Disentangling the quantum and tempo of immigrant fertility

This is an unpublished draft. All feedback will be gratefully received.

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Abstract

Migrant fertility has become an increasingly prominent explanation for recent fertility change. Immigrant Total Fertility Rates (TFRs) are consistently higher than native TFRs in the majority of European countries (Sobotka, 2008). However, research has cast doubt on the use of tempo-distorted measures of fertility for evaluating the contribution of immigrants to aggregate fertility (Toulemon, 2004, 2006). Furthermore, previous research has almost exclusively analysed incomplete or partially completed fertility profiles, an approach which provides minimal insight into the absolute impact of immigrant fertility.

Considering the UK, this research uses survey estimation and count regression techniques to disentangle tempo variation from the quantum of immigrant fertility. This approach is crucial for testing migrant fertility hypotheses because migration is known to influence the timing of childbearing (e.g. Andersson, 2004). The results support several hypotheses, with evidence of disruption followed by elevated fertility, particularly for recent cohorts of women arriving after age 25. This may be explained by selection, anticipation, or adaptation. Furthermore, the results show variation in the underlying fertility profiles of different immigrant groups by country of origin, and provide new insight into the links between quantum and tempo for immigrants to the UK. After exploring these results in detail, this paper discusses the benefits of this approach for understanding migrant fertility and informing population projections.

Introduction

An important question for demographers, particularly with regard to population projections, is the extent to which immigrant fertility will influence the aggregate fertility of nations, both now and in the future. Immigrant fertility is frequently proposed as a driver of recent changes in the fertility patterns of many European countries, especially by non-demographers (e.g. policymakers), who link recent increases in fertility with recent increases in immigration. Among demographers, it is well known that the proportion of total births to immigrant women has increased for the majority of countries in Europe (including the UK), but it remains uncertain whether this has made a material impact on aggregate (national) fertility levels (Sobotka, 2008).

Despite much research that aims to understand migrant fertility differentials (i.e. comparisons between immigrants and the native-born), and changes in immigrant fertility over time, the literature remains fragmented, and has several limitations (Forste and Tienda, 1996). In particular, there is an almost total absence of research on the completed fertility of migrants (exceptions include Mayer and Riphahn, 2000; Parrado and Morgan, 2008). This means that although there is some understanding of tempo variation between migrant and natives, it is unclear whether this variation persists across the childbearing schedule. Given that many existing hypotheses and explanations posit an effect of migration on childbearing (e.g. disruption), an evaluation of both quantum and tempo are required in order to establish whether this effect is temporary or permanent. This paper proposes such an evaluation, and demonstrates that the weaknesses in much previous research can be overcome by disentangling the quantum and tempo of migrant fertility.

Migrant definitions

Although many studies of migrant fertility have focused on internal migration, this research focuses on international migration (i.e. the fertility of immigrants). In accordance with most of the literature on immigrant fertility, migrants are defined using country of birth and year of arrival. These definitions are preferred over other measures, such as ethnicity and intention-to-stay, because they are time constant, and not subject to change as a result of migration or assimilation.

The UK context

The case for studying immigrant fertility in the UK has been made elsewhere (Dubuc, 2012; ONS, 2007; Robards, 2012; Wilson, 2013; Zumpe et al., 2012), and includes the ambition to meet the needs of governmental and non-governmental users of statistics within the UK, in particular those who wish to gain a greater understanding of the effects of immigration on

population composition (including fertility). Furthermore, the constituent countries of the UK (England, Wales, Scotland, and Northern Ireland) have a diverse immigrant population, which therefore allows a more thorough exploration of heterogeneity in the relationship between the quantum and tempo of immigrant fertility for different migrant groups.

Theories, hypotheses, and expectations

There are numerous theories and hypotheses that attempt to predict and explain the fertility behaviour of migrants (Coleman, 1994; Goldscheider and Uhlenberg, 1969; Goldstein and Goldstein, 1981; Hervitz, 1985; Kulu, 2005; Ritchey, 1975; Zarate and de Zarate, 1975). Despite a somewhat fragmented literature, where no one paper considers all of these hypotheses, and precise predictions are few and far between, a summary of these hypotheses is given in Table 1, alongside their inferred predictions for adult and child migrants (Forste and Tienda, 1996; Goldstein and Goldstein, 1983; Hervitz, 1985; Milewski, 2007; Sobotka, 2008).

Table 1: Hypotheses and predictions[1]

Hypothesis	Main prediction type	Prediction for adult migrants	Prediction for child migrants
Adaptation	Quantum	Fertility level (largely) converges with natives [Tempo effects uncertain - e.g. within 10 years?]	Fertility level converges with natives [No tempo prediction]
Socialisation	Quantum	Fertility level of country of origin is maintained [No tempo prediction]	Fertility level converges with natives [No tempo prediction]
Cultural entrenchment	Quantum	Fertility level of country of origin is (largely) maintained [No tempo prediction]	Depends on country of origin subculture in destination country [No tempo prediction]
Minority status	Quantum	Fertility levels could be higher than or lower than natives, depending upon the effect of minority status [No tempo prediction]	Fertility levels could be higher than or lower than natives, depending upon the effect of minority status [No tempo prediction]
Disruption	Tempo	Interruption of fertility due to migration, then (some) recovery [possibly to origin quantum levels?]	Limited or no effect on tempo [or quantum]
Elevated fertility	Tempo	Increase in fertility after migration [but quantum effect is unclear]	Limited or no effect on tempo [or quantum]
Anticipation	Tempo	Increase in fertility after migration [but suggests no quantum effect]	Limited or no effect on tempo [or quantum]
Inter-relation of events / family formation	Tempo	Other events, (e.g. partnership) are assumed to induce tempo effects (as per disruption and elevation) [but quantum effect is unclear]	Limited or no effect on tempo [or quantum]
Legitimacy	Tempo	Birth timing is driven by desire to obtain citizenship (for the parent) [but a quantum effect is unlikely]	Birth timing is driven by desire to obtain citizenship (for the parent) [but a quantum effect is unlikely]

1: Given that the precise predictions of migrant fertility hypotheses are rarely stated in previous research, the predictions in this table have been inferred based on the discussion of hypotheses in the extant literature.

As Table 1 illustrates, migrant fertility hypotheses can be divided into quantum hypotheses, which make almost no tempo predictions, and tempo hypotheses, which make almost no quantum predictions. Recent work using the same data source has focussed on the quantum hypotheses, and found some evidence of adaptation in the UK for women from Ireland and Jamaica, and of cultural entrenchment for South Asian migrants (Wilson, 2013). This research instead focuses on the tempo hypotheses, and considers both the tempo and quantum of migrant fertility.

The 'tempo hypotheses' focus on the behaviour of first generation adult migrants, and are concerned principally with the direct impact of a migration event on childbearing. On the other hand, the quantum hypotheses (socialisation, cultural entrenchment and adaptation) make predictions beyond first generation adults (e.g. second and third generations). This paper does not consider second or later generations, but a distinction is made between adult and child migrants through the consideration of age at migration (where child migrants are those who arrive in the UK aged under 16).

Having inferred the predictions in Table 1 from a review of the literature, it is clear that they can only be tested simultaneously with reference to both quantum and tempo. For example, it is difficult to identify disruption of fertility, as opposed to fertility decline, without reference to completed childbearing. This is therefore the approach taken here. Given the ambiguity of predictions for the minority status hypothesis, and the fact that the legitimacy hypothesis does not apply to the UK, both of these hypotheses are ignored here. Although not the focus of this paper, additional migrant fertility hypotheses are also considered, including: reverse causality, selection, and social characteristics (Forste and Tienda, 1996; Goldscheider and Uhlenberg, 1969; Sobotka, 2008; Toulemon, 2004, 2006), as well as the potential influence of 'global' demographic convergence on fertility (Billari and Wilson, 2001; Wilson, 2001).

Data and method

This research uses data from the first wave of Understanding Society (UKHLS). These data are representative of the UK population, and include around 60,000 adults who were surveyed in 2009/10. Approximately 10% of this sample is part of an ethnic minority boost, which means that first generation migrants are overrepresented. The sample is restricted to women aged 40 and above. Cases surveyed by proxy, 3% of all surveyed women over 40-years-old, are dropped from the analytical sample because of item non-response. Similarly, the analysis drops non-proxy cases with missing information on variables used in the analysis (fewer than 200 cases). This results in a sample size of slightly more than 14,000 women (who may be assumed to have completed their fertility), including 1,900 foreign-born women.

Estimation strategy

As in previous research, count regression models are used to estimate children ever born (Adsera et al., 2012). The results reported here use Poisson regression, although there were almost no differences when models were rerun using a negative binomial specification (to check for problems of over-dispersion). In addition, each regression uses survey estimation

techniques to account for the complex survey design of the UKHLS (strata, sampling units, and non-response).

Given the focus on birth timing, a model is estimated for the whole sample at a range of ages, from 20 to 40, using children ever born as the response variable. Crucially, the sample remains the same for each of the estimation models so that results can be compared across models to infer variations in quantum and tempo both within and between different groups. Initially, the variables of interest are birth cohort, age at migration, and country of birth, with other variables discussed toward the end of the results section.

Results and conclusions

As discussed in previous research for the UK using the same data (Wilson, 2013), there is a much smaller difference between UK-born and foreign-born women for completed family size (CFS) than there is for the total fertility rate (TFR). This is also shown in Table 2, which compares the CFS and TFR for women in England and Wales. As is commonly done elsewhere (e.g. ONS, 2011), the TFR for a given year is compared with the CFS for cohorts of women who were born 30 years earlier.

Table 2: Total fertility rate (for women aged 15-45) versus completed family size (for women aged 40 plus)

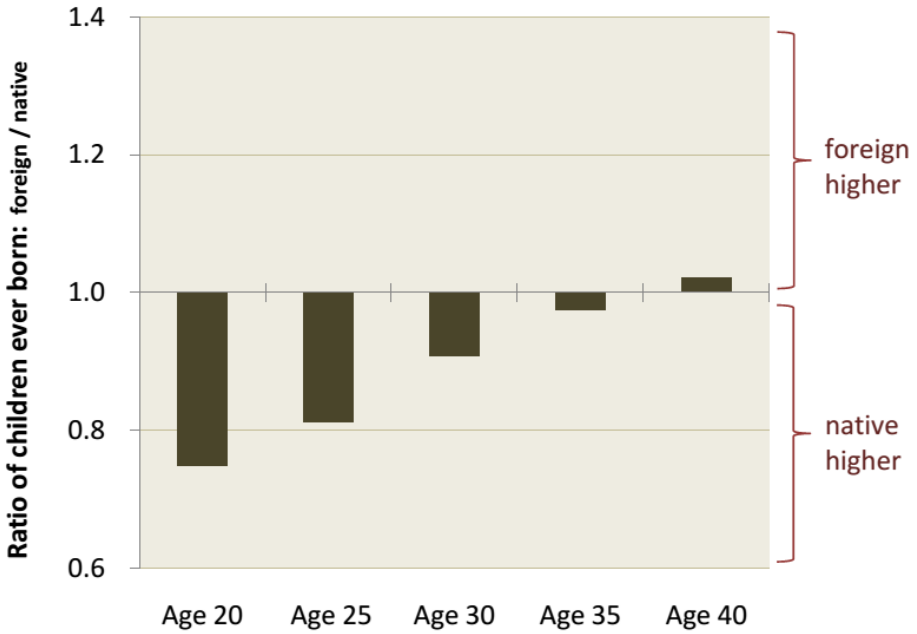
England & Wales		1981	1986[a]	1991	1996	2001	2006	2011
TFR	**UK-born**	1.7	1.7	1.8	1.7	1.6	1.8	1.9
	Foreign-born	2.5	2.5	2.4	2.5	2.2	2.4	2.3
Difference		0.8	0.8	0.6	0.8	0.6	0.6	0.4
CFS (+ 30 years)	**UK-born**	2.1	2.0	2.1	2.0	2.1		
	Foreign-born	2.0	2.4	2.1	2.1	2.3		
Difference		-0.1	0.4	0.0	0.1	0.2		

Note: Results for England and Wales (i.e. the UK excluding Scotland and Northern Ireland). Source: Office for National Statistics and UKHLS data (author's analysis)

Crucially, although foreign-born women have a TFR that is almost always more than half a child larger than UK-born women, the CFS difference is far small, and even equals zero for the 1991 comparison. This indicates the importance of using appropriate measures of fertility for migrant fertility research. Although far more timely than CFS, where we must wait for women to complete their childbearing before measures are available, the TFR is susceptible to tempo-distortion (Ní Bhrolcháin, 2011). Furthermore, it has been shown that TFR measures are overestimated for the foreign-born in France due to a mismatch between the numerator and denominator (i.e. exposure to risk excludes immigrant's childbearing

years prior to arrival) (Toulemon, 2004, 2006). Table 2 provides evidence for a similar phenomenon in the UK.

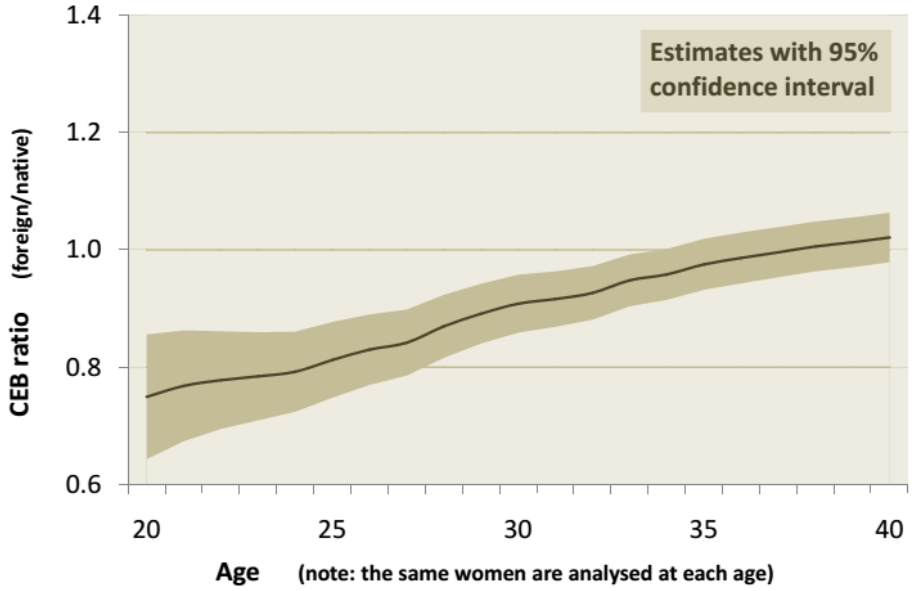
Figure 1: Ratio of children ever born to foreign-born women versus native (UK-born)



Note: Figure 1 reports the results from five separate Poisson regression models, although the analytical sample is the same for each model (women born between 1942 and 1971). The ratio of children ever born is obtained from the modelled IRR of foreign-born women relative to UK-born women. Source: UKHLS data (author's analysis)

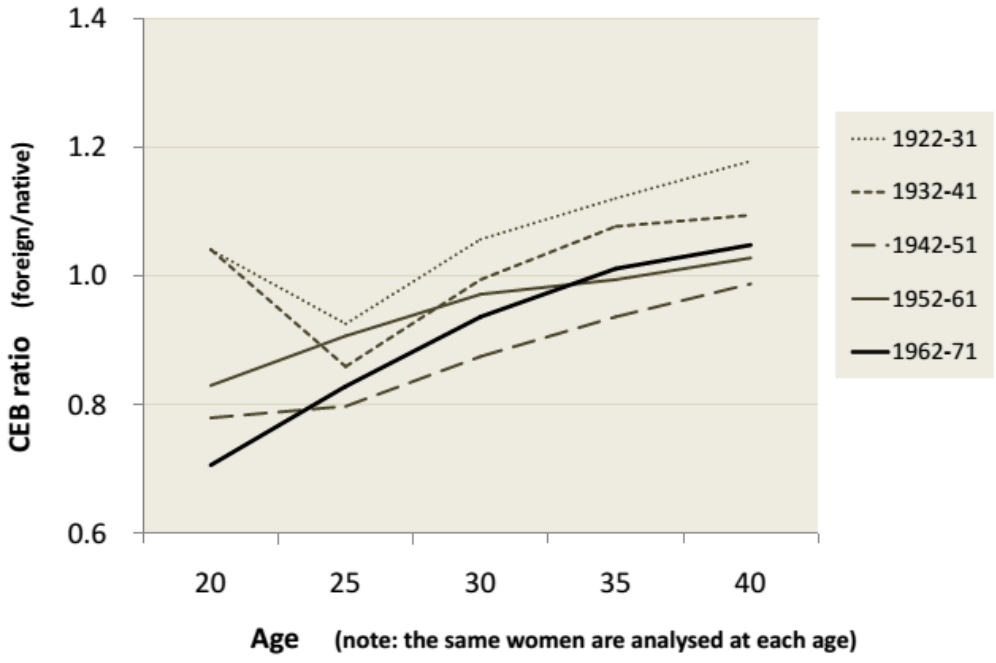
Figure 1 shows that when women in the sample are aged 20, foreign-born fertility is lower than that of the native-born, by a factor of 0.75. The same is true at age 25, 30 and 35, although the differential becomes smaller as age increases. Figure 2 shows the same ratio (at every age) including a 95% confidence interval. From this, it is clear that the differential is significant (at the 5% level) for all ages below 33. By age 40, foreign-born fertility has 'caught-up' with native fertility, overtaking it slightly, such that the risk of birth(s) for foreign-born women is marginally greater (by a factor of 1.02). This evidence of a temporary 'disruption' in fertility is more apparent for older migration ages, and provides support for the disruption hypothesis, although this evidence alone does not imply that any other hypotheses are unsupported. In order to investigate these results further, the analysis is repeated, but controlling for a number of additional covariates.

Figure 2: Ratio of children ever born (foreign vs native) with confidence intervals



Note: Results are obtained from a series of Poisson regression models, where the analytical sample is the same for each model (women born between 1942 and 1971). The ratio of children ever born is obtained from the modelled IRR of foreign-born women relative to UK-born women. Source: UKHLS data (author's analysis)

Figure 3: Ratio of children ever born (foreign vs native) by birth cohort



Note: Results are obtained from a series of Poisson regression models, where the analytical sample is the same for each model (women born between 1942 and 1971). The ratio of children ever born is obtained from the modelled IRR of foreign-born women relative to UK-born women. Source: UKHLS data (author's analysis)

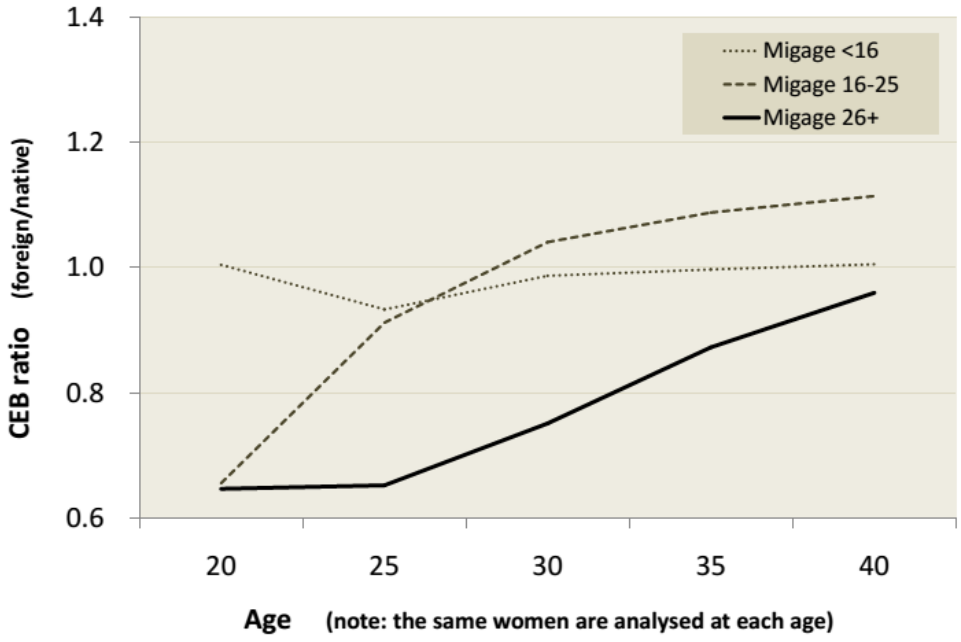
Birth cohorts

The results reported in Figure 3 show that the 'disruption' pattern obtained by an aggregate analysis is the similar for different birth cohorts. There is considerable variation in the ratio of completed fertility, such that migrants from older generations, compared with younger generations, have a higher birth risk ratio (relative to natives). However, the pattern is similar, with the only material exception being at age 20 for the generations born between 1922 and 1941. It should be noted that these women are excluded from the rest of the analysis.

Age at migration

As shown in Table 1, the predictions associated with the tempo hypotheses vary for child and adult migrants. For child migrants (i.e. those arriving in the UK when under 16-years-old), there is predicted to be no effects of migration on fertility, essentially because in the majority of cases migration occurs prior to childbearing (or at least the likelihood of having a birth under 16 is very low – for both migrants and natives). If this is true, there should be no variation in the difference between the birth risks of child migrants and natives. Of course, a difference might exist, for example if the cultural entrenchment hypothesis holds true (and child migrants have an entrenched propensity for higher levels of childbearing), but tempo variation is not expected.

Figure 4: Ratio of children ever born (foreign vs native) by birth cohort



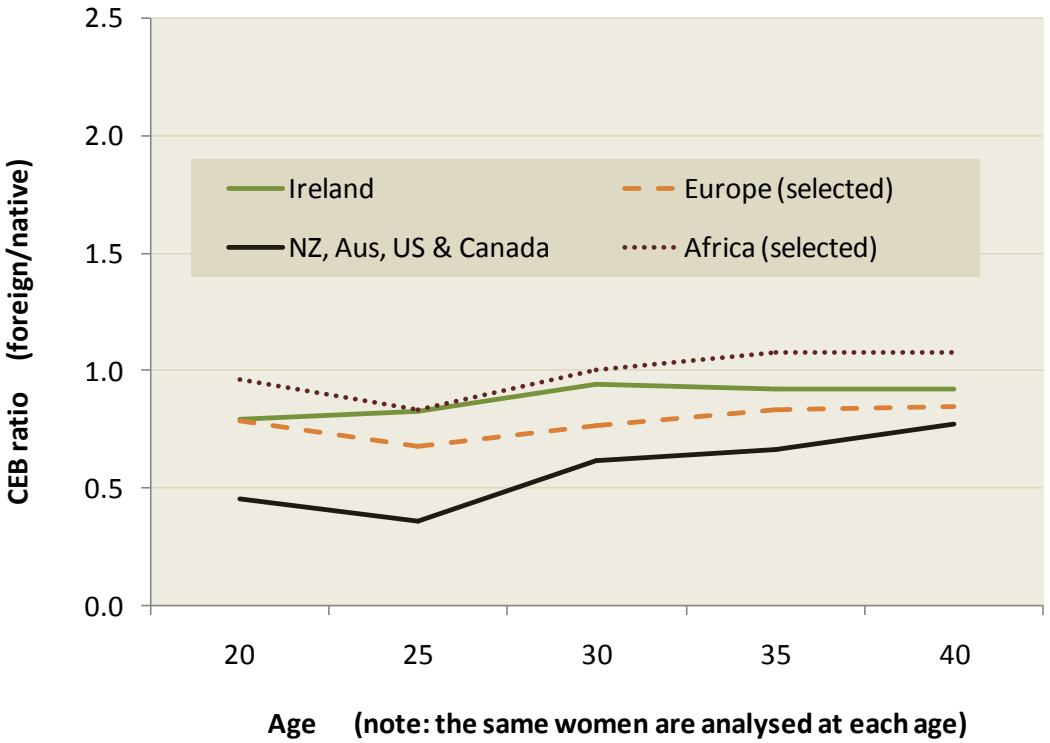
Note: Results are obtained from a series of Poisson regression models, where the analytical sample is the same for each model (women born between 1942 and 1971). The ratio of children ever born is obtained from the modelled IRR of foreign-born women relative to UK-born women. Source: UKHLS data (author's analysis)

Figure 4 shows the children-ever-born ratios for three age at migration groups. For child migrants, not only is there a lack of variation in the ratio by age (i.e. the line in the chart is horizontal), but there is also little difference in the birth risk for child migrants and natives (i.e. the ratio is close to or equal to 1.0). The results therefore accord with predictions for all the tempo hypotheses. Although this does not help distinguish between tempo hypotheses, it is a new finding for the UK, and suggests that child migrants who are resident in the UK have a very similar fertility profile to UK-born women (in aggregate). It also provides evidence in support of the adaptation and/or socialisation hypotheses.

For adult migrants, their relative fertility profile (compared with natives) varies according to age at migration (Figure 4). Foreign-born women who arrive in the UK when aged between 16 and 25 have a lower risk of birth(s) at age 20 than UK-born women (by a factor of 0.66). However, by age 25 (i.e. after they have migrated), this difference is materially reduced (to a factor of 0.91). This suggests a strong relationship between the timing of migration and childbirth. Although a different analysis would be required to consider whether births occurred just before, or just after migration, the more important consideration here is the link between quantum and tempo. Despite the lower relative risk for these adult migrants around the time of migration, by age 40 they have had more children than natives (on average by a factor of 1.11). Considered in totality, this relative fertility profile provides evidence of disruption in fertility (close to the migration event), as well as anticipation and/or elevated fertility (i.e. increased fertility after migration). It is also not possible to dismiss the remaining tempo hypothesis considered here: inter-relation of events (e.g. family formation). Although this is an unsatisfying result for the aim of discounting one or more hypotheses, it may be worth remembering that, in addition to being a new finding, this does not preclude a different result beyond the aggregate analysis shown here.

The third group shown in Figure 4 are adult migrants who arrive after age 26. With birth rates considerably lower than natives at age 20 and 25, this group exhibits a similar pattern of disrupted fertility prior to migration. Importantly, they also 'catch-up' with native fertility levels by age 40, implying a period of elevated fertility after migration. As with the results for adult migrants arriving between ages 16 and 25, it is not possible to isolate the precise order of events with this analysis, and the result does not provide evidence against any specific hypotheses. However, it does provide great insight into the links between quantum and tempo, which can be further investigated (see below). Alongside the other results by age at migration, it also demonstrates the potential tempo-distortion when analysing migrant fertility using samples of women including those who have yet to complete childbearing.

Figures 5a & 5b: Ratio of children ever born (foreign vs native) by country of birth



Note: Results are obtained from a series of Poisson regression models, where the analytical sample is the same for each model (women born between 1942 and 1971). The ratio of children ever born is obtained from the modelled IRR of foreign-born women relative to UK-born women. Source: UKHLS data (author's analysis)

Country of birth

It is well known that immigrant fertility in the UK shows considerable variation by country of birth. As such, Figures 5a and 5b show results from a series of models controlling for both age at migration and country of birth. The age at migration results in these models look very similar to Figure 4 (except risk ratios for child migrants are constrained to be equal to 1.0 at all ages in order to identify the models). Controlling for age at migration, several conclusions can be drawn:

(i) Some origins show very similar levels of completed fertility, but very different fertility profiles. For example, compared with Pakistani women, Bangladeshi women have very similar completed fertility (i.e. similar birth risks at age 40), but far higher birth risks at ages under 30. The same is true for India and Jamaica.

(ii) Some origins show very similar fertility profiles, but very different levels of completed fertility. For example, Jamaican and Bangladeshi women show patterns of early childbearing (relative both to natives and their own tempo at older ages). However, although the completed fertility of Jamaicans converges with natives, Bangladeshi women sustain a higher birth risk than natives across the entire fertility schedule.

(iii) Many of the fertility profiles are relatively stable (i.e. close to horizontal), suggesting for these origins that there is little variation in birth risk relative to natives after controlling for age at migration.

(iv) There is considerable variation amongst South Asian origins

(v) For the USA and 'Old Commonwealth' countries (New Zealand, Australia and Canada), birth risks are increasingly similar to natives, rising from less than half (at ages 20 and 25) to around three-quarters of the native level by age 40. Since migrants from these origins tend to have a higher social capital than an average native, this result may be driven by selection of migrants who are more likely to postpone childbearing.

Partnership

[Further analysis by partnership history is planned]

Discussion

This research has demonstrated a new approach for the analysis of immigrant fertility that takes into account both quantum and tempo variation. In addition to providing a more robust test of existing hypotheses, this approach shows that comparisons between immigrant and native fertility will differ depending upon the sample composition and measures of fertility used. For example, the analysis of samples of individuals who have yet to complete their childbearing, such as women aged 15-45, may highlight tempo variations that do not persist across the childbearing life-course. A lack of quantum variation may therefore be incorrectly inferred. Likewise, variations in tempo may by masked by an analysis of completed fertility.

For the UK, these results show that a higher foreign-born TFR almost certainly reflects tempo-distortion. Analysis by age at migration shows that immigrants have elevated fertility after arrival in the UK, which will mean that at older childbearing ages, migrant age specific fertility rates are higher than those for natives. Conversely, lower immigrant fertility prior to migration is not reflected in the TFR because immigrants are excluded from the population at risk. This finding echoes that shown for France (Toulemon, 2004, 2006).

With regard to migrant fertility hypotheses, this research shows strong evidence in support of disruption and elevated fertility. However, it also remains impossible to discount the hypotheses of anticipation, selection, reverse causality, or the inter-relation of events. For example, the pattern seen here, of disruption followed by elevation, may be explained by the fact that migration and family formation are inter-related, or by a selection into migration of women with a propensity to postpone their childbearing (relative to UK-born natives). In any event, this research presents further support and explanation for the adaptation hypothesis. In aggregate, child migrants in the UK show little difference from natives in either quantum or tempo. Since child migrants are further removed from a migration decision than adult migrants, this result accords with similar research (using the same data) that supports the adaption hypothesis, namely that migrant fertility converges with native fertility when comparing (in aggregate) between or across generations (Wilson, 2013). From the analysis by country of birth, it is also possible to see which origins are more (or less) likely to converge with the completed fertility of natives, alongside their fertility profile. This insight into the relationship between tempo and quantum provides a strong insight into tempo shifts across the childbearing life-course, and with additional assumptions offers insights into the adaptation of fertility behaviour.

The implications for population projections

The approach taken here provides several insights for population projections, particularly regarding the setting of assumptions regarding immigrant fertility. As discussed above, one implication is that any appraisal of TFR differences between foreign-born and native-born women may lead to incorrect inferences about quantum variation. For the UK, there is strong evidence that there is relatively little difference in completed fertility between immigrants and natives. Interestingly, the analysis by birth cohort suggests that the completed fertility of younger generations of migrants is more similar to natives than older generations. In addition, the evidence for disruption is slightly stronger for more recent cohorts.

It is clear that there is also considerable variation by country of birth. Compared with natives, some origins have very similar completed fertility, but very different fertility profiles – i.e. different tempo patterns. For other origins the opposite is true. An awareness of the precise nature of these patterns is a valuable insight for those setting population projection assumptions in the UK.

There are several aspects of this research that may be improved in further work. One issue is that an alternative research design would be required to further disentangle the tempo hypotheses. For example, it would be desirable to also have an appropriate sample of non-migrants from the origin country for each of the countries of birth, or at least for some of the largest origin countries (by share of the immigrant population). An additional problem is that this research only considers women who have completed their fertility, so caution must be taken in generalising the findings to future immigrants or those who have yet to complete. One related consideration is the fact that this research uses a sample of women who remain resident in the UK at ages 40 and above. A considerable number of UK immigrants will emigrate from the UK (e.g. return to their origin country) after arrival, and the proportion that do so is known to vary by country of origin (Rendall and Ball, 2004). The fertility of these immigrants, and any natives who have emigrated, is not included in this analysis. The same is true for individuals who have died, although it should be noted that most of the analysis excludes women born before 1942.

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