

Differential responses in first birth behaviour to economic recession in the United Kingdom

Mark Lyons-Amos and Ingrid Schoon, Institute of Education

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Abstract

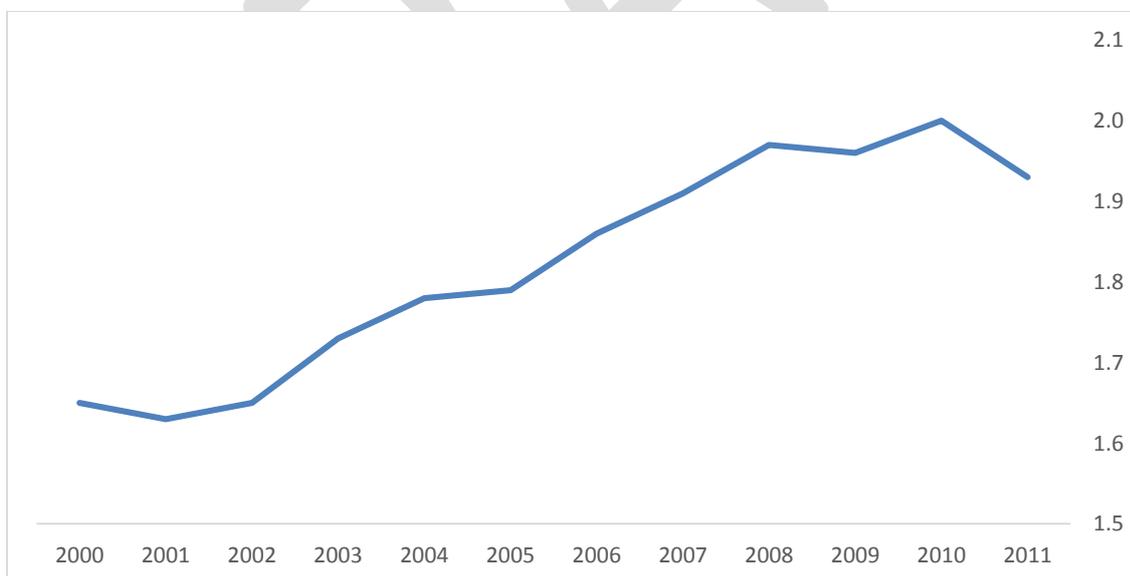
Economic conditions have historically had dramatic influences on fertility behaviour. Whilst aggregate fertility rates in the United Kingdom since the 2008 Great Recession have belied economic growth rates, there has been little analysis of variation according to individual characteristics. This paper therefore evaluates the effect of the recession on first birth rates allowing the effect of the recession on fertility vary by individual level characteristics, allowing us to observe variation in responses. We model the cumulative transition probability of first birth age 17-30 for three birth cohorts. The effect of the recession is captured using local unemployment rates and individual unemployment status, and a pre-/post- comparison. The overall effect of the recession is disaggregated by social strata. Relatively advantaged groups are able to withstand external economic influences, while women in disadvantaged positions are most likely to not only experience early fertility but are most likely to change their fertility.

Introduction

The Great Recession had a dramatic impact on a variety of economic and social processes. In turn these had a dramatic influence on demographic behaviour, including fertility rates. There was a distinct downturn in fertility in the 2008 and after period (post-crash), a trend which is mirrored in relatively high fertility countries as well as those with historically low fertility rates (e.g. Spain and Italy). The effect of economic slumps is well established in historical European fertility series- for example the slump in UK fertility during the Great depression (Hinde 2003)- and during the economic trauma experienced by Eastern European countries following the fall of Socialism. Increasing economic uncertainty was broadly associated with falls in period fertility rates, which was replicated across a number of settings where fertility was already at exceptionally low levels (Witte and Wagner 1995, Perelli 2003, Perelli-Harris 2006, Bernardi et al. 2007).

That said, it is debatable whether similar falls in fertility are applicable to the United Kingdom following the 2008 Great recession, which was experiencing an upsurge in fertility prior to the 2008 crash. The United Kingdom in contrast to much of Europe exhibited remarkably little demographic response to the economic downturn. Figure 1 presents the Total Fertility Rate for the United Kingdom since 2000, which increases from just above 1.6 to nearly replacement level in 2010, unabated by the 2008 crash.

Figure 1: United Kingdom period Total Fertility rate since 2000



Source: Office for National Statistics

Within this aggregate trend, a number of shifts in UK fertility are changing the composition of childbearing. Similar to many other European countries, the United Kingdom has been experiencing falling fertility rates among younger women, with the increases in fertility seen being primarily driven by increasing birth among older women <REF-ONS>. UK fertility is also increasingly dichotomised, with fertility among younger women being concentrated among those not involved in

higher education (Ni Bhrolchain and Beaujaean 2012). Similar dichotomisation of fertility (and partnership) behaviour between relatively advantaged and disadvantaged groups has been observed in other settings (McLanahan). That said the extent to which education is a predictor of demographic behaviour varies strongly between country contexts (Perelli-Harris and Lyons-Amos 2014) and it is likely that this effect is strongest in the United States.

First birth patterns tend to be most strongly affected by external influences. Education is a key predictor (Ni Bhrolchain and Beaujaean), and (critically in the context of recession employment) household wealth and household income are also closely related to the incidence of first births (Kravdal 1994). That said, much of these effects tend to be on the timing of fertility, with the effect on cohort fertility levels being much more mixed (Kravdal 1994, Sobotka 2004). The primacy of the effect of recessions is also demonstrated by Witte and Wagner, who find the most drastic falls in both fertility behaviour and the probability of considering a birth within the near future exhibited among nulliparous German women (compared to higher order parities, while Goldstein et al. find that first birth rates tend to decline most dramatically in response to unemployment rates in a variety of European settings. Further evidence is provided by Goldstein et al. who find the strongest effect of unemployment tends to be on first birth rates, with an attenuated effect for higher order births.

The effect of female education plays a key role in not only determining initial fertility behaviour but also responses to economic shocks. Education is a strong predictor of fertility timing, with a large proportion of the postponement of fertility in the United Kingdom explained by increasing levels of educational enrolment (Ni Bhrolchain and Beaujaean 2012). Conversely, much of the early fertility in the United Kingdom precludes women from further education enrolment, due to the difficulty of role combination (Berrington 2004). This in general tends to lead to a dichotomised career path, similar to the diverging destinies pattern observed in the United States (McLanahan). Fertility divergence is part of a more general trend in the evolution and diversification of the interrelationship between different demographic processes (Lyons-Amos and Perelli-Harris 2014, Holland 2012), and the emergence of educational gradients can often depend on country context (Perelli-Harris and Lyons-Amos 2014). In general, economic hardship tends to produce a postponement of fertility (McDonald *et al.* 2000, Blossfeld et al 2005). More general insecurity for disadvantaged youths characterised by unemployment, fixed terms contracts and generally unstable work environment have been proffered as an explanation for low fertility in Eastern Europe (McDonald 2000, De la Rica 2005). This effect has also been observed in post Socialist countries, where perceived economic instability tend to dampen fertility preferences (Witte and Wagner 1995) as part of a transition to more Western and consumerist society, with increasing individualisation and emphasis on personal fulfilment further depressing fertility as part of second demographic transition processes (Mikolai 2013)

Despite the well understood variation in responses to economic conditions at a population level on fertility responses by individual circumstance, there remain scant evidence of the effect of individual

level characteristics (Kreyenfeld 2005). Macro level rates are often operationalised as sole variables of interest, where individual level data is analysed respondent characteristics are treated as a nuisance parameter or control variable, rather than a specific source of variance. That said, the most dramatic responses in terms of both partnership and fertility behaviour tend to be concentrated among those most disadvantaged, and this variation is well established in non-recessional circumstances (McDonald 2000, Oppenheimer, Kravda 1994). Many existing studies (e.g. Neels et al. 2013, Kohler and Kohler 2002) often operationalise the effect of economic recession in terms of direct or observable economic indicators, such as GDP growth or unemployment rates. However, much of the effect of economic recession is not through direct economic effects but through general instability (Witte and Wagner 1995, Perelli-Harris 2006 Bernardi et al 2007). Witte and Wagner (1995) found that in East Germany that a desire for children tended to be depressed among women who considered both their own and wider macro-economic conditions to be unstable. Similar evidence is provided by Perelli-Harris (2006), who finds that fertility desires for a child in the near future are influenced not only by involvement in employment but also by subjective well being. We note that women in Western European countries tend to have the most dramatic disconnect between fertility desires and preferences (Bongaarts 2002, Berrington 2003) and hence the assumed homogeneity of responses is unlikely to be sufficient. As such the conceptualisation of economic recession is unlikely to be adequately captured by economic indicators alone.

This analysis synthesises the themes laid out, focussing specifically on the effect of the recession on first birth rates, with a focus on heterogeneous responses. Specifically we examine the effect of the recession on first birth rates in the United Kingdom, using data from the UK Household Longitudinal Survey, and combination of the British Household Panel Survey and Understanding Society Survey. We measure the effect of the recession not only through direct measures of regional unemployment rates and average regional earnings, but test the significance of a residual indicator variable designed to capture any residual effects, for instance perceptions of economic uncertainty. Finally, we allow the effects of the recession according to individual characteristics. This allows us to determine differential effect of the recession, and identify those groups who were able to withstand economic trauma, and those most affected by it. This allows us to address two research questions: what are the direct and indirect responses of first birth rates to the Great Recession? Further, how do responses differ depending on individual level characteristics?

Data

Data for this analysis are the British Household Panel Survey (BHPS) and Understanding Society Survey (UK-HLS). The BHPS is a nationally representative household based survey which comprised 10300 individuals in c.5500 households in the initial wave in 1991. Households are contacted on a yearly basis. A boost sample for Wales and Scotland was added in 1999, and for Northern Ireland in 2001. In 2009 the BHPS was replaced with the Understanding Society Survey (UK-HLS), which incorporated 40000 households. BHPS members re-entered the Understanding Society panel at Wave 2. Thus, the combined BHPS and UK-HLS dataset represents a continuous series, save for 2009 where we are unable to track individuals.

Some of the information for our analysis can be derived solely from the understanding society survey via the retrospective information included in the survey (for example, fertility and

employment histories), taking advantage of the larger sample size and removing potential sample attrition issues. However, variables such as the receipt of benefit or employment do not include retrospective information, and we therefore used the full run of BHPS/US society surveys to ensure that we are able to include this information accurately across the life course. We therefore restrict data in the Understanding Society survey to those respondents who were also present in the BHPS (some 6000 cases). We select a sample relevant to our research question. We choose young women, focussing on those born in 1980-84, 1985-89 and 1990 and later. These cohorts contain 761, 596 and 1217 women respectively, each contributing 184, 87 and 29 births in the observed window. This means we are able to analyse women who are largely having their first birth, and hence will be experiencing a transition which is liable to be most affected by external economic conditions.

Method

We define the response variable as the random variable $y_{age,j}$ which denotes whether woman j has experienced first birth by a given age where j indexes individual women. This variable takes the value 1 after a woman experiences first birth, and 0 before that. Women are right censored by the date of interview for wave 3 of Understanding Society or drop-out from the survey. In this instance, we are able to reconstruct births which occurred during wave 1 of the UK-HLS, and hence there is no interval censoring although we are not able to accurately reconstruct time varying covariate information (although we can identify the age and pre-post-recession indicator in these years). We model $y_{age,j}$ as a cumulative probability of having had first birth π_{age} , where $\pi_{age} = \Pr(y_{age,j} = 1)$. We model this variable initially as a quadratic function of age, described in equation 1.

$$\ln\left(\frac{\pi_{age}}{1 - \pi_{age}}\right) = \beta_1 age_j + \beta_2 age_j^2$$

Eq 1.

We tried alternative specifications of the underlying growth curve, including linear, cubic and fully non-parametric (each age is represented by a dummy variable). Quadratic form (in the manner of Eq. 1) demonstrated best model based on a comparison of AIC statistics. This specification of the model allows us to measure the cumulative probability of transitioning from nulliparous to parity 1 across specified ages and is interpreted analogously to a growth model. We allow the baseline age-fertility profile to vary by birth cohort, to reflect shifts in birth behaviour among women. This is achieved by interacting birth cohort with the underlying polynomial for age, and is described in Equation 2 (the dummy for birth cohort 1985-89 is omitted to identify the model).

$$\ln\left(\frac{\pi_{age}}{1 - \pi_{age}}\right) = \beta_1 age_j + \beta_2 age_j^2 + \beta_3 age_j \cdot cohort_{85-89} + \beta_4 age_j^2 \cdot cohort_{85-89} + \beta_5 age_j \cdot cohort_{90 \text{ and later}} + \beta_6 age_j^2 \cdot cohort_{90 \text{ and later}}$$

Eq. 2.

Pre-post recession indicator

Equation 3 represents the incorporation of the recession effect in our model. Here, we represent the cohort specific baseline specification in the form of $\beta'x$ where x is a matrix containing age and cohort covariates, and β' transposed vector of corresponding beta coefficients (.e. the models presented are nested). The model is presented in equation 3,

$$\ln\left(\frac{\pi_{age}}{1 - \pi_{age}}\right) = \beta'x + \delta \cdot recession$$

Eq. 3

Under this specification, the effect of the recession is captured by the dummy variable *recession*, which takes the value 0 for all years prior to the 2008 crash, and 1 for all years including and following 2008. This allows for a displacement in fertility due to the crash, of magnitude δ . The limitation of model is that it assumes that the effect was homogenous by birth cohort. Therefore the base model for our analysis is presented in equation 4, where the effect of the recession is allowed to vary by cohort.

$$\ln\left(\frac{\pi_{age}}{1 - \pi_{age}}\right) = \beta'x \cdot \delta' \cdot recession$$

Eq. 4

The robustness of the regression effect can be asessed via the inclusion of control variables. For example, in equation 5, the vector of control variables z can include information such as educational level, labour market activity and other pertinent factors. Significant dummy variables after the effect of recession after controlling for individual (employment status) and regional (regional unemployment rate) economic indicators indicate an incomplete specification of the effect of recession by direct effects alone. Moreover, by interacting the recession dummy with these control variables we are able to examine whether the effect of the recession differed according to respondent characteristics.

$$\ln\left(\frac{\pi_{age}}{1 - \pi_{age}}\right) = \beta'x \cdot \delta' \cdot recession + \gamma'z \cdot \delta' \cdot recession$$

Modelling strategy

We assemble to model by first establishing the base model in the form of equation 2. This model is then extended to test the significance of the recession dummy on fertility rates. The dummy is an indicator variable, taking the value 0 at ages pertaining to prior to 2008, and 1 in those years including and following 2008. Significance is assessed by LR test comparing the base model nested within a model including a main effect for recession, with significance set to the 5% level. On significance of the recession effect, a further test is performed to see if the effect of the discontinuity varied between birth cohorts, by testing whether including an interaction between cohort and the discontinuity. Significance is again assessed on a test of global test of significance using a LR test at 5% significance.

The robustness of this discontinuity effects is then assessed by the addition of individual level control variables. We add controls for education (educational attainment), receipt of benefits (including unemployment benefit housing benefit), lagged employment status and defacto partnership status. We then test for significant interactions between all individual level variables and the recession effect, to capture differential effects of the recession by respondent characteristics. These interactions are added to the model sequentially, and retained on passing the criterion of significance at the 5% level based on an LR test.

Following selection of the individual level model, we test the significance of the regional level information considered relevant, namely the proportion of respondents within the GOR with low pay, and the proportion unemployed. We aggregate from individual level data in our dataset, rather than using comparable datasets used to produce official rates, to ensure a complete and consistent series for all GOR.

Results

We present predicted curves for the cumulative probability of having had first birth. Figure 2 presents the figures in the absence of a recession effect for each birth cohort. The 1980-84 and 1985-89 birth cohorts exhibit similar patterns with increasing cumulative fertility for both such that roughly 10% of women have had their first birth by age 23. Thereafter there is some divergence between the birth cohorts: the younger cohort (1985-89) flattens in fertility profile, while the 1980-84 cohort exhibits a continues upward trend, with 20% of women having had first birth by age 27 and 30% by age 32. In contrast, the fertility profile for the 1990 or more recent birth cohort is considerably lower than older cohorts: the teenage childbearing rate is considerably below those of the older cohort, and a 5% cumulative transition is not reached until age 24, some 3 years later than the 1980-84 birth cohort.

<Figure 2 about here>

Table 1 presents the estimated model including cohort specific discontinuity effects and controls. Model 1 presents the results for cohort specific effect of recession only, while model 2 includes control variables. Both models correct for the correlation between respondents with GOR via the use of clustered standard errors. All coefficients are presented in terms of odds ratios.

<Table 1 about here>

In neither model is the effect of the recession dummy statistically significant. Moreover, in both models the effect is predicted to increase, rather than decrease fertility. This effect is highlighted in Figure B, which described the predicted probabilities for a) the 1980-84 birth cohort, b) 1985-89 birth cohort and c) 1990 or more recent birth cohort. In all three panel, the predicted effect of the recession variable is that fertility is higher in the post-recession period, indicative of counter-cyclical fertility.

<Figure 3 panel A about here>

<Figure 3 panel B about here>

<Figure 3 panel C about here>

We now consider the effect of other control variables. Married women are most likely to have had a first birth, with odds ratios lower than 1 indicating that women who are living with their partner (OR=0.70) and single (OR=0.09) both considerably less likely to have had first birth. This is consistent with persistently elevated rates of fertility among married couples, even after the widespread transmission of fertility behaviour to cohabiting relationships (REF)

Broadly speaking, all other control variables indicate a pattern of heightened fertility among disadvantaged women. Women who are unemployed have higher predicted fertility than women who are in work, albeit that this effect is non-significant. Women not in the labour force have higher cumulative transition rates, although this probably reflects reverse causation where mothers disengage from labour market activity following first birth. Women enrolled in education demonstrate extremely low first birth rates, only 30% of those of women in work. A clear gradient of fertility behaviour exists for education: compared to the reference category- women with a degree- we find significantly higher cumulative fertility for women with only A-level (OR=2.20), GCSE (OR=2.81) and lower qualification (OR=2.14). This indicate higher fertility among women with lower educational attainment.

Women living in rented accommodation demonstrate a higher cumulative birth rate than those who own their own home. Similarly, women in receipt of housing benefit were considerably more likely

to have had a first birth than women who were not reliant on support. Surprisingly, women who were claiming JSA demonstrated lower cumulative fertility than those not receiving unemployment benefit. Compared to the baseline category of No/low pay, we find that women in the highest pay tertial are significantly less likely to have had a first birth.

Considering the effect of GOR level characteristics, we note that controlling for individual level effects means that poorer labour market and wage environments are associated with depressed fertility rates: both odds ratios for the Proportion of women unemployed and the Proportion of women receiving low pay are below 1 indicating lower cumulative transitions. We note however, that neither effect is significant.

Differential effects of recession

We find two control variables have significant interactions with the recession effect, education ($p=0.02$) and pay category ($p=0.00$). To facilitate interpretation of the interaction model, we present predicted probabilities of the proportion of women having had first birth by the age of 21 for pre and post recession intervals. Table C presents predicted probabilities by educational category. Overall we note the persistence of the pattern of fertility by education from the main effects model: women with high levels of education are unlikely to have had their first child by the age of 21, with very low cumulative transitions among women with Degree, Other higher or A-level compared to women with only GCSE or Lower or no qualification, who demonstrate higher fertility in the precession period. However, in the post recession period this effect disappears: the incidence of fertility is now consistently low across all categories of education.

<Table 3 about here>

Table 4 presents the predicted probability of first birth by age 21 by pay category. In the pre-recession period we again note the consistency with the main effects model: women with high pay have the lowest predicted probability of first birth, which increases for women with medium or low pay. In the post-recession period, the predicted probability falls for all pay categories, but most markedly among lower paid groups: women in the middle tertial experience a fall in predicted probability of 30%, while the predicted probability among women with Low or No pay falls by 75%

<Table 4 about here>

Conclusions

The Great Recession has had profound effects across a number of demographic behaviours. This paper specifically evaluates the effect on fertility, focussing on first births rates. In general recessions tend to depress fertility, as has been seen in both previous European economic transitions and economic recessions. In contrast the UK continued to see rising aggregate fertility rates which continued to increase despite the incidence of the recession. The major contribution of the paper is to extend existing analyses to allow the effect of the recession by direct and indirect effects (via economic indicators, and a pre-/post-recession dummy variable) and to allow these effect to vary according to individual characteristics.

A limitation of this analysis is that we are unable to establish whether the effect on fertility are permanent or simply postponement effects. These influences are generally seen manifested by downward and rightward shifts in the overall growth curve. However, at present the data series available provides a post-recession period only 4 years in length and as such we are unable to reliably estimate a change in the slope parameter in the post-recession period required to detect postponement (REF). Similar economic crises have in general been associated with postponement, where overall fertility has not been broadly affected (Sobotka), and while external factors seem to affect the tempo of fertility in the short term, the extent to which this is reflected in cohorts rates varies according to external but critically individual characteristics (Kravdal 1994). That said women in the United Kingdom are generally poor at translating fertility preferences in to fertility behaviour, and this tends to be associated with educational attainment (Berrington xxxx).

The first result of note is that we do not detect a headline significant effect of the pre-/post-recession dummy variable. This is broadly consistent with overall population fertility rates: there was little change in the total fertility rate of the UK in the wake of the 2008 crash (see Figure 2). In this instance, macro level fertility behaviour is consistent with individual level results. Further, this indicates that studies relying on inferences at an aggregate level are at least internally consistent when limiting explanatory effects to direct economic influences such as employment rates (e.g. Goldstein, Neels et al.). The non-significance of the overall dummy variable for the pre-/post-recession period indicates that under a specification of homogenous effects, there is no information beyond unemployment or similar direct economic indicators.

Our analysis disaggregated fertility behaviour by individual characteristics, and found very different responses to the recession in terms of fertility behaviour. In general, we note two distinct patterns emerge from our results. Women in relatively advantaged positions: those who have high education, high wages, own their own homes and do not rely on benefits exhibited relatively lower rates of first birth which were relatively unaffected by the recession. The significance of the pre-/post recession indicator for certain interaction terms also indicates that a different process of fertility rationalisation(?) among different social groups. While the limited effect of the recession for advantaged groups, and the overall non-significance of the recession dummy variable indicates that among these groups individual circumstances are the most important influence on fertility behaviour and perception seems to play little effect. In contrast, among disadvantaged groups the strong effect of the re-/post-recession indicator indicates a sensitivity to external economic circumstances.

These findings are somewhat in contrast to the trends observed in Southern Europe and Eastern Europe in the immediate post-Socialist period, where economic instability has tended to depress overall fertility rates (McDonald 2000, Sobotka 2004). Instead, we find that the dichotomisation of British fertility patterns extended not only to overall fertility behaviour but to responses to external economic pressures. Relatively advantaged women seem resilient to external economic pressures, principally due to a dearth of fertility behaviour in their early 20s, and the fact that many women are established economically before starting a family (Berrington, Oppenheimer) means that their fertility behaviour is resilient to external shocks. In contrast, women disconnected from advantaged transition patterns, and in particular labour force and educational enrolment tend to compensate for underlying instability in their lives via family formations (McDonald 2000, Oppenheimer, McLanahan). As such, these women are most vulnerable to external economic shocks, and hence exhibit exaggerated responses to recession. Given that their initial fertility behaviour is a means by which these women compensate for general life instability, the impact on wellbeing in the most disadvantaged group is particularly concerning, since recession not only increases job instability and stress (Perelli 2003), but also precludes the limited coping strategies available to this group.

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Figure 2: Predicted cumulative transition to first birth by maternal birth cohort

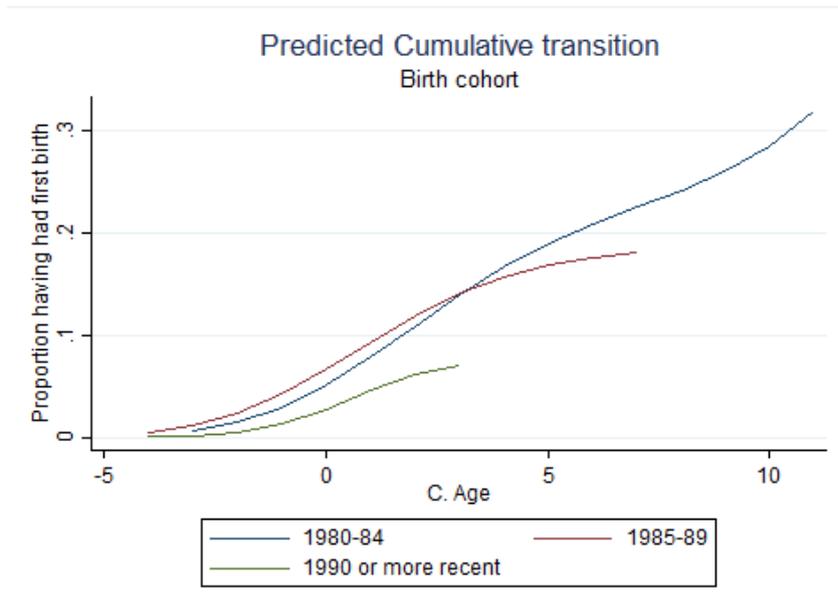
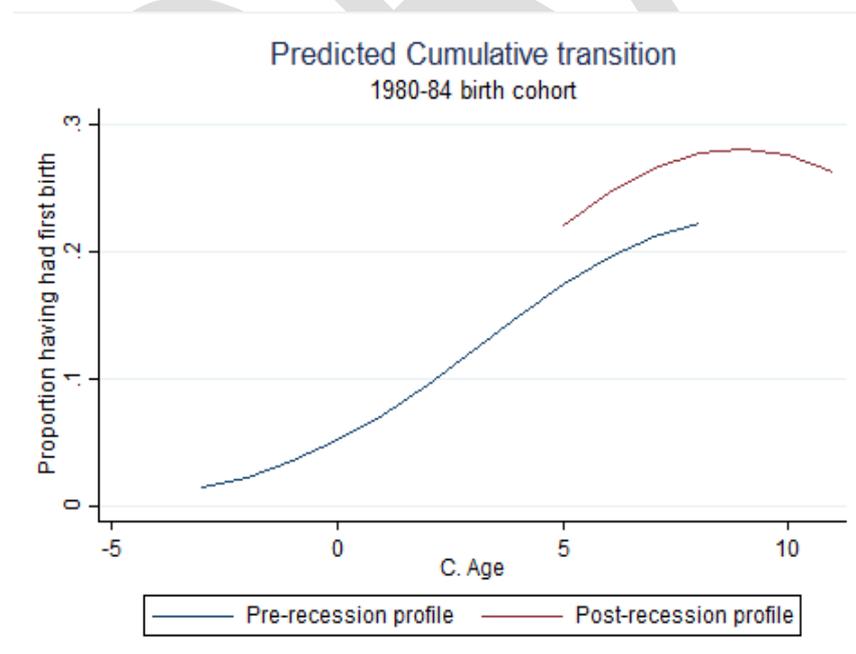
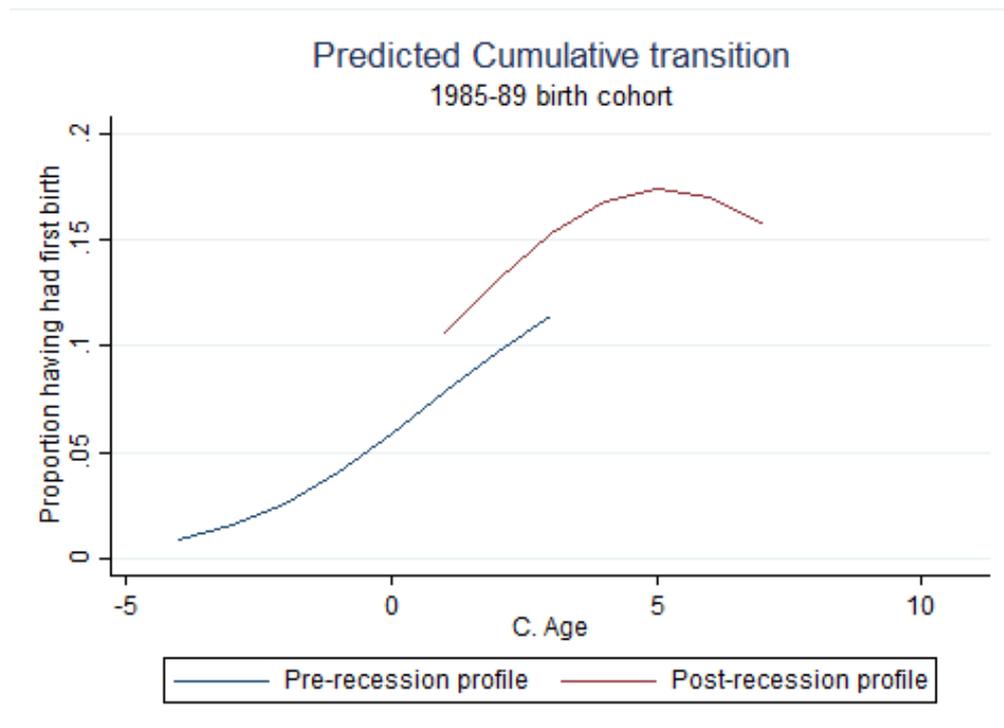


Figure 2: Cumulative transition to first birth for pre- and pos-recession periods, for a) 1980-84 birth cohort, b) 1985-89 birth cohort and c) 1990 or more recent birth cohort

a)



b)



c)

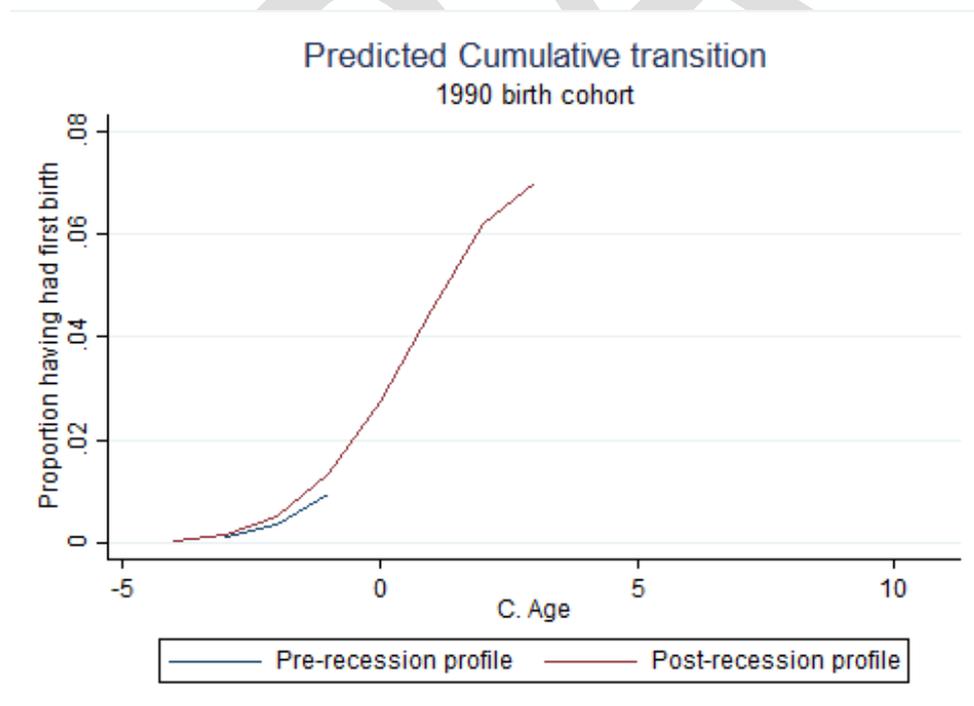


Table 1: Estimated model for a) cohort specific effect of recession (model 1) and b) cohort specific effect of recession with controls (model 2)

Variable	Odds ratio	Model 1 95% confidence interval		Odds ratio	Model 2 95% confidence interval	
Constant	0.05					
Age	1.45	1.36	1.54	1.45	1.11	1.89
Age ²	0.97	0.97	0.98	0.96	0.94	0.99
<i>Cohort (ref=1980-84)</i>						
1985-89	1.13	0.88	1.45	1.57	0.74	3.33
1990 or more recent	0.35	0.10	1.27	0.14	0.01	3.72
<i>Age x Cohort</i>						
Age x 1985-89	0.97	0.86	1.09	0.74	0.51	1.08
Age x 1990-onward	1.28	1.06	1.55	0.76	0.03	16.04
<i>Age² x Cohort</i>						
Age ² x 1985-89	0.98	0.97	1.00	0.99	0.91	1.08
Age ² x 1990-onward	0.92	0.84	1.01	1.16	0.32	4.12
Recession	1.34	1.10	1.62	1.37	0.99	1.89
<i>Recession x Cohort</i>						
Recession x 1985-89	1.04	0.71	1.52	1.07	0.57	1.99
Recession x 1990-onward	1.06	0.29	3.83	3.12	0.53	18.25
<i>Marital status (ref: Married)</i>						
Living together				0.70	0.50	0.96
Single				0.09	0.06	0.15
<i>Employment status (ref: Employed)</i>						
Unemployed				1.49	0.95	2.32
Family activity				6.35	4.64	8.69
Education				0.30	0.15	0.58
<i>Educational attainment (ref: Degree)</i>						
Other higher				1.69	0.86	3.34
A-level				2.20	1.32	3.68
GCSE				2.81	1.39	5.67
Lower or none				2.14	1.30	3.51
<i>Tenure (ref=Owner occupier)</i>						
Rented (social or private)				1.56	1.05	2.32
<i>Receipt of Housing benefit (ref=No)</i>						
Yes				6.94	2.82	17.06
<i>Receipt of JSA (ref=No)</i>						

Yes	0.15	0.05	0.38
Pay (ref=Low or none)			
Medium	1.20	0.89	1.64
High	0.19	0.13	0.29
% GOR unemployed	0.22	0.00	23.23
% GOR receiving low pay	0.28	0.01	6.77

Table 3: Cumulative probability of first birth by age 21 by educational attainment

Educational attainment	Pre-recession	Post-recession
Degree	0.00	0.00
Other higher	0.04	0.01
A-level	0.02	0.02
GCSE	0.10	0.01
Lower or none	0.12	0.02

Table 4: Cumulative probability of first birth by age 21 by earnings

Pay	Pre-recession	Post-recession
Low or none	0.08	0.02
Medium	0.05	0.03
High	0.01	0.00