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Residential context, migration and fertility in a modern urban society☆

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ABSTRACT

This study examines fertility variation by residential context in Britain. While there is a large literature on fertility trends and determinants in industrialised countries, to date longitudinal research on spatial fertility variation has been restricted to the Nordic countries. We study fertility variation across regions of different sizes, and within urban regions by distinguishing between central cities and suburbs. We use vital statistics and longitudinal data and apply event history analysis. We investigate the extent to which the socio-economic characteristics of couples and selective migrations explain fertility variation between residential contexts, and the extent to which contextual factors potentially play a role. Our analysis shows that fertility levels decline as the size of an urban area increases; within urban regions suburbs have significantly higher fertility levels than city centres. Differences in fertility by residential context persist when we control for the effect of population composition and selective migrations.

1. Introduction

There is a growing body of literature on spatial aspects of fertility and their importance for understanding fertility patterns and dynamics in industrialised countries. Studies show that urban–rural fertility variation may have decreased over time, but significant differences between various types of settlement persist (Kulu, Vikat, & Andersson, 2007). Fertility levels are high in rural areas and small towns and low in large cities. This pattern has been observed for the US (Glusker, Dobie, Madigan, Rosenblatt, & Larson, 2000; Heaton, Lichter, & Amoateng, 1989), England and Wales (Boyle, Graham, & Feng, 2007; Tromans, Natamba, & Jefferies, 2009), France (Fagnani, 1991), the Netherlands (De Beer & Deerenberg, 2007; Mulder & Wagner, 2001), Italy (Brunetta & Rotondi, 1991; Michielin, 2004; Vitali & Billari, 2011), Germany and Austria (Hank, 2001; Kulu, 2006), the Nordic countries (Kulu et al., 2007; Thygesen, Knudsen, & Keiding, 2005), the Czech Republic (Burcin & Kučera, 2000), Poland and Estonia (Kulu, 2005, 2006; Vojtěchovská, 2000) and Russia (Zakharov & Ivanova, 1996).

While studies on urban–rural fertility variation show broadly similar patterns (the larger the settlement, the lower the fertility levels), it is far from clear why fertility levels are higher in smaller places and lower in larger settlements. Usually two competing hypotheses are discussed in the literature: the compositional and the contextual. The *compositional* hypothesis suggests that fertility levels vary between places because different people live in different settlements, whereas the *contextual* hypothesis suggests that factors related to immediate living environment are of critical importance. The role of *selective migrations* has also been discussed in the literature; couples with childbearing intentions may decide to move to smaller places that are better suited to childrearing, whereas those

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with no childbearing plans may move to larger settlements leaving behind a select population group.

Drawing upon individual-level data, recent research has shown that all three factors may play some role in spatial fertility variation, although their contribution varies by research context. For example, selective moves have been found to explain some fertility differences between city centres and suburbs, but account for little of the fertility variation between urban and rural areas (Kulu, 2013; Kulu & Boyle, 2009; Kulu, Boyle, & Andersson, 2009). However, almost all the studies investigating individual childbearing behaviour by residential context come from Nordic countries; little (if any) research has been conducted in other industrialised countries. Nordic countries (except Denmark) have large territories and relatively small populations; in all of them there are sufficiently large populations living in remote rural areas. These facts make Nordic countries rather unique in the context of many industrialised countries where population density is usually much higher and most people live in the vicinity of large urban areas. Nordic countries also lack truly big cities, while all four capital cities (Copenhagen, Oslo, Stockholm and Helsinki) have significantly increased over the past half-century or so, the size of the capital city region still hardly exceeds one or two million people. The presence of a significant population in remote rural areas and the lack of truly big cities thus raise questions as to the wider importance of the findings from the Nordic context. This is particularly relevant in the light of studies showing that spatial fertility variation significantly decreased in industrialised countries during the post-WWII period; although some variation may still exist (particularly in the 'peripheral' countries) this may be negligible and thus unimportant for the understanding of fertility patterns and dynamics in industrialised countries (cf. Coleman, 1996; Courgeau & Pumain, 1993).

In this study, we examine fertility variation by residential context in Britain. We move beyond a simple urban–rural dichotomy and distinguish residential contexts by size of area and density of population. Further, we also investigate fertility variation within urban regions by distinguishing between central cities and suburban areas. We investigate the extent to which the socio-economic characteristics of couples and selective migrations (or residential moves) explain fertility variation between various residential contexts, and the extent to which contextual factors potentially play a role. The British case is interesting and important to study for two reasons. First, it can be argued that no one lives in (remote) rural areas any more in Britain (except perhaps in Scotland), while there may be some truth in this it is still the case that people live in areas of different size, density and vicinity to nature. The British context allows us to explore whether and how much fertility varies across space in a 'modern urban' society (or in a society where rural areas, or at least their relative population, are negligible) and, more importantly, to investigate the causes of spatial fertility variation. Second, Britain has a 'true' world city, London. With a population of 7–10 million (depending on the definition of the urban area) it offers a good opportunity to study fertility levels and patterns in big cities in comparison to other residential contexts and to learn about fertility determinants in highly urbanised societies.

2. The causes of spatial fertility variation

The notion of *compositional factors* suggests that fertility levels vary across space because different people live in different settlements. First, the share of highly educated people is larger in cities than in small towns and rural areas. Fertility levels tend to differ by education level, with the lowest levels for university-educated individuals and the highest for individuals with only compulsory education (Hoem, 2005). Therefore, lower fertility in larger places is potentially explained by the higher proportion of highly educated people living there. Second, fertility variation by residential context may also result from the larger share of students in cities and towns than in small towns and rural areas (Kulu et al., 2007). Previous research shows that the likelihood of family formation is negligible when individuals are in full-time education. Third, the percentage of married people is larger in rural areas and small towns than in large cities and marriage is directly related to childbearing. Thus, the over-representation of married people in smaller places may explain the higher fertility rates there, particularly the higher likelihood of becoming a parent. However, the direction of causality between marriage and fertility is not clear; it is possible that people decide to marry when they wish to have children. It is important to note that some compositional factors may in fact reduce spatial fertility variation and thus hide potential contextual effects. For example, fertility in large cities may be relatively high because of significant immigrant and ethnic minority populations. Immigrants in industrialised countries have relatively high fertility because they usually come from high-fertility countries, and because international (female) migration is often driven by marriage and family formation (Toulemon, 2004).

Selective migrations may also explain fertility variation by residential context. Couples who intend to have a child may move from larger places to smaller ones because the latter are seen as better suited to raising children. Recent studies show that selective moves mostly take place between cities and neighbouring rural areas, many of which can be classified as suburbs (Kulu & Boyle, 2009). However, selective migrations are likely to be less relevant for explaining urban–rural fertility variation if the suburban areas around cities and towns have been classified in the analysis as part of the urban region. Previous studies have shown that there are families who move from cities and towns to small towns and rural areas over long distances, potentially with the intention of having another (or a third) child (Kulu, 2008). However, the share of such migrants is usually not large.

The *context* may influence fertility behaviour through economic opportunities and constraints or cultural factors (Kulu, 2013). Children are more expensive in cities than in rural areas (Becker, 1991; Livi-Bacci & Breschi, 1990). First, food, commodities and services have traditionally been more expensive in larger than in smaller places, although the spatial differences in the costs may have decreased recently because of greater competition between suppliers in the cities and access to large supermarkets with economies of scale. Secondly, children are more expensive in cities because parents normally have to pay for after-school activities (e.g. playing football at a sports club rather than just playing with other village children in a local school stadium after the school day). Third, children in cities are more time-consuming for their parents than those in rural areas; parents not only need to pay for after-school activities but also organise their children's journeys to and from home. Fourth, urban environments encourage higher spending on children because of norms, proximity to shops and other attractions and a need to invest more in children through extra-curricula activities. Fifth, opportunity costs are also higher in cities and towns than in small towns and rural areas (Becker, 1991; Michielin, 2004). Life in an urban context, particularly in large cities, offers varied opportunities for work and leisure. Having children, however, means that the possibility of taking advantage of such opportunities is relatively small. Finally, life is more competitive in large cities than in small settlements; high costs mean it takes more effort and time for young people to establish themselves in the labour market in a big city environment. Research suggests that appropriate work and housing are critical prerequisites for family formation in industrialised countries (Mulder & Wagner, 2001). Many people may thus need to delay childbearing in large cities and some may eventually have a smaller family than initially planned, or no family at all (Kulu, 2013).

Cultural factors may also account for urban–rural fertility variation. Research has shown that people in rural areas and small towns retain traditional attitudes and lifestyles, with a value orientation towards large families and a preference for extended families (Heaton et al., 1989; Snyder, 2006; Snyder, Brown, & Condo, 2004; Trovato & Grindstaff, 1980). Childlessness, an ingredient of a 'new European marriage pattern', is widespread in the cities, but has not (yet) spread to small towns and rural areas. While economic considerations may be one factor behind childlessness in big city environments it is equally likely that the phenomenon is one expression of our modern individualistic urban societies, which are supported by increased female labour force participation and promoted by continued gender inequality within families in many industrialised countries (McDonald, 2000).

Daily social interaction may also play some role (Fiori, Graham, & Feng, 2012). Smaller places are usually considered as family-friendly environments because of low population density and their vicinity to nature. Residents in these areas are more likely to be surrounded by families with children because of higher local fertility and the inward moves of families with children from larger settlements. Demographic processes may thus not only reinforce local cultural values for large families, but also create a context where social interaction encourages people to have a child (or another child).

The purpose of this study is to determine fertility differences by residential context in Britain – a 'modern urban society' – and to investigate how much these differences can be explained by compositional factors and selective migrations and how much is left for other, potentially contextual, factors. An explicit examination of the nature of possible contextual effects requires a different research design, but the current analysis does allow us to draw some conclusions about contextual effects and give suggestions for further research.

3. Data and definitions

Our data come from two sources: the Office for National Statistics (ONS) birth statistics and the British Household Panel Survey (BHPS). The ONS data provide us with information, first, on the number of births by age of mother across local authority districts (LAD) in England and Wales for 2011, and second, on female population by age at the 2011 UK census. We use the data to calculate the total fertility rate (TFR) for 2011. We also considered the calculation of fertility trends by local authority districts over multiple years. However, it turned out that it is not possible to obtain unbiased fertility estimates until revised population figures for the period between two recent censuses (2001 and 2011) become available. Our calculations based on initial population estimates showed relatively high fertility for London and somewhat lower than expected fertility levels for rural areas in the pre-2011 census years. We believe that this was largely due to undercounting of the immigrant population in the capital city of London and undercounting of young adults (women) who leave rural areas and small towns for cities for educational reasons.

We use data from the British Household Panel Survey (BHPS) to calculate parity-specific fertility rates across residential contexts, with and without controlling for a number of socioeconomic variables, and investigate the impact of selective residential moves and migrations. The BHPS is an annual survey consisting of a nationally representative sample of about 5500 households recruited in 1991, containing a total of approximately 10,000 individuals. The sample is a stratified clustered design drawn from 250 postcode areas of Great Britain, and all residents present at those addresses at the first wave of the survey were designated as panel members. The BHPS collects annual information on major life events of individuals, including union formation and dissolution, birth of children, and residential change. Additionally, in 1992 and 1993, completed fertility, partnership, educational and employment histories of the respondents were collected. A new wave of fertility and partnership histories was also collected in 2002 and 2003. The extract we use includes women aged 16–49 between 1991 and 2008. We focus on the childbearing of those women by residential context.

The BHPS data provide information on birth dates of children and changes in individual partnership, employment and educational status at the precision of a month. Information is also collected on the month of the (last) move between two consecutive waves (i.e. within a year); the place of residence is recorded at each panel wave; there is no information on residential histories before the first wave, although information was collected on the date of the last move before the first wave. We include in the analysis residential changes of individuals since the first wave of the panel in 1991 or their entry into the study (if later).

We study the impact of residential context on first, second and third births. We distinguish six types of areas according to the size of the local authority district and its population density: (1) the capital city of London; (2) other large cities with a population of more than 400,000 (large cities); (3) cities with 200,000–400,000 inhabitants (cities); (4) local authority areas with less than 200,000 inhabitants, but with a population density of 1000 or more individuals per km^2 (towns); (5) local authority areas with less than 200,000 inhabitants and with a population density of 250–1000 individuals per km^2 (small towns); and (6) areas with less than 200,000 inhabitants and with less than 250 individuals per km^2 (rural areas). Additionally, we distinguish between central cities and suburban areas for cities and towns with more than 200,000 people. A local authority area is assigned to an urban centre if at least 15% of its employed population commuted there in 2001. Using commuting data to define 'travel-to-work' or labour-market regions is standard in migration and urbanisation research, although the threshold used varies across studies (see Champion, 2001; Hugo, Champion, & Lattes, 2003). We have experimented with different thresholds (15%, 20% and 30%). As expected the fertility differences between the urban regions are the largest when using the criteria of 30% and the smallest with the threshold of 15% (used in the current analysis). In total, one-fourth of women at reproductive ages lived in the London urban region in 2011; about 30% lived in local authority areas classified in this study as small towns and rural areas (Table 1).

4. Methods and modelling strategy

We first calculate the total fertility rate (TFR) for various residential contexts. We then use event-history analysis to calculate parity-specific birth rates (for the first three transitions) (Hoem, 1987). We model the time to conception (subsequently leading to a birth) to measure the effect of the place of residence on childbearing decisions as precisely as possible. The basic model can be formalised as follows:

$$\ln \mu_i(t) = \ln \mu_0(t) + \sum_j \alpha_j x_{ij} + \sum_l \beta_l w_{il}(t), \qquad (1)$$

where $\mu_i(t)$ denotes the hazard of the first, second or third conception for individual i and $\ln \mu_0(t)$ denotes the baseline log-hazard, which we specify as a piecewise linear spline (Lillard & Panis, 2003); the baseline for first birth is a woman's age in months (women are considered at risk since age 16); for the second and third births it is time since previous birth in months. x_{ij} represents the values of a time-constant variable, and $w_{il}(t)$ represents a time-varying variable. We also include in the model a woman-level residual (random effect) to control for unmeasured time-invariant characteristics that influence her fertility behaviour. The model is as follows:

$$\begin{aligned}
\ln \mu_i^{B1}(t) &= \ln \mu_0^{B1}(t) + \sum_j \alpha_j^{B1} x_{ij} + \sum_l \beta_l^{B1} w_{il}(t) + \varepsilon_i^B \\
\ln \mu_i^{B2}(t) &= \ln \mu_0^{B2}(t) + \sum_j \alpha_j^{B2} x_{ij} + \sum_l \beta_l^{B2} w_{il}(t) + \varepsilon_i^B \qquad (2) \\
\ln \mu_i^{B3}(t) &= \ln \mu_0^{B3}(t) + \sum_j \alpha_j^{B3} x_{ij} + \sum_l \beta_l^{B3} w_{il}(t) + \varepsilon_i^B
\end{aligned}$$

where ε_i^B is the residual for woman i; the residuals are assumed to follow a normal distribution.

In our modelling strategy, we investigate first, second and third birth risk by residential context controlling for basic demographic characteristics: the *woman's age* or *time since previous birth* and *calendar time*. We then also control for women's socio-economic characteristics to explore to what extent these characteristics explain fertility variation by residential context. We include in the models *educational level* (low, medium or high) of the woman and her *activity status* (self-employed, full-time employed, part-time employed, in education, unemployed or other activity) and *ethnicity/race* (white or other). We also include in the models *partnership status* (in union or out of union) and the woman's *age at first birth* (for second and third birth models). Finally, we control for *residential moves* (residential changes within a labour market area) and *migrations* (moves between labour market areas)[1] and a woman's *unmeasured time-invariant characteristics*. The distribution of exposure time and occurrences by the categories of demographic and socio-economic variables is provided in Tables 2–4.

Table 1
Female population at reproductive age by residential context in England and Wales, 2011 (percent).

Residential context	
London, centre	8
London, suburbs	17
Large cities, centre	8
Large cities, suburbs	6
Cities, centre	12
Cities, suburbs	7
Towns, centre	8
Towns, suburbs	5
Small towns	16
Rural areas	14
Total	100

Source: Calculations based on the ONS data 2011.

5. Total fertility by residential context

We calculated the total fertility rate (TFR) for local authority districts of England and Wales with different size and population density. We see that the larger the county, the smaller was the total fertility rate (Fig. 1). While the total fertility rate for small towns and rural areas varied between 2.2 and 2.3 in 2011, the rate for city regions and towns was between 1.9 and 1.95; and the rate for the London region was about 1.8. Next, we distinguished between city centres and suburbs. We see that suburbs had significantly higher fertility levels than city centres (Fig. 2). The difference was particularly pronounced for London;

[1] Residential changes of individuals since the first wave of the panel in 1991 (or their entry into the study) were included in the analysis. Once an individual had moved she became a mover or a migrant. In preliminary analysis, we also distinguished movers/migrants by order (had moved n times), but such a distinction improved neither the model fit nor our understanding of the role selective residential changes play in spatial fertility variation.

Table 2
Person-years and first births by categories of variables.

	Person-years		First births	
	Number	Percent	Number	Percent
Place of residence				
London central city	9158.33	5	23	3
London suburbs	24,051.50	13	96	12
Other cities and towns	76,998.51	40	311	39
Rural areas and small towns	63,873.18	33	291	37
Scotland	16,767.67	9	72	9
Age				
−19 years	48,228.17	25	136	17
20–24 years	51,242.34	27	192	24
25–29 years	35,147.51	18	228	29
30–34 years	20,350.34	11	176	22
35+ years	35,880.84	19	61	8
Partnership status				
Single	112,512.81	59	203	26
Cohabiting	26,782.19	14	164	21
Married	33,563.87	18	378	48
Separated	17,990.33	9	48	6
Period				
1991–1994	38,434.68	20	192	24
1995–1999	56,954.01	30	230	29
2000–2004	60,782.51	32	243	31
2005–2008	34,678.01	18	128	16
Ethnic minority				
No	168,735.03	88	720	91
Yes	6577.33	3	34	4
Missing	15,536.84	8	39	5
Educational level				
Low	92,567.52	49	421	53
Medium	54,454.01	29	181	23
High	43,827.68	23	191	24
Activity status				
Self-employed	6043.67	3	20	3
Full-time employed	105,229.18	55	386	49
Part-time employed	17,316.34	9	102	13
Enrolled in education	40,216.50	21	32	4
Unemployed	8424.17	4	64	8
Other	11,261.67	6	181	23
Activity missing	2357.67	1	8	1
Mover status				
Non-mover	108,945.40	57	344	43
Mover	42,188.82	22	274	35
Migrant	39,714.98	21	175	22
Total	190,849.20	100	793	100

Source: Calculations based on the BHPS data.

the total fertility rate in the city centre was about 1.5, whereas the figure for the suburbs was 2.0.

Next, we used the microdata to investigate the contribution of first-, second- and third-birth rates to fertility variation by residential context and examined the extent to which the socio-economic characteristics of women and selective migrations explain spatial fertility variation. We combined residential categories into four groups: London central city; London suburbs; other cities and towns; and small towns and rural areas (Tables 2–4). This was necessary due to small sample sizes in some residential categories. However, it remained important to distinguish between the central city and suburbs of London as fertility levels significantly varied between these contexts. We grouped observations in Scotland as a separate category. This helped to ensure comparability with the classifications based on the vital statistics data (which exclude Scotland) while at the same time boosting the sample size and hence the precision of the covariate coefficient estimates. The results were not sensitive to the exclusion of Scotland from the sample (not shown).

6. Parity-specific fertility by residential context

6.1. First birth

In the first model, we only controlled for the woman's age and calendar period. Women living in central London

Table 3
Person-years and second births by categories of variables.

	Person-years		Second births	
	Number	Percent	Number	Percent
Place of residence				
London central city	2196.00	3	18	3
London suburbs	7601.67	10	69	10
Other cities and towns	30,989.00	39	257	38
Rural areas and small towns	30,858.50	39	268	39
Scotland	8252.33	10	67	10
Time since first birth				
0–1 year	9623.17	12	106	16
1–3 years	13,832.00	17	343	51
3–5 years	8739.67	11	132	19
5–10 years	16,057.66	20	78	11
10+ years	31,644.99	40	20	3
Partnership status				
Single	8216.66	10	48	7
Cohabiting	11,888.33	15	134	20
Married	43,578.18	55	455	67
Separated	16,214.33	20	42	6
Age at first birth				
−19 years	10,328.50	13	104	15
20–24 years	24,136.67	30	174	26
25–29 years	24,116.67	30	228	34
30+ years	21,315.66	27	173	25
Period				
1991–1994	16,999.17	21	154	23
1995–1999	24,200.50	30	215	32
2000–2004	25,543.17	32	209	31
2005–2008	13,154.67	16	101	15
Ethnic minority				
No	74,464.33	93	634	93
Yes	3834.00	5	30	4
Missing	1599.17	2	15	2
Educational level				
Low	51,364.83	64	371	55
Medium	14,550.67	18	147	22
High	13,982.00	17	161	24
Activity status				
Self-employed	4318.00	5	22	3
Full-time employed	28,598.83	36	145	21
Part-time employed	20,264.84	25	155	23
Enrolled in education	1643.67	2	8	1
Unemployed	4203.00	5	38	6
Other	20,329.16	25	306	45
Activity missing	540.00	1	5	1
Mover status				
Non-mover	41,087.68	51	237	35
Mover	26,989.99	34	293	43
Migrant	11,819.83	15	149	22
Total	79,897.49	100	679	100

Source: Calculations based on the BHPS data.

had a significantly lower risk of a first birth than those in the city's suburbs or in other urban regions (Tables 5 and 6, Model 1). The highest risk was observed for women living in rural areas and small towns. In the second and third models, we also controlled for the socio-economic characteristics of women and their partnership status. The differences between residential contexts decreased, but remained significant between urban and rural areas; women in small towns and rural areas had a 21% higher risk of first birth than those living in cities and towns. The analysis revealed that differences in partnership status explained much of the initial fertility differences between central London and other areas; a relatively large share of single women in central London is responsible for low first birth rates there, which is not surprising. In the fourth model, we also included mover status indicators to control for the effect of selective residential moves and migrations. We observed no differences in first-birth risks between movers and non-movers, and this was also the case when we allowed the effect of migrations to vary across

Table 4
Person-years and third births by categories of variables.

	Person-years		Third births	
	Number	Percent	Number	Percent
Place of residence				
London central city	2429.67	2	8	3
London suburbs	11,306.50	8	22	7
Other cities and towns	61,428.49	41	112	36
Rural areas and small towns	62,192.08	42	140	45
Scotland	12,163.67	8	28	9
Time since second birth				
0–1 year	8616.09	6	31	10
1–3 years	16,753.84	11	124	40
3–5 years	15,065.67	10	72	23
5–10 years	34,714.99	23	61	20
10+ years	74,369.82	50	22	7
Partnership status				
Single	4141.49	3	15	5
Cohabiting	12,437.42	8	58	19
Married	111,015.00	74	214	69
Separated	21,926.49	15	23	7
Age at first birth				
−19 years	19,707.08	13	89	29
20–24 years	58,881.66	39	108	35
25–29 years	49,179.99	33	81	26
30+ years	21,751.66	15	32	10
Period				
1991–1994	32,206.83	22	88	28
1995–1999	44,057.33	29	99	32
2000–2004	47,938.58	32	79	25
2005–2008	25,317.66	17	44	14
Ethnic minority				
No	142,069.73	95	291	94
Yes	6022.00	4	16	5
Missing	1428.67	1	3	1
Educational level				
Low	100,635.24	67	204	66
Medium	23,543.16	16	59	19
High	25,342.00	17	47	15
Activity status				
Self-employed	7548.50	5	18	6
Full-time employed	48,457.00	32	55	18
Part-time employed	50,084.83	33	67	22
Enrolled in education	1581.00	1	2	1
Unemployed	4100.67	3	19	6
Other	36,048.74	24	145	47
Activity missing	1699.67	1	4	1
Mover status				
Non-mover	89,868.01	60	135	44
Mover	42,832.06	29	113	36
Migrant	16,820.32	11	62	20
Total	149,520.40	100	310	100

Source: Calculations based on the BHPS data.

settlement types (although the sample was too small for a detailed analysis).[2] In the final model, we additionally controlled for unobserved time-invariant characteristics of women. The fertility differences between residential contexts persisted – women in small towns and rural areas had a significantly higher risk of first birth than those living in urban areas.

6.2. Second birth

In the first model, we controlled for time since first birth and calendar period. Interestingly, we observed no differences in second-birth risk by residential context

[2] We fitted a model with an interaction term for place of residence and migrant status (e.g. migrants in London vs those in rural areas); the model fit did not improve significantly in comparison to the model with the main effects only. However, the small size of migrant group did not allow a detailed analysis of fertility patterns by migration destination with the data at hand.

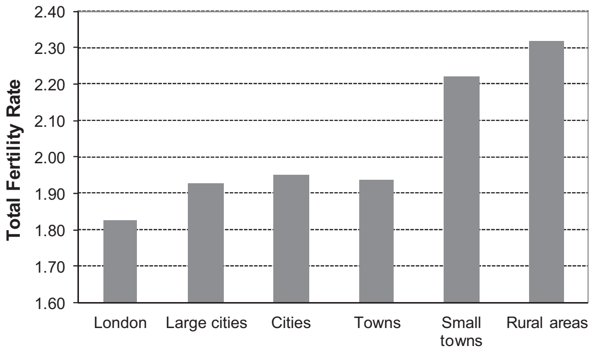

Fig. 1. TFR by residential context in England and Wales, 2011.

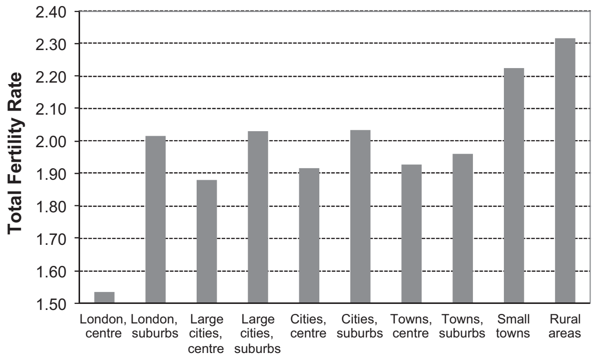

Fig. 2. TFR by residential context in England and Wales, 2011.

Table 5
Relative risks of conception leading to first birth.

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Place of residence										
London central city	0.55	***	0.59	**	0.77		0.77		0.77	
London suburbs	0.95		0.99		1.00		0.99		0.98	
Other cities and towns	1		1		1		1		1	
Small towns and rural areas	1.20	**	1.24	***	1.21	**	1.22	**	1.23	**
Scotland	1.02		1.05		1.11		1.10		1.08	

Source: Calculations based on the BHPS data.
Model 1: controlled for the woman's age and calendar time.
Model 2: additionally controlled for ethnicity, educational level and activity status.
Model 3: additionally controlled for partnership status.
Model 4: additionally controlled for mover status.
Model 5: additionally controlled for unobserved heterogeneity.
* $p < .10$; ** $p < .05$; *** $p < .01$.

Table 6
Log-risks of conception leading to first birth (parameter estimates and standard errors).

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Place of residence										
London central city	−0.606	***	−0.527	**	−0.258		−0.258		−0.261	
	(0.227)		(0.234)		(0.208)		(0.206)		(0.227)	
London suburbs	−0.049		−0.012		−0.002		−0.009		−0.022	
	(0.121)		(0.125)		(0.121)		(0.120)		(0.134)	
Other cities and towns	0		0		0		0		0	
Small towns and rural areas	0.185	**	0.216	***	0.190	**	0.198	**	0.205	**
	(0.082)		(0.080)		(0.082)		(0.082)		(0.092)	
Scotland	0.022		0.045		0.105		0.099		0.080	
	(0.138)		(0.127)		(0.135)		(0.136)		(0.150)	
Demographic variables										
Age (baseline)										
Constant	−3.875	***	−3.778	***	−1.488	***	−1.530	***	−1.603	***
	(0.220)		(0.251)		(0.275)		(0.280)		(0.292)	
−20 years (slope)	0.162	**	0.068		−0.018		−0.019		−0.005	
	(0.066)		(0.069)		(0.070)		(0.070)		(0.071)	
20–24 years (slope)	0.036		−0.002		−0.191	***	−0.190	***	−0.191	***
	(0.032)		(0.033)		(0.034)		(0.034)		(0.036)	
25–29 years (slope)	0.172	***	0.167	***	0.085	***	0.086	***	0.094	***
	(0.030)		(0.031)		(0.031)		(0.031)		(0.033)	
30–34 years (slope)	−0.077	**	−0.078	**	−0.061	*	−0.061	*	−0.044	
	(0.035)		(0.035)		(0.036)		(0.036)		(0.037)	
35+ years (slope)	−0.320	***	−0.351	***	−0.374	***	−0.372	***	−0.389	***
	(0.047)		(0.047)		(0.047)		(0.048)		(0.048)	
Partnership status										
Single					−2.456	***	−2.432	***	−2.556	***
					(0.116)		(0.121)		(0.130)	

Table 6 (*Continued*)

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Cohabiting					−1.049	***	−1.044	***	−1.137	***
					(0.098)		(0.098)		(0.106)	
Married					0		0		0	
Separated					−1.527	***	−1.523	***	−1.629	***
					(0.156)		(0.157)		(0.161)	
Socio-economic variables										
Period										
1991–1994	0.203	**	0.180	*	0.079		0.096		0.062	
	(0.100)		(0.101)		(0.102)		(0.108)		(0.112)	
1995–1999	0		0		0		0		0	
2000–2004	0.022		0.031		0.211	**	0.213	**	0.237	**
	(0.093)		(0.096)		(0.097)		(0.098)		(0.103)	
2005–2008	−0.050		0.066		0.320	***	0.323	***	0.381	***
	(0.111)		(0.117)		(0.119)		(0.121)		(0.130)	
Ethnic minority										
No			0		0		0		0	
Yes			0.469	**	0.476		0.487	***	0.528	**
			(0.188)		(0.183)		(0.182)		(0.211)	
Missing			−0.406	***	−0.355	*	−0.350	*	−0.384	*
			(0.157)		(0.187)		(0.189)		(0.202)	
Educational level										
Low			0.262	***	0.384	***	0.384	***	0.386	***
			(0.087)		(0.087)		(0.087)		(0.100)	
Medium			0		0		0		0	
High			0.086		0.149		0.167		0.114	
			(0.111)		(0.104)		(0.108)		(0.121)	
Activity status										
Self-employed			0.115		0.077		0.072		0.108	
			(0.234)		(0.219)		(0.217)		(0.230)	
Full-time employed			0		0		0		0	
Part-time employed			0.694	***	0.602	***	0.603	***	0.631	***
			(0.116)		(0.111)		(0.111)		(0.119)	
Enrolled in education			−1.300	***	−1.129	***	−1.117	***	−1.096	***
			(0.201)		(0.203)		(0.203)		(0.205)	
Unemployed			0.820	***	0.902	***	0.902	***	0.953	***
			(0.145)		(0.149)		(0.149)		(0.155)	
Other			1.668	***	1.527	***	1.527	***	1.645	***
			(0.083)		(0.084)		(0.084)		(0.097)	
Activity missing			0.079		0.288		0.292		0.291	
			(0.385)		(0.408)		(0.402)		(0.418)	
Mover status										
Non-mover							0		0	
Mover							0.087		0.124	
							(0.091)		(0.100)	
Migrant							−0.038		−0.037	
							(0.114)		(0.124)	

Source: Calculations based on the BHPS data.
Notes: For linear splines we present slope estimates which show how the log-hazard increases or decreases over a certain duration.
* $p < .10$; ** $p < .05$; *** $p < .01$.

(Tables 7 and 8, Model 1). The estimated second-birth rate was smaller for women living in central London, but the sample size was not large enough to detect significant differences between the residential contexts. Next, we also controlled for the socio-economic characteristics of women, their mover status and unmeasured characteristics. The patterns did not change much. Therefore, while first-birth rates significantly differed by residential context, there were no such differences in second-birth rates. Interestingly, however, women who moved from one region to another had significantly higher second-birth rates than those who did not move, suggesting that selective migration was indeed in operation (Table 8, Model 4). Our further analysis of the timing of fertility relative to moving (i.e. allowing second-birth rates to vary by time since a move) supported that observation; fertility levels were relatively high during the first year after the move to a new region, suggesting that couples with childbearing intentions moved to places that are better suited to childrearing (results not shown). The general patterns did not change, however, because of the relatively small share of (selective) migrants.

Table 7
Relative risks of conception leading to second birth.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Place of residence					
London central city	0.80	0.88	0.96	0.97	0.94
London suburbs	0.96	0.96	1.02	1.02	1.02
Other cities and towns	1	1	1	1	1
Small towns and rural areas	0.99	1.00	0.99	0.98	0.98
Scotland	0.92	0.94	0.91	0.91	0.91

Source: Calculations based on the BHPS data.
Model 1: controlled for time since first birth and calendar time.
Model 2: additionally controlled for partnership status, ethnicity, educational level and activity status.
Model 3: additionally controlled for age at first birth.
Model 4: additionally controlled for mover status.
Model 5: additionally controlled for unobserved heterogeneity.
* $p < .10$; ** $p < .05$; *** $p < .01$.

Table 8
Log-risks of conception leading to second birth (parameter estimates and standard errors).

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Place of residence										
London central city	−0.222		−0.129		−0.039		−0.027		−0.066	
	(0.275)		(0.296)		(0.297)		(0.292)		(0.320)	
London suburbs	−0.038		−0.038		0.020		0.018		0.020	
	(0.143)		(0.146)		(0.144)		(0.144)		(0.162)	
Other cities and towns	0		0		0		0		0	
Small towns and rural areas	−0.013		−0.005		−0.007		−0.016		−0.019	
	(0.087)		(0.086)		(0.089)		(0.089)		(0.099)	
Scotland	−0.080		−0.066		−0.098		−0.099		−0.090	
	(0.144)		(0.143)		(0.143)		(0.145)		(0.159)	
Demographic variables										
Time since first birth (baseline)										
Constant	−3.168	***	−3.526	***	−3.355	***	−3.431	***	−3.763	***
	(0.253)		(0.286)		(0.298)		(0.304)		(0.330)	
0–1 year (slope)	2.075	***	2.155	***	2.140	***	2.140	***	2.217	***
	(0.283)		(0.290)		(0.291)		(0.292)		(0.295)	
1–3 years (slope)	−0.055		0.012		0.017		0.019		0.101	
	(0.073)		(0.074)		(0.074)		(0.075)		(0.078)	
3–5 years (slope)	−0.463	***	−0.409	***	−0.397	***	−0.394	***	−0.358	***
	(0.087)		(0.088)		(0.089)		(0.089)		(0.090)	
5–10 years (slope)	−0.260	***	−0.251	***	−0.255	***	−0.251	***	−0.250	***
	(0.055)		(0.057)		(0.058)		(0.058)		(0.058)	
10+ years (slope)	−0.341	***	−0.341	***	−0.347	***	−0.346	***	−0.358	***
	(0.092)		(0.093)		(0.093)		(0.093)		(0.093)	
Partnership status										
In union			0		0		0		0	
Out of union			−0.972	***	−1.094	***	−1.082	***	−1.214	***
			(0.116)		(0.118)		(0.119)		(0.127)	
Age at first birth										
−20 years					0.166		0.178		0.183	
					(0.136)		(0.137)		(0.151)	
20–24 years					0		0		0	
25–29 years					−0.047		−0.050		−0.039	
					(0.107)		(0.108)		(0.121)	
30+ years					−0.537	***	−0.529	***	−0.510	***
					(0.115)		(0.116)		(0.128)	
Socio-economic variables										
Period										
1991–1994	−0.075		−0.055		−0.080		−0.027		−0.017	
	(0.111)		(0.112)		(0.112)		(0.118)		(0.123)	
1995–1999	0		0		0		0		0	
2000–2004	−0.044		−0.029		−0.006		−0.020		−0.021	
	(0.102)		(0.103)		(0.103)		(0.104)		(0.110)	
2005–2008	−0.164		−0.139		−0.108		−0.137		−0.120	
	(0.120)		(0.121)		(0.122)		(0.123)		(0.131)	

Table 8 (*Continued*)

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Ethnic minority										
No			0		0		0		0	
Yes			0.076		−0.012		−0.026		−0.007	
			(0.201)		(0.201)		(0.200)		(0.223)	
Missing			0.021		−0.139		−0.145		−0.173	
			(0.275)		(0.278)		(0.270)		(0.305)	
Educational level										
Low			−0.099		−0.104		−0.098		−0.095	
			(0.098)		(0.100)		(0.101)		(0.112)	
Medium			0		0		0		0	
High			0.222	**	0.382	***	0.356	***	0.386	***
			(0.113)		(0.121)		(0.123)		(0.138)	
Activity status										
Self-employed			0.128		0.171		0.154		0.176	
			(0.231)		(0.235)		(0.233)		(0.249)	
Full-time employed			0		0		0		0	
Part-time employed			0.227	*	0.216	*	0.206	*	0.269	**
			(0.117)		(0.119)		(0.119)		(0.128)	
Enrolled in education			−0.168		−0.327		−0.330		−0.299	
			(0.372)		(0.380)		(0.380)		(0.392)	
Unemployed			0.720	***	0.578	***	0.563	***	0.673	***
			(0.180)		(0.182)		(0.184)		(0.200)	
Other			0.638	***	0.586	***	0.575	***	0.674	***
			(0.101)		(0.104)		(0.104)		(0.112)	
Activity missing			1.076	**	1.070	**	1.089	**	1.184	**
			(0.519)		(0.470)		(0.467)		(0.480)	
Mover status										
Non-mover							0		0	
Mover							0.078		0.073	
							(0.100)		(0.107)	
Migrant							0.216	*	0.230	*
							(0.116)		(0.127)	

Source: Calculations based on the BHPS data.
Notes: For linear splines we present slope estimates which show how the log-hazard increases or decreases over a certain duration.
* $p < .10$; ** $p < .05$; *** $p < .01$.

6.3. Third birth

The patterns for third births are also interesting. Women living in rural areas and small towns had a significantly higher risk of third birth than those in cities and towns (Tables 9 and 10, Model 1). Intriguingly, the estimated third-birth rate was also somewhat higher for women living in London (the central city and suburbs combined), but again the sample size was not large enough to detect significant differences. Next, we controlled for the socio-economic characteristics of women; the differences in the third-birth rates between residential contexts remained. We then also included in the analysis the woman's age at first birth. The differences between small

Table 9
Relative risks of conception leading to third birth.

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Place of residence										
London	1.13		1.07		1.42		1.51	*	1.55	*
Other cities and towns	1		1		1		1		1	
Small towns and rural areas	1.28	*	1.27	*	1.32	**	1.27	*	1.29	*
Scotland	1.14		1.21		1.20		1.15		1.14	

Source: Calculations based on the BHPS data.
Model 1: controlled for time since second birth and calendar time.
Model 2: additionally controlled for partnership status, ethnicity, educational level and activity status.
Model 3: additionally controlled for age at first birth.
Model 4: additionally controlled for mover status.
Model 5: additionally controlled for unobserved heterogeneity.
* $p < .10$; ** $p < .05$; *** $p < .01$.

Table 10
Log-risks of conception leading to third birth (parameter estimates and standard errors).

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Place of residence										
London	0.123		0.072		0.352		0.415	*	0.441	*
	(0.205)		(0.215)		(0.224)		(0.226)		(0.238)	
Other cities and towns	0		0		0		0		0	
Small towns and rural areas	0.248	*	0.239	*	0.280	**	0.242	*	0.251	*
	(0.129)		(0.130)		(0.131)		(0.133)		(0.140)	
Scotland	0.132		0.190		0.184		0.139		0.132	
	(0.211)		(0.213)		(0.215)		(0.217)		(0.230)	
Demographic variables										
Time since second birth (baseline)										
Constant	−3.805	***	−4.037	***	−3.839	***	−4.068	***	−4.368	***
	(0.379)		(0.430)		(0.441)		(0.450)		(0.466)	
0–1 year (slope)	1.258	***	1.304	***	1.342	***	1.358	***	1.403	***
	(0.423)		(0.439)		(0.439)		(0.442)		(0.444)	
1–3 years (slope)	0.018		0.063		0.085		0.099		0.143	
	(0.119)		(0.121)		(0.121)		(0.122)		(0.123)	
3–5 years (slope)	−0.391	***	−0.354	***	−0.344	***	−0.335	***	−0.311	***
	(0.112)		(0.114)		(0.114)		(0.115)		(0.116)	
5–10 years (slope)	−0.275	***	−0.265	***	−0.268	***	−0.261	***	−0.254	***
	(0.061)		(0.062)		(0.062)		(0.062)		(0.063)	
10+ years (slope)	−0.233	***	−0.237	***	−0.260	***	−0.258	***	−0.262	***
	(0.063)		(0.064)		(0.064)		(0.064)		(0.064)	
Partnership status										
In union			0		0		0		0	
Out of union			−0.287		−0.603	***	−0.598	***	−0.639	***
			(0.184)		(0.191)		(0.193)		(0.200)	
Age at first birth										
−20 years					0.770	***	0.769	***	0.827	***
					(0.152)		(0.153)		(0.166)	
20–24 years					0		0		0	
25–29 years					−0.516	***	−0.503	***	−0.513	***
					(0.155)		(0.154)		(0.162)	
30+ years					−1.005	***	−1.031	***	−1.092	***
					(0.229)		(0.228)		(0.237)	
Socio-economic variables										
Period										
1991–1994	0.140		0.088		0.003		0.115		0.157	
	(0.148)		(0.151)		(0.152)		(0.165)		(0.170)	
1995–1999	0		0		0		0		0	
2000–2004	−0.290	*	−0.266	*	−0.322	**	−0.382	**	−0.412	**
	(0.157)		(0.158)		(0.162)		(0.163)		(0.168)	
2005–2008	−0.167		−0.127		−0.155		−0.267		−0.301	
	(0.185)		(0.192)		(0.192)		(0.197)		(0.203)	
Ethnic minority										
No			0		0		0		0	
Yes			0.253		0.051		0.026		0.020	
			(0.270)		(0.271)		(0.269)		(0.288)	
Missing			0.057		0.064		0.151		0.129	
			(0.583)		(0.692)		(0.740)		(0.766)	
Educational level										
Low			0.029		−0.126		−0.065		−0.084	
			(0.152)		(0.151)		(0.152)		(0.161)	
Medium			0		0		0		0	
High			−0.278		0.002		−0.020		−0.017	
			(0.198)		(0.204)		(0.204)		(0.215)	
Activity status										
Self-employed			0.248		0.392		0.357		0.378	
			(0.268)		(0.266)		(0.265)		(0.271)	
Full-time employed			0		0		0		0	
Part-time employed			−0.313	*	−0.276		−0.287		−0.270	
			(0.187)		(0.187)		(0.187)		(0.193)	
Enrolled in education			−0.591		−0.646		−0.756		−0.794	
			(0.819)		(0.858)		(0.870)		(0.930)	
Unemployed			0.716	**	0.518	*	0.445		0.416	
			(0.293)		(0.296)		(0.298)		(0.308)	

Table 10 (*Continued*)

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Other			0.468	***	0.441	**	0.440	**	0.475	***
			(0.171)		(0.172)		(0.172)		(0.181)	
Activity missing			0.453		0.678		0.694		0.791	
			(0.565)		(0.580)		(0.579)		(0.587)	
Mover status										
Non-mover							0		0	
Mover							0.175		0.150	
							(0.147)		(0.154)	
Migrant							0.623	***	0.617	***
							(0.179)		(0.188)	
Standard deviation of residuals										
Fertility									0.510	***
									(0.070)	

Source: Calculations based on the BHPS data.
Notes: For linear splines we present slope estimates which show how the log-hazard increases or decreases over a certain duration.
* $p < .10$; ** $p < .05$; *** $p < .01$.

towns and rural areas and between cities and towns persisted; interestingly, the higher risk of a third birth in London became statistically significant.[3] Finally, we also included mover status in the model. Women who had changed their region of residence had a significantly higher risk of a third birth than did women who had not moved from one area to another, showing that selective migration was in operation for third births as well (Table 10, Model 4). However, the patterns did not change much because of the relatively small share of (selective) migrants. Further analysis of the timing of fertility relative to moving showed relatively high third-birth rates during the first year after the move, suggesting that couples moved in order to find a better living environment for their growing family (results not shown).

7. Summary and discussion

In this study, we examined fertility variation by residential context in Britain. We analysed fertility variation across regions of different size and within urban regions by distinguishing central cities and suburbs. This is the first study outside the Nordic countries to provide such a detailed analysis of fertility by residential context. Our analysis of vital statistics showed that the total fertility declined as the size of an urban area increased; within urban regions suburbs had significantly higher fertility levels than the city centres. The analysis of individual-level longitudinal data showed significant variation in first- and third-birth rates by residential context, but no variation in second-birth levels. First-birth levels were low in the capital city of London, whereas first- and third-birth rates were high in rural areas and small towns. Further analysis revealed that the socioeconomic characteristics of women explained some fertility variation by residential context. We also observed elevated fertility for couples moving from one area to another, suggesting that some couples with childbearing intentions moved to places that are better suited to childrearing. However, selective migrations did not explain any of the variation in spatial fertility as the share of internal migrants was small.

We observed significant fertility variation by residential context after controlling for compositional characteristics and selective migrations, suggesting that there were contextual effects. However, it can be argued that additional controls for compositional characteristics would have explained fertility variation by residential context further. First, we included in the models women's education and employment status, but failed to control for her partner's education and employment status. We are confident that the inclusion of partner's characteristics would have not changed the results much; recent research on Britain has shown no effect of partner's characteristics on spatial variation in first-birth risks (Fiori et al., 2012). Second, we did not include housing type and characteristics in the models; it could be argued that different housing structures explain observed fertility variation by residential context. We did include housing type (detached, semi-detached, terraced, apartment) and tenure (ownership, private rent, social rent) in our preliminary analysis – interestingly, their effect on spatial fertility variation was negligible. We decided to exclude housing characteristics from the further analysis, mostly because the direction of causality between housing and childbearing is far from clear (Kulu & Vikat, 2007) and a different study design and methodology is needed to investigate their relationships (Kulu & Steele, 2013). Some variables that explained fertility variation by residential context could have been excluded from the analysis. For example, we showed that the relatively large share of unmarried women in central London was responsible for low first-birth rates there; once we included partnership status in the models, the differences between the first-birth

[3] However, it should be noted that the estimated third-birth rates were sensitive to different specifications. When we included in the analysis only episodes within union (cohabitation or marriage) and demographic and socioeconomic controls the estimated third-birth rate was lower for women in London than for those in other urban areas. When we also controlled for age at first birth the estimated third-birth rate was higher for women in London but, unlike when out-of-union episodes were included, the differences were not significant. Some caution is thus needed when interpreting the results on third-birth rates by residential context, particularly the patterns in London.

rates in London and elsewhere decreased. However, the question arises as to why people were less likely to marry and have a child in some contexts (large cities) than in others (rural areas and small towns). The answer might lie in contextual factors.[4]

Why then were first-birth levels low in the capital city of London, whereas first- and third-birth rates were high in rural areas and small towns? We believe that economic factors play a major role (although cultural factors certainly also have some importance). Research suggests that most young people in industrialised countries have a family once they have established themselves in the labour market and can afford 'appropriate' housing for family. It is much more difficult to fulfil these prerequisites in a competitive and costly big city environment than in small towns and rural areas. Therefore, many young people may need to postpone family formation in the big city environment and some may eventually be unable to fulfil their desires because of lack of opportunity. Conversely, in smaller places it is much easier to start employment and thereafter family life because of less competitive labour markets and relatively easy access to appropriate family housing. Previous studies have shown that such differences exist between large cities and small towns and rural areas (Kulu & Steele, 2013). The lack of spatial variation in second birth rates suggest that, in what is still a two-child-norm society, satisfactory conditions for family formation are critical for young couples; once these are met then they will have a first and many also a second child.

The higher third-birth rates in rural areas and small towns are not surprising. Besides the increased direct and indirect costs of childrearing discussed in the first part of the paper, having a third child usually sets much higher requirements for housing. While three-bedroom houses are widespread in Britain and standard for a two child family, a family of three children usually needs a four-bedroom house; such housing is much less common in big cities and more expensive than standard three-bedroom houses. A four-bedroom house is affordable for many couples in smaller places; further it is possible to build an extension for a three-bedroom detached or semi-detached house in rural areas and small towns where gardens are large enough and space is not an issue. While we have mostly emphasised economic factors behind fertility differences by residential context it is clear that cultural factors may also play a role, although the identification of their relative importance remains beyond the scope of this study. We believe that desired family size is smaller in larger places than smaller settlements, possibly for cultural reasons (as we have emphasised in the first part of the paper); however, and most importantly, the gap between the desired and actual fertility is likely larger in cities than in small towns and rural areas because of higher direct and indirect costs of childbearing in larger places. This is an issue that needs to be explicitly studied and tested in future research.

[4] The same may be said about the age at first birth in the second- and third-birth models. Women in London have children later and this is related to lower fertility, but why do they have children later?

We acknowledge some issues related to the comparison of the results of the analysis of vital statistics and those of the BHPS individual-level data. First, immigrants were included in the calculation of the total fertility by residential context in 2011. Previous studies have shown high fertility levels for immigrants to European countries, mostly because of marriage migration or family re-unification (Milewski, 2007). Contemporary labour migrants, in turn, may have relatively low fertility levels. However, it is not clear how different migrant groups were spatially distributed in the UK and how this influenced fertility levels by residential context. The BHPS data included immigrants who were present at the first wave in 1991, but excluded those who arrived later. Therefore the parity-specific analysis was based on the UK-born population and pre-1991 immigrants. Second, the analysis of fertility by birth order was based on information from the period of 1991 to 2008, whereas information on the total fertility by residential context came from 2011; this was the only time-point at which we had reliable data about the female population in Britain. We considered the calculation of fertility trends by local authority districts over multiple years. However, our analysis showed that flow statistics under-estimated female population in large cities and over-estimated it in rural areas and small towns. Revised figures on female population by local authority district from 2001 to 2011 should become available in the future.

This study showed that fertility levels vary significantly by residential context in Britain. While fertility levels are low in large cities, they are high in small towns and rural areas. High fertility in remote rural areas would not be surprising even for a low-fertility country; however, given that almost one third of British population live in areas that were classified in this study as 'small towns and rural areas' the results of the study merit some attention. Critics may argue that high fertility currently observed in smaller places is a temporary phenomenon related to the end of fertility postponement. However, similar patterns have been found in Nordic countries for a longer period, which suggests the story is not that simple. Future research should investigate 'demographically sustainable' contexts in modern urban societies to find out how couples structure their family, employment and residential lives in those socio-spatial contexts and what (if anything) is needed to do to support relatively high fertility there.

Future research should simultaneously examine fertility patterns in large cities. If competitive labour markets and high housing costs are the main reasons for low fertility in London and other big cities in Britain it may be argued that little (if anything) can be achieved by government policies to make life in big cities more family friendly and raise fertility levels. Traditionally, one solution has been seen in the promotion of suburbanisation around big cities, which may also promote higher fertility levels due to social interaction of young families (Boyle et al., 2007; Fiori et al., 2012). However, this may not be environmentally sustainable in the long run unless commuting costs and the effects on the environment are significantly reduced by new transport technologies. Another idea to consider is the possibility of reducing opportunity costs for couples with children in competitive urban environments with high female labour market participation rates. Nordic countries provide a good example of how to support compatibility of employment and parenthood and this may also be one reason why fertility levels in the capital city regions in those countries are still 'reasonable high', although lower than in rural areas and small towns. With increasing levels of urbanisation in advanced and emerging economies and growing numbers of people in big city regions, the compatibility of parenthood and employment and access to housing become the critical issues which governments need to address to keep our urbanised societies demographically viable.

This study added further evidence on the need to go beyond national averages and examine fertility variation by residential context if we are to understand fertility dynamics and patterns in industrialised countries and their causes. Fertility levels vary significantly by residential context and compositional factors and selective migrations, usually seen as the main causes of spatial fertility variation, explain only a small part of this variation. Clearly, the importance of contextual influences on fertility found for Nordic countries also applies in the setting of a modern urban society with negligible remote rural populations.

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