.4	22.4	37.6	21.2	5.2	0.9	0.1	31.1
Salonika	0.0	1.8	6.6	21.2	38.2	25.6	5.8	0.8	0.1	32.0
Iraklio	0.0	2.9	10.3	26.7	35.2	19.8	4.4	0.5	0.2	30.7
Kyklades	0.0	1.2	10.9	27.3	33.9	21.5	3.8	1.3	0.1	31.0

Cont. from page 77

District	< 14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+	Mean age*
Difference (2016-1980)										
Greater Athens	–0.1	–7.6	–27.6	–14.7	19.6	23.5	5.8	1.0	0.1	6.6
Rest of Attica	0.0	–10.2	–27.2	–9.1	21.3	20.2	4.4	0.6	0.0	6.2
Larissa	0.2	–11.1	–33.4	–3.8	25.5	17.8	4.1	0.7	0.0	6.6
Salonika	0.0	–7.5	–31.0	–9.8	23.0	20.2	4.4	0.7	0.1	6.3
Iraklio	–0.3	–13.5	–24.6	–0.1	21.2	14.1	2.9	0.3	0.1	5.6
Kyklades	–0.2	–9.5	–26.4	0.8	16.9	15.1	2.1	1.2	0.0	5.2

* The mean age of women at birth

Source: own elaboration on ELSTAT data.

Multi-way Factor Analysis

A multivariate analysis of the percent composition of births by mother's age was performed for all the Greek provinces at the 5 study years (factor loadings and scores respectively presented in Table 5 and Figure 2). The first axis discriminates younger (15–29 years) from older classes (30–40 years), which are spatially segregated along the urban gradient. Specific trends towards moderate postponement and more stable fertility patterns are outlined along the second axis, characterizing Northern Greece prefectures, such as Kastoria, Serres and Pella, especially in the first years of study. Factor scores of axis 3 were more likely reflective of place-specific conditions across rural districts of Greece, assuming positive scores in the provinces of Karditsa (7.00) and Chalkidiki (5.63), while the most negative values were observed in Florina (–9.44) and Kefallinia (–7.95).

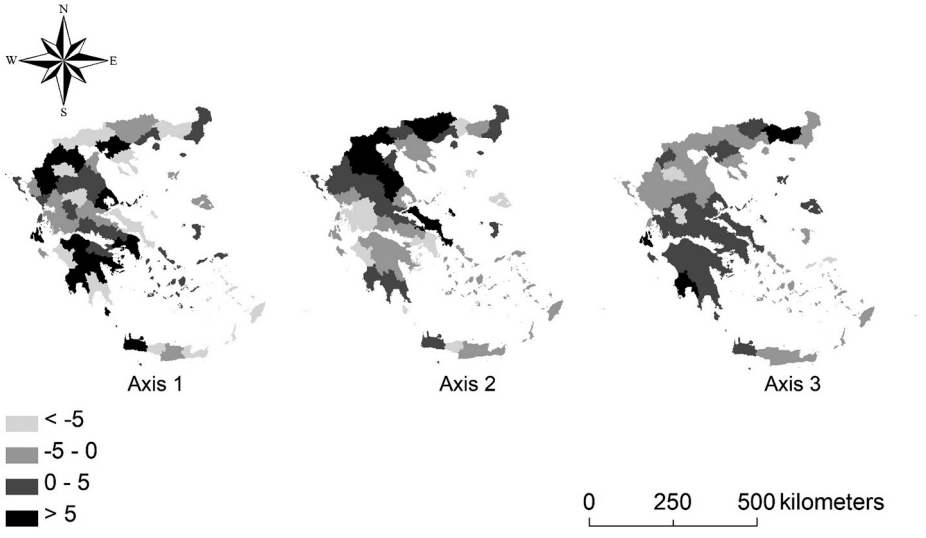
Table 5. A multiway factor analysis of percent composition of births by mother's age at selected years (bold indicates relevant loadings |> 0.5| to the extracted axes).

Axes	< 14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+
1980									
Axix 1	–0.28	–0.49	–0.19	0.5	0.3	0.18	0.14	0.08	0.11
Axis 2	0.05	0.7	0.76	–0.46	–0.84	–0.76	–0.61	–0.5	–0.13
Axis 3	0.26	–0.09	0.33	0.1	–0.19	–0.25	–0.19	–0.25	–0.04
1989									
Axix 1	–0.28	–0.87	–0.71	0.62	0.73	0.51	0.29	0.26	0.11
Axis 2	–0.27	0.13	0.36	0.12	–0.36	–0.5	–0.46	–0.21	0.44
Axis 3	–0.04	–0.08	–0.12	0.41	–0.24	–0.01	–0.17	–0.08	0.07

Axes	< 14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50+
1998									
Axix 1	–0.42	–0.77	–0.89	0.44	0.86	0.63	0.37	0.25	0.06
Axis 2	0.15	–0.1	–0.04	–0.14	0.19	0.09	–0.13	–0.02	–0.08
Axis 3	0.19	0.3	–0.18	–0.59	0.26	0.34	0.2	0.34	0.26
2007									
Axix 1	–0.31	–0.55	–0.74	–0.51	0.71	0.76	0.6	0.25	0.21
Axis 2	0.03	–0.37	–0.42	0.14	0.41	0.17	–0.22	–0.07	0.01
Axis 3	0.45	0.53	0.25	–0.42	–0.25	0.02	0.25	–0.24	0.18
2016									
Axix 1	–0.14	–0.45	–0.64	–0.7	0.46	0.74	0.47	0.32	0.16
Axis 2	–0.03	–0.19	–0.33	–0.17	0.24	0.28	0.03	–0.02	0.03
Axis 3	0.28	0.57	0.26	–0.08	–0.61	0.07	0.04	0.16	0.01
Explained variance (%)									
Axix 1	43.3								
Axis 2	15.1								
Axis 3	8.9								

Source: own elaboration on ELSTAT data.

Figure 2. Factor scores of a multiway analysis of percent composition of births by mother's age in Greek provinces, selected years



Source: own elaboration on ELSTAT data.

Discussion

While economic forces may assume a key role in shaping fertility trends over the recession (Caldwell and Schindlmayr, 2003), demographic dynamics based on individual decisions on family formation and childbearing were demonstrated to be associated with the local (social and territorial) context (Sobotka et al., 2011; Vrachnis et al., 2014; Matthews and Parker, 2013; Johnson et al., 2015; Goldstein and Kluge, 2016). Moreover, joint social and economic forces can (directly or indirectly) lead to rapid demographic changes at the local scale (e.g. Rontos, 2007). For instance, the 2007 recession in Europe determined economic instability and social changes, with financial shocks impacting (more or less directly) fertility patterns and trends (Rontos, 2010; Sobotka et al., 2011; Neels et al., 2012; Kreyenfeld et al., 2012). In Greece, demographic dynamics were demonstrated to be highly sensitive to economic downturns, as in other contexts all over Europe (Sobotka et al., 2011; Kroll and Kabisch, 2012; Goldstein et al., 2013; Simou et al., 2013; Vrachnis et al., 2014; Walford and Kurek, 2016). After a moderate recovery in the early 2000s, regional fertility rates in Greece have declined significantly since 2009 – when the economy entered a recession (Kotzamanis et al., 2017).

The approach proposed in our study was based on the analysis of the percent composition of births by mother's age, investigating short- and long-term changes in fertility patterns and trends, and the potential impact of economic cycles along urban-rural gradients. A multivariate analysis pointed out a relevant spatio-temporal variability in demographic dynamics at different spatial scales in Greece. Except a few years of demographic recovery during the 2000s, demographic dynamics in the long-term, pre-crisis period (1980–2007) demonstrated to be quite comparable to more recent trends (2007–2016). While recessions may significantly alter short-term demographic patterns (Sobotka et al., 2011), as observed in Greece when comparing fertility trends of the early and late 2000s, the empirical results of this study confirm that the 2007 recession was relatively neutral in terms of fertility trends when looking at country-scale, long-term dynamics. Conversely, the 2007 recession has substantially influenced demographic dynamics at the metropolitan scale, contributing to a further – more subtle – population divide between accessible/tourism districts and strictly rural areas (Snyder, 2006; Rontos, 2007; Kulu et al., 2009). In these regards, childbearing postponement was more pronounced in metropolitan areas. For instance, when comparing Greater Athens and the rest of Attica, a more evident trend toward postponement was observed in the Greater Athens area. Residential mobility in suburban areas was associated

to relatively high fertility rates (Kulu et al., 2009), and childbearing postponement was relatively less pronounced than in compact urban districts (Mulder and Wagner, 2001; Kulu, 2008; Martín-García, 2013).

The empirical results of this study suggest how policy strategies adapted to specific regional contexts can be more effective in supporting family formation and childbearing (McDonald, 2006; Gauthier, 2007; Van Nimwegen, 2013). For instance, demographic response to economic downturns depends on institutional decisions, e.g. the existence of specific policies to support families and the employment status (Goldstein et al., 2009, 2013; Livi Bacci, 2013); in this way, the 2007 recession has possibly altered the post-crisis ability to social recovery in Greece – and especially in metropolitan regions – due to public spending cuts aimed at decreasing economic deficits (Bongaarts and Sobotka, 2012). In this respect, government policies toward 'austerity' should avoid negative consequences on fertility, since the relationship between childbearing postponement and recession is in turn dependent upon the socio-institutional context varying across space. Therefore, public subsidies and incentives to young families have demonstrated to reduce the negative effect of economic downturns on fertility with a spatial pattern depending on the specific socioeconomic local context (Sobotka et al., 2011).

Conclusion

A spatio-temporal analysis of a gross indicator of fertility allows for a detailed investigation of short and long-term demographic dynamics at multiple spatial scales across the urban-rural gradient in Greece. Different fertility profiles have characterized economically-marginal, inland rural areas, metropolitan regions, tourism-specialized districts or more accessible coastal districts devoted to agriculture. A long-term trend toward childbearing postponement was particularly evident in metropolitan regions; a short-term impact of the 2007 recession was more relevant in tourism-specialized districts and more accessible rural areas. A better understanding of demographic trends in both spatial direction and intensity, seems to be an essential knowledge base for measures stimulating demographic recovery of local districts in countries heavily affected by the 2007 economic crisis.

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Demographic dynamics, urban-rural divides and the (changing) mother's age at birth in Greece: a regional analysis, 1980–2016

Abstract

Being more sensitive to economic fluctuations, childbearing postponement increased during the second demographic transition and was accompanied by a moderate decline in the number of children per woman and the progressive rise of mother's age at first birth. Under the hypothesis that recessions have a marked influence on population dynamics, the present study investigates spatial changes in mother's age at birth in Greece with the aim to assess the differential impact of economic crisis along the urban-rural gradient. The percent composition of births by mother's age class – considered a gross indicator of fertility under a changing socioeconomic context – was studied at 4 spatial scales (the whole country, administrative regions, prefectures and metropolitan areas or specific economic districts) over an economic

cycle from expansion to recession (1980–2016). While stimulating childbearing postponement observed since the early 1980s, empirical results of this study indicate that the 2007 recession was quite neutral on fertility trends in Greece, consolidating the traditional divide between urban and rural areas.

Keywords: fertility, demographic transition, recession, urban-rural gradient, Southern Europe