Educational Differences in Tempo and Quantum of Childbearing in Britain: A Study of Cohorts Born 1940-1969.

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1 Introduction

Overall levels of fertility in the UK are relatively high by European standards. While period fertility, as measured by the Total Fertility Rate (TFR), has fluctuated over the period 1947 to 2012, completed family size has been more stable, rising slightly for cohorts born in the 1930s, and declining slightly thereafter (Figure 1). Some of the fluctuations in period trends relate to changes in the tempo (timing) of childbearing, specifically an increase in the mean age at first birth and an increase in fertility rates at older ages. Increasing female education is often cited as a key explanation for the postponement of entry into motherhood to older ages (Blossfeld and Huinink 1991) and recent evidence from the UK suggests that increased enrolment in higher education in the late 1980s and 1990s is a key explanation of the (period) increase in mean age at first birth (Ni Bhrolchaín and Beaujouan 2012).

Educational attainment is generally assumed to exert a downward pressure on achieved fertility because it opens up opportunities for women beyond the maternal role (Kravdal 1992). Higher levels of attainment increase the economic opportunity costs of leaving the labour market to care for children (Becker 1981;Becker and Lewis 1973). At some point an income effect may outweigh this opportunity cost effect, especially as a result of educational homogamy – if women's income exceeds the cost of funding fulltime childcare, work and childbearing become more compatible, particularly if a woman's partner is also a high-earner. Increased educational attainment is also argued to reduce fertility through the positive impact of education on female emancipation and a desire for personal fulfilment (Lesthaeghe 1998;Van de Kaa 1987). Thus it may be the case that increased childlessness among more educated groups may be due to an increased desire to remain childless. However, in the UK only a small proportion of women intend to remain childless and so voluntary childlessness is only likely to be part of the explanation (Berrington 2004;Berrington and Pattaro 2013). Other important impediments to achieving desired fertility relate to partnership dynamics – postponement of entry into a co-residential partnership and partnership dissolution. The extent to which childlessness results from the over-postponement of first births is difficult to quantify but evidence from the UK suggests that childless women in their late thirties still have positive fertility intentions which may be difficult to achieve given the biological constraints on fecundability at older ages (Berrington and Pattaro 2011).

The impact of educational attainment on childbearing will differ according to the socio-economic context, for it depends on a variety of factors such as the employment rights of mothers, and the costs and availability of childcare (Kravdal 1992). Research based on Nordic countries has demonstrated that the educational gradient in cohort fertility differs among the four Nordic countries: Sweden, Finland, Norway and Denmark (despite the fact that the overall level of cohort fertility in these countries being similar). In particular, there are significant differences in the educational gradient of childlessness in these countries. In Norway and Denmark the highest levels of childlessness are among the most educated, but in Sweden and

Finland there is a U shape pattern, with childlessness higher among those with both high and low education (Andersson et al. 2009). In the UK, there have been large and persistent socio-economic differences in the likelihood of remaining childless (Kneale and Joshi 2008). Berrington and Pattaro (2013) found that for the 1958 cohort, despite only a tiny minority of women intending to remain childless, one quarter of those with a degree level qualification did so – far higher than the proportion of women with no qualifications (12%). One underlying explanation for this association may be an enduring incompatibility between the demands of a high-level career and family life for women in the UK. This could be in part due to constraints such as insufficient provision of affordable childcare, as well as persistent norms regarding gender roles that mean the mother is still regarded as a child's primary carer. Strong educational gradients in the proportions childless are also seen in Australia (Department of the Prime Minister and Cabinet, Canberra 2008) and the US (Biddlecom and Martin 2006) despite relatively high overall completed family sizes in these countries.

As well as cross-national differences in the impact of education on reproductive behaviour we might expect cohort changes within countries, for example as a result of changing social norms, structural changes, for example to the labour market, the availability and affordability of childcare and so on. Notable is the fact that in both Sweden and Finland there has been a cross-over in the proportions childless by education for recent cohorts as a result of a significant increase in childlessness among low educated (Andersson et al. 2009). In the Netherlands, levels of childlessness among those with higher education have historically been high and stable (van Agtmaal-Wobma and van Huis 2008). For example the same proportion (27%) of degree-educated women remained childless in the birth cohorts 1945-49 and 1965. In contrast the proportions childless among women with low education increased from 9.4% in the 1945-49 birth cohort to 15.7% in the 1965-59 cohort. It was thus the increase in childlessness among the lower educated women that has resulted in a dramatic increase in childlessness in the Netherlands (from 13.5% to 20.9%) (van Agtmaal-Wobma & van Huis 2008) .

It is recognised that the same overall aggregate level of cohort fertility can mask large differences in parity distributions (Frejka and Calot 2001;Sobotka 2012) For some Northern and Western European countries we have simultaneously seen relatively stable cohort fertility (or even increasing cohort fertility in Denmark) in the context of increasing childlessness. This is possible since increased childlessness can be compensated by more births among those who do have children. Similarly, there may be different cohort changes in educational gradients in childlessness and in parity progression which need to be understood separately if we are to interpret cohort changes in educational gradients in childbearing.

Specifically for the UK previous research has highlighted a number of key patterns which place the UK in a unique position among European countries – and perhaps the natural comparators are in fact other Anglo-Saxon countries (Rendall et al., 2010). Whilst postponement of entry into motherhood is a trend common to most developed societies, countries differ in the extent to which the delay has occurred, and the extent to

which this increase in the age at entry into parenthood has been educationally homogeneous. First, it has been observed that later first childbearing is more common in England and Wales than in Norway and France. Rendall et al 2005 note that "more than two-fifths of women born in England and Wales in the mid-to-late 1960s entered their 30s childless, compared with one-third of women in France and Norway." Furthermore, not only has fertility been postponed more in the UK than in other countries, this postponement has been concentrated in the most educated groups. As Rendall et al (2010) note "Unlike the educationally heterogeneous changes in age pattern at first birth seen under the Southern European and Anglo-American family-policy regimes, the changes across birth cohorts in the study's two 'universalistic' countries -Norway and France, have been educationally homogeneous." (Rendall et al. 2010).

We might assume that those women who begin childbearing later on will end up with fewer children – the tempo-quantum interaction put forward by Kohler et al. 2002. However, up until now there has been no UK research which has looked at relationships between age at entry into motherhood and completed family size. Furthermore, no prior research has looked at how the relationship between age at entry into motherhood and completed family size differs by educational attainment, and how such educational differentials may have changed over cohorts. One of the reasons for a lack of prior research in this area is the fact that educational level is not usually collected at the time of birth registration and sample surveys which collect retrospective fertility histories often do not have sufficient sample size in order to examine these trends disaggregated by cohort or educational level. Register data from Nordic countries have permitted the analysis of fertility conditional upon entry into motherhood and suggest significant recuperation of fertility. Furthermore, the late starters in the more recent cohorts end up with slightly more children than the late starters in the earlier cohorts – but only really seen in Norway and Sweden (Andersson, Ronsen, Knudsen, Lappegard, Neyer, Skrede, Teschner, & Vikat 2009)

Existing research for the UK by Rendall and colleagues is primarily based on the England and Wales Longitudinal Study – a census linked database which only contained very basic information on educational level. Nevertheless these papers described a strong social polarisation in age at entry into motherhood. Analyses of educational differences of subsequent childbearing (Rendall and Smallwood, 2003) showed that conditional upon age at entry into motherhood, those with higher education were more likely to progress to further births. This evidence pertains to the 1950-59 cohort and so new analyses are required in order to a) use more specific indicators of educational level and b) compare the experience of the 1950s birth cohort with women born earlier and later. This paper moves beyond existing research by demonstrating how a simple decomposition technique can be used to quantify the relative importance of childlessness, delay in entry into motherhood to later ages, and fertility rates conditional upon age at entry into motherhood in explaining overall differences in completed family size between the lowest and highest educated women. Comparing these indicators for three ten-year birth cohorts: 1940-49; 1950-59 and 1960-

69 provides new insight as to changes in the way in which increased education has affected the reproductive process in Britain.

Our overall aim is to examine the relative contribution of childlessness, delayed entry into motherhood and parity progression to educational differences in completed family size in Britain and whether these relationships have changed over time. The first three of our research questions build up our understanding using descriptive analyses, the fourth question relates to a decomposition analysis described in the following section.

RQ1: How have educational differences in childlessness and parity distributions among mothers changed over cohorts born 1940-1969?
RQ2: How have educational differentials in age at entry into motherhood changed for cohorts born 1940-1969?
RQ3: How does the relationship between age at entry into motherhood and completed family size differ by education? Has this relationship changed over cohorts born 1940-1969?
RQ4: What are the relative contributions of childlessness, age at first birth and fertility rates conditional upon age at first birth to explaining the educational gradient in completed family size?

2 Data and Methods

The analyses are based primarily on retrospective fertility histories collected in repeated rounds (1979-2009) of a nationally representative cross-sectional survey of adults in Britain – the General Household Survey (GHS)[1]. A team of researchers at the ESRC Centre for Population Change has combined these retrospective histories to provide a unique data source to study family change in Britain (Beaujouan et al. 2014). The histories include information on the fertility experiences of more than 600,000 men and women across periods, cohorts and at different ages. Ni Bhrolchain and colleagues (2011) demonstrate that the retrospective reports of fertility for women aged under 50 are consistent with estimates from national birth registration, although there is some evidence of under-reporting of past childbearing among women aged over 50 (Ni Bhrolchain et al. 2011). Therefore the work reported here only uses retrospective reports for women aged under 50 at the time of the survey. We assume that estimates of completed fertility based on women aged 40-49 are good approximations to ultimate fertility since very few British women have children after the age of 40. The following analyses are based on revised fertility histories where retrospectively reported births are augmented with additional information on children living within the household. The data are weighted to take account of survey design and non-response (Beaujouan et al. 2011). Our analyses are based on a total of 31,583 women from the GHS.

[1] Later renamed the General Lifestyle Survey.

A limitation of the GHS data is that the sample sizes for more recent cohorts are smaller than for older cohorts. This is because the fertility experience of younger cohorts of women is only captured in the most recent surveys among women who have recently reached aged 40, whereas the experience of older cohorts is represented in the retrospective reporting of repeated survey rounds. We therefore supplement the GHS data using the UK Household Longitudinal Study, Understanding Society, a panel study of around 30,000 households in the UK (Mcfall 2013). We use data from Wave 1 in 2009-10, at which point retrospective fertility histories were collected. We include 12,768 women aged 40-70 years at interview who completed a valid fertility history. The analyses are weighted using cross-sectional wave 1 weights, standardised to the sample size.

Before combining fertility histories from the two surveys we evaluated the consistency of key findings from the two data sources, for example, completed family size and the age pattern of childbearing, and found them to be comparable to each other. Furthermore, completed parity distributions and age patterns of childbearing within our sample closely match national data from vital registration (Office for National Statistics 2013a).

Our measure of education is based on highest educational qualification at the time of survey. We use four categories of education: 1. Less than Ordinary (O); Level 2. Ordinary level; 3. Advanced (A) level; 4. Degree or equivalent. O level qualifications are equivalent to a school leaving qualification taken at age 16 years. A level qualifications are taken at age 18 years and are generally required in order to progress to a tertiary (university) educational setting. Since educational attainment is measured at the time of interview, some qualifications will be gained in a second stage, subsequent to entry into motherhood. We address by taking women's reported age at leaving education into account when coding their educational attainment. Specifically, we seek to identify whether women with a degree or equivalent qualification are likely to have had a break in continuous education before attaining this higher qualification. We assume that this is the case if women report having a degree but left school or further education at the age of 18 or younger, or if they have a degree but report leaving education at the age of 28 or older. In both situations, we recode their highest qualification as A level to reflect their likely educational attainment at the time of exposure to the risk of childbearing.

The interpretation of changing educational differentials in fertility over time is made complex by the changing composition of the British population by education. As shown in Figure 2 the proportion of the female population with either no qualifications or who fail to achieve any Ordinary Level (O Level) qualifications at the end of compulsory schooling (generally at age 16), decreases from 63% among women born 1940-49, to just one fifth of women born 1960-69. At the same time, the proportion with a degree or other higher level qualification increases from 9% to 24%. Hence among earlier cohorts female graduates were a select group of women, whereas today they form a significant minority. When

interpreting our results, it is important to keep in mind these compositional changes in our sample across cohorts.

Research questions 1-3 are examined using descriptive statistics in Tables 1-3. In order to examine research question 4, i.e. to assess the relative contributions of childlessness, age at first birth and fertility rates conditional upon age at first birth in explaining educational differences in completed family size, we focus on a comparison of those with the highest and lowest levels of education.[2] Our aim is to explain the absolute difference in completed family size for women with degrees versus those with less than O level qualifications. This overall difference can be broken down into three components: 1. Differing levels of childlessness; 2. Timing of entry into motherhood (composition effect); 3. Fertility rates conditional upon age at first birth (rate effect). We employ a two-step approach, with the impact of childlessness being assessed in step one and the impact of delaying entry into parenthood and fertility rates conditional upon age at first birth assessed in step two.

Step 1: We utilise the fact that total completed family size (CFST) is equivalent to completed family size for mothers (CFSM) multiplied by the proportion of women who are mothers (Sobotka 2012). For each 10-year cohort, we calculate the completed family size that would exist if the degree-educated women experienced the levels of childlessness found among the least educated group. The difference between this hypothesised completed family size and that observed for degree-educated women can be viewed as the difference attributable to increased childlessness among the highly educated group. This is expressed as a proportion of the overall difference.

Step 2: We focus on differences in childbearing among women who have had at least one child. We use a standardisation and decomposition method introduced by Kitagawa over 50 years ago (Kitagawa 1955). This method can be used to decompose the difference between the completed family size for mothers (CFSM) in two sub-populations into two components. The first component reflects the distribution of women according to their age at entry into motherhood. The second component reflects fertility rates conditional upon age at first birth. In other words, we can break down the overall difference in completed family size for mothers into a composition effect (component one) and a rate effect (component two). The composition effect addresses the extent to which CFSM would change if the distribution of age at entry into motherhood changed but the fertility rates conditional upon age at first birth remained constant. The second component reflects the extent to which CFS_M changed if age-specific fertility rates changed but the distribution of women at entry into motherhood remained constant. Kitagawa proposed a symmetric solution using the average age composition to weight the age-specific completed family size component and the average age-specific family sizes to weight the composition component. This solution does not

[2] We are able to focus on just the two extreme categories given that there is a linear relationship between education and completed family size, as reported in the descriptive results in section 3.1.

favour one educational group over the other in terms of the weights of the two components (Schempf and Becker 2006). See equation (1):

(1)

$$CFSM_H - CFSM_L = \sum_i \left(\frac{\frac{N_{iL}}{N_{++L}} + \frac{N_{iH}}{N_{++H}}}{2} \right) (R_{iH} - R_{iL}) + \sum_i \left(\frac{R_{iL} + R_{iH}}{2} \right) \left(\frac{N_{iH}}{N_{++H}} - \frac{N_{iL}}{N_{++L}} \right)$$

Where i=age in five-year age groups and N_{iL} is the number of least-educated women in age group i and N_{iH} is the number of highly-educated women in age group i. R_{iL} and R_{iH} are the completed family size for low and high educated women who enter motherhood at in the *ith* age group.

We express the rate effect and composition effect as proportions of the overall difference in CFSM. We then apply these proportions to the remaining part of the overall difference in CFST that is not explained by differential childlessness. We repeat the analyses for different cohorts and present the findings in Table 4.

3 Results

3.1 RQ1: How have educational differences in completed family size, childlessness and parity distributions among mothers changed over cohorts 1940-1969?

Table 1 shows that mean completed family size has reduced slightly from 2.23 among women born in the 1940s (who were having their children at the height of the 1960s baby boom) to 1.99 among women born in the 1960s (Table 1). Within each birth cohort, completed family size is larger for those with lower levels of education. Completed family size has remained stable across the cohorts for those with the lowest levels of education but has fallen for those with higher levels. Thus, educational differences in completed family size have widened for more recent births cohorts. Among those born in the 1960s, completed family size was around 2.35 for those with no or below O level qualifications as compared to 1.68 for women with higher qualifications.

The parity distributions according to education within each birth cohort are also shown in Table 1. As expected, there is a persistent, positive educational gradient in childlessness. In all cohorts, the proportion

of women with degrees remaining childless is more than double that for those with less than O level qualifications (eg. 22.0% vs 10.2% in the 1960-69 cohort). The overall percentage remaining childless has increased significantly (from 10.4% of the 1940-49 cohort to 15.1% of women born in 1960-69). However, within each educational group, the increase in the percentage childless has across birth cohorts is less pronounced. For example, among female graduates the proportion remaining childless rose from 18.5% to 22.0%, and from 8.4% to 10.2% among those with the lowest levels of education. Thus to a large extent, increases in childlessness have been driven by the increasing number of women gaining higher level qualifications (Figure 2).

In all three cohorts, the proportions of women with one child are similar regardless of educational attainment. Likewise, there are only small differences by education in the proportion with two or with three children. However, for higher parities (4+ children), there is a clear and widening gap between the educational groups, with higher parities much more common among women with lower levels of education. In the 1960-69 cohort, 17.4% of women with the lowest level of education have four or more children, compared with only 4.9% of those with a degree level qualification. This suggests that the educational gradient in completed family size is in part driven by this difference at higher parities, in addition to the effect of differences in the prevalence of childlessness.

3.2 RQ2: How have educational differentials in age at entry into motherhood changed for cohorts born 1940-1969?

Table 2 shows how the age schedules of entry into motherhood have changed over cohorts, and whether the ASFR schedule has shifted more for some educational groups than for others. Overall, the median age at entry into parenthood among mothers increased by around 3 years in the 1960-69 cohort versus the 1940-49 cohort, from 23 years to 26 years.

For those with the lowest levels of education (i.e. no qualifications, or less than Ordinary Level (O level) qualifications) the median age at entry into motherhood for mothers has not changed significantly over cohorts, remaining stable at about 23 years. To some extent this may be due to this becoming an increasingly select group, as shown in figure 2. Among those with intermediate levels (A level) there is a small increase in the median of about one year, from 25 to 26.

The increase in the median age at motherhood is largest for women with degrees: from about 27 to 30 years. This change is despite this degree educated group becoming a larger proportion of the sample – although HE was still a minority transition in this cohort, with only one quarter of women reporting a degree-level qualification.

There has been almost no change in the age at which the first 10% of mothers had their first child. This is consistent with our existing knowledge about the persistence of an early entry into motherhood for certain subgroups (Rendall, Aracil, Bagavos, Couet, DeRose, DiGiulio, Lappegard, Robert-Bobee, Ronsen, Smallwood, & Verropoulou 2010). At the same time, the distribution of age at entry into motherhood at higher ages has shifted even later, with the 75th centile of age at first birth rising for all educational groups. This increase in what we might call "latest late" fertility is greatest among those with degree level qualifications among whom the 75th percentile increased from 30 to 33 years. Within the degree educated group the spread of ages at which women are entering motherhood has spread. In contrast, those in the two lowest educational groups have only seen a one year shift in this distribution of oldest entry into motherhood. This demonstrates that the social polarisation in age at first birth as reported for earlier cohorts (Rendall and Smallwood 2003) has continued to widen for women born in the 1960s.

3.3 RQ 3: How does the relationship between age at entry into motherhood and completed family size differ by education? Has this relationship changed over cohorts 1940-1969?

Table 3 shows completed family size among mothers according to cohort, education and age at first birth. The overall mean completed family size falls dramatically as age at first birth increases. For example in the 1960-69 cohort women who have their first child before the age of 20 years have a mean completed family size of 3.1, compared with 1.5 for women who have their first birth at age 35-39 years. This gradient has remained remarkably stable over the three successive birth cohorts, with only a very small increase in completed fertility for women entering motherhood at later ages seen between the 1940-49 and 1950-59 cohort (see the 'Total' column of Table 3).

Within each educational group we see this negative relationship between age at first birth and completed family size.[3] However, this gradient is less steep for those with higher levels of education, as compared with lower levels of education. In other words, degree educated women who start their childbearing in their late twenties and early thirties tend to have a larger completed family size as compared to low educated women who enter motherhood at later ages. For example, among women born in the 1960s who have their first birth aged 30-34, average completed family size is 2.1 for those with degrees, as compared with 1.8 for those with less than 'O level' qualifications. This is what we would expect given selection mechanisms and the postponement of childbearing among more educated women (Berrington & Pattaro 2013;Rendall, Aracil, Bagavos, Couet, DeRose, DiGiulio, Lappegard, Robert-Bobee, Ronsen, Smallwood, &

[3] For certain subgroups our interpretation is restricted by small sample sizes – notably, for women with a degree who become mothers before the age of 20 years and for women in all educational groups who have their first birth at age 35-39.

Verropoulou 2010). What is perhaps more unexpected is the way in which these educational differences have remained relatively stable over the cohorts born over a 30 year period. There is only a slight increase in completed family size for women with degrees who have their first birth in their thirties (for example from 1.5 to 1.6 for those entering motherhood at age 35-39). Nevertheless, despite this relative stability, for mothers with degree level qualifications there is an overall decline in completed family size from 2.3 in the 1940-49 cohort to 2.1 in the 1960-69 cohort. This suggests a changing distribution of age at first birth in this group, with a higher proportion postponing to later ages when completed family sizes are smaller. This reflects the findings from Table 2 showing that postponement to "latest late" fertility is greatest among those with degree level qualifications.

3.4 RQ4: What are the relative contributions of childlessness, age at first birth and fertility rates conditional upon age at first birth to explaining the educational gradient in completed family size?

The findings from the decomposition analysis for each birth cohort of women are shown in Table 4. The results indicate that childlessness makes a substantial contribution to the difference in completed family size between those with the lowest and highest levels of education. In the first two cohorts childlessness explains almost half of the difference in total completed fertility (CFST) between the educational groups. However, in the 1960-69 cohort, this falls to 40%, reflecting the fact that the educational difference in the completed family size of mothers (CFSM) has widened in this most recent cohort.

Overall, the composition effect largely predominates over the rate effect to explain educational differences in completed fertility – in other words, the difference in the composition of age at first birth is much more important than the age specific fertility rates in contributing to the educational fertility differences. The contribution of the composition effect varies between 59% (in the 1940-49 cohort) and 69% (in the 1950-59 cohort). In contrast, the contribution of the age-specific rate is negative in the first two cohorts, with a particularly strong effect in the middle cohort (1950-59) of -18%. This reflects that, given age at first birth, women with higher educational attainment actually have a *higher* completed family size than those with the lowest levels of education, particularly for older ages at first birth. This can be seen in Table 3 (discussed earlier), where, for example, among women in the 1950-59 cohort who enter motherhood at age 30-34, completed family size is just 1.8 for women with less than O level qualifications, compared with 2.1 for women with degree level qualifications. In the most recent cohort, the rate effect becomes positive but with a relative contribution of only 1%.

Since a small number of estimates of completed family size by educational attainment and age at first birth were based on small sample sizes, we undertake a sensitivity analysis. For those sub-groups with a sample size of <100 we recalculate the decomposition by taking the lowest and highest limits of the confidence

interval as test values. The contribution of childlessness shows minimal variation. However, the contribution of rates and structure varies by up to -+10 percentage points. Nevertheless, the essential pattern of contributions remains, with the composition effect making the strongest contribution and the rate effect having a negative or negligible positive contribution.

4 Summary and discussion

In this paper, we have provided evidence for ongoing social polarisation in both the timing and quantum of fertility among women in the UK according to their educational attainment. We have shown that a rise in the median age at first birth has been most pronounced among highly educated women, increasing by more than two years from 27.3 to 29.6 years between the 1940-49 and 1960-69 birth cohorts. In contrast, the median age remained stable for those with less than O level qualifications, at around 23 years. Thus, we have found continued social polarisation in the timing of entry into motherhood across educational groups in the cohorts born in the 1960s. Our findings have further demonstrated a shift towards 'latest late' entry into motherhood that is concentrated among women with higher education – the 75th centile of age at first birth has increased from 30.1 to 33.0 in the degree educated group. It is possible that we are observing an additional social polarisation of timing of entry into motherhood *within* the group of degree educated mothers.

Women with degree-level qualifications have a smaller completed family size than those with low-level or no qualifications and this disparity has widened in more recent cohorts. This paper has identified the key reasons for these patterns and their relative importance.

Firstly, completed family size is smaller for more educated women in Britain because a higher proportion of degree educated women remain childless. Although childlessness has increased for all educational groups, among the 1960-69 cohort twice as many degree educated women remained childless as compared with those with less than O level qualifications.

Secondly, degree educated women who enter motherhood tend to have fewer children than less educated women. This gap has increased very slightly between the 1940-1969 cohorts due to a small decline in average completed family size for degree educated mothers (from 2.3 to 2.1 children per woman). However, compared to the large educational gradient in overall completed family size for all women, completed family size for mothers is more similar according to education, and differences in family size for mothers has remained remarkably consistent across birth cohorts. To a large extent the smaller average family size among degree educated mothers is associated with their later age at starting a family. There is a sharp decline in achieved fertility associated with older ages at entry into motherhood: Mean completed

family size for those who become teenage mothers (around 3 births) is twice as high as that for women who enter motherhood in their late thirties (around 1.5 births). We have demonstrated that this pattern has remained virtually unchanged across the cohorts 1940 to 1969.

Conditional upon age at first birth, completed family size for mothers is similar across cohorts and educational groups: at most ages of entry into motherhood, degree educated women will have similar or slightly higher completed family sizes. (The only exception to this finding is the particularly high completed family sizes of the least educated women who enter motherhood in their teens.) We conclude, therefore, that the smaller completed family sizes of degree educated mothers is associated with their older age composition at entry into motherhood. Furthermore, the slight decline in completed family size among degree educated mothers (from 2.3 to 2.1 births per women) across the three cohorts must be due to the further postponement to very late ages at entry to motherhood among this group.

This paper has demonstrated how a simple decomposition analysis can be used to quantify the relative contributions of childlessness, the distribution of age at first birth, and fertility rates conditional upon age at first birth to explaining educational differences in completed family size. The contribution of educational differences in childlessness remains strong, although its relative contribution to the educational gradient in overall fertility fell slightly in the 1960-69 cohort as compared to those born in the 1940s and 1950s. However it is the composition effect (i.e. educational differences in age at first birth) that is the main driver of the educational gradient in completed family size. In contrast, the rate effect (fertility rates conditional upon age at first birth) has a minimal impact. In future work this decomposition technique can be applied to better understand cross-national differences in educational gradients in cohort fertility.

In comparison with other countries with similar levels of completed family size, educational differences in childlessness and parity progression in the UK are large and stable. The educational gradient in childlessness is much higher than in Denmark and there is no evidence of a reversal of the educational gradient in childlessness that has been documented in Sweden and Finland, or a narrowing in the case of the Netherlands (Andersson, Ronsen, Knudsen, Lappegard, Neyer, Skrede, Teschner, & Vikat 2009;Persson 2010;van Agtmaal-Wobma & van Huis 2008)

In fact, despite the changing socio-economic context and changing distribution of the population in terms of educational experience, the educational gradient in childlessness is remarkably constant. Furthermore, conditional upon age at entry into motherhood, the educational gradient in completed family size has also remained remarkably constant. The main development over these three ten year cohorts is in the increased difference in the age pattern of entry into motherhood. The average age at entry into motherhood has increased faster for degree educated women, than for other educational groups – i.e. there has been further social polarisation in the timing of fertility. But in addition to this we may be seeing further differentiation

among the degree educated group with a sub-set of highly educated women delaying entry into motherhood until their late thirties and early forties.

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6 Tables and Figures

Table 1: Educational gradient in parity distribution and completed family size (all women). Britain, 1940-49, 1950-59 and 1960-69 cohorts.

Cohort	Parity	< O level	O level	A level	Degree	Total
1940-49	0	8.4	10.9	13.4	18.5	10.4
	1	12.7	12.6	12.8	12.3	12.7
	2	39.7	48.0	42.3	42.7	41.5
	3	22.7	20.5	21.5	19.2	21.9
	4+	16.5	8.1	10.0	7.3	13.6
	Mean completed family size	2.36	2.06	2.06	1.86	2.23
1950-59	0	10.0	13.7	16.0	20.6	14.0
	1	14.4	15.3	15.1	13.4	14.6
	2	39.5	42.5	42.1	42.1	41.2
	3	21.3	19.3	18.0	18.2	19.6
	4+	14.8	9.2	8.7	5.7	10.7
	Mean completed family size	2.26	1.99	1.91	1.77	2.04
1960-69	0	10.2	12.4	15.7	22.0	15.1
	1	14.4	15.9	16.6	16.9	16.0
	2	35.9	39.6	40.5	39.4	39.1
	3	22.1	22.0	18.4	16.8	19.8
	4+	17.4	10.1	8.9	4.9	10.0
	Mean completed family size	2.35	2.07	1.92	1.68	1.99

Table 2: Weighted percentile ages at first birth among those women who ever had a child, by cohort and educational attainment.

		Age by level of education				
Cohort	Percentile	< O level	O level	A level	Degree	Total
1940-49	10	18.8	19.8	19.8	22.7	19.1
	25	20.3	21.6	21.9	24.9	20.9
	40	21.7	23.0	23.4	26.3	22.3
	50	22.5	24.2	24.6	27.3	23.3
	60	23.4	25.3	25.7	28.1	24.4
	75	25.3	27.2	27.5	30.1	26.4
	90	28.5	30.7	31.0	32.8	29.9
1950-59	10	18.1	18.9	19.3	23.8	18.8
	25	19.8	21.2	21.8	26.1	21.0
	40	21.3	23.2	23.8	27.7	23.2
	50	22.4	24.4	25.0	28.8	24.6
	60	23.7	25.8	26.3	29.8	26.0
	75	26.1	28.1	28.8	31.8	28.4
	90	30.0	32.0	32.9	35.2	32.3
1960-69	10	18.2	19.1	19.8	23.3	19.3
	25	19.9	21.4	22.7	26.3	22.0
	40	21.7	23.5	24.8	28.3	24.3
	50	22.8	24.6	26.2	29.6	25.8
	60	24.1	26.0	27.3	30.7	27.3
	75	26.8	28.4	29.6	33.0	29.9
	90	30.8	32.5	33.4	36.7	33.8

Table 3: Mean number of children among mothers aged 40-49 (GHS) or 40-70 (USoc) by age at first birth, education and cohort.

Cohort	Age at first birth	< O level		O level		A level		Degree		Total	
		Mean	n	Mean	n	Mean	n	Mean	n	Mean	n
1940-49	<20	3.3	2,150	3.0	278	2.9	217	2.6	33	3.2	2,678
	20-24	2.6	5,343	2.4	1,165	2.5	928	2.6	351	2.6	7,787
	25-29	2.1	2,241	2.1	799	2.2	723	2.3	746	2.2	4,509
	30-34	1.7	601	1.7	264	2.0	222	2.0	331	1.8	1,418
	35-39	1.3	161	1.5	58	1.6	72	1.5	70	1.4	361
	All ages	2.6	10,496	2.3	2,564	2.4	2,162	2.3	1,531	2.5	16,753
1950-59	<20	3.0	1,388	2.9	468	2.8	378	2.6	40	3.0	2,274
	20-24	2.6	2,080	2.5	997	2.5	968	2.7	320	2.5	4,365
	25-29	2.2	1,163	2.1	824	2.2	848	2.4	920	2.2	3,755
	30-34	1.8	440	1.8	359	1.9	435	2.1	628	1.9	1,862
	35-39	1.4	120	1.5	124	1.5	143	1.6	218	1.5	605
	All ages	2.5	5,191	2.3	2,772	2.3	2,772	2.2	2,126	2.4	12,861
1960-69	<20	3.3	466	3.0	391	3.0	230	2.9	54	3.1	1,141
	20-24	2.7	699	2.6	870	2.5	634	2.6	256	2.6	2,459
	25-29	2.2	405	2.2	736	2.2	781	2.3	688	2.2	2,610
	30-34	1.8	186	1.8	375	1.9	372	2.1	594	1.9	1,527
	35-39	1.4	64	1.4	119	1.5	146	1.6	268	1.5	597
	All ages	2.6	1,820	2.4	2,491	2.3	2,163	2.1	1,860	2.3	8,334

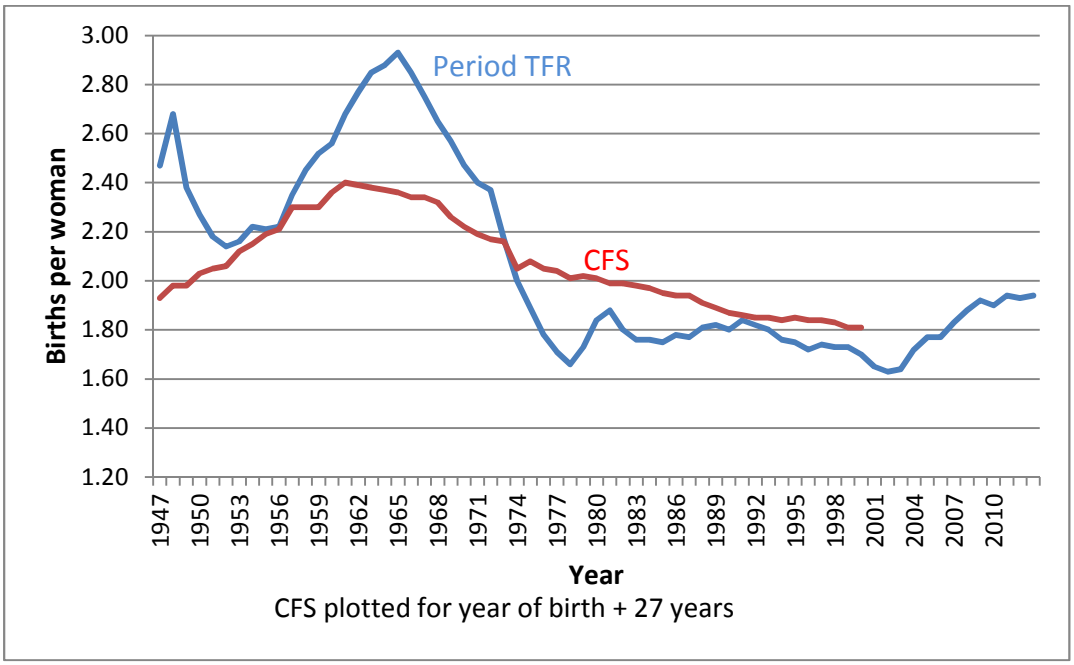
Table 4: Childlessness and completed family size by educational attainment and relative contributions of childlessness, rate effect and composition effect to educational differences in completed family size, by cohort.

Cohort	% Childless		CFSM		CFST		Contribution to educational differences in CFST (%)		
	<O Level	*Degree*	*<O Level*	*Degree*	*<O Level*	*Degree*	*Childlessness*	*Rate*	*Composition*
1940-49	8.4	18.5	2.58	2.28	2.36	1.86	45.9 (44.6;47.3)	-4.6 (-4.6;-14.2)	58.7 (50.9;66.9)
1950-59	10.0	20.6	2.51	2.23	2.26	1.77	48.8 (48.2;49.3)	-17.7 (-9.0;-26.5)	68.9 (60.8;77.2)
1960-69	10.2	22.0	2.62	2.15	2.35	1.68	37.6 (37.0;38.1)	1.4 (7.4;-4.8)	61.1 (55.5;66.7)

Notes: *CFSM=Completed family size for mothers; CFST=Completed family size for all women*

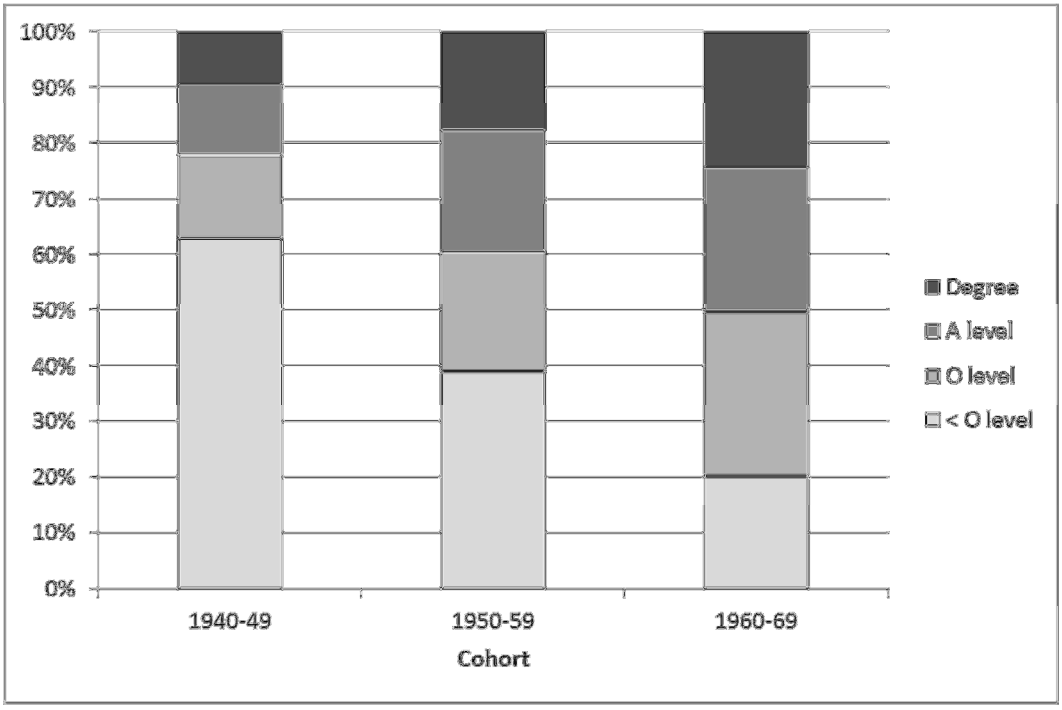
Values in parentheses indicate lower and upper estimate based on high and low limits of 95% confidence interval for age-specific CFST for samples where n<100

Figure 1: Trend in period fertility (Total Fertility Rate 1947-2012) and cohort fertility (Completed Family Size, birth cohorts 1920-73). England and Wales.



Source: (Office for National Statistics 2013a;Office for National Statistics 2013b)

Figure 2: Distribution of educational attainment among women aged 40-70 years by cohort.



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