

# Yearning, Learning and Conceding: (some of) the reasons people change their childbearing intentions

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## Non-Technical Summary

If people of childbearing age are asked how many children they expect to have over the course of their reproductive lives, and asked the same question again several years later, the majority will give the same answer on both occasions, but a substantial percentage of people will give a different answer. This paper looks at the factors which are associated with these changes in childbearing expectations, and asks: what is it that makes people change their plans?

This issue is important for a number of reasons. Birth rates have fallen to very low levels across large parts of the Western world, and in many countries stand well below the 2.1 births per woman needed to sustain a stable population. Expected fertility has also fallen, but by less than actual fertility. This gap between expectations on the one hand, and actual childbearing on the other, has been conceptualised as an “unmet need for children” – people are in some way prevented from having all the children they want, because of (for example) economic constraints, infertility, or the difficulty of reconciling family and paid work.

However, there is another possible explanation for this gap, namely that people just change their minds about the number of children they want to have. In this paper we identify a number of such reasons why people may change their minds, and use a statistical model to test whether they are indeed significantly associated with changes to childbearing plans.

We use data from the British Household Panel Survey – a survey of around 10,000 adults. Participants are re-interviewed every year, giving a picture of how their lives are evolving. As well as background information on people’s age, sex, income, work status, partnership status and so on, the survey contains information on (a) how many children people have, and (b) how many children they *expect* to have over their lives. We take a sample of people aged 18-39, and analyse how their expectations have changed between two points in time, six years apart.

Our findings show that people’s expectations *do* change; and that at least some of these changes are not related to constraints. Changes occur both upwards and downwards: although on average people’s childbearing expectations decline over their fertile years, this is made up of some people increasing their expectations, and rather more people reducing their expectations. Research which has previously been done in this area did not distinguish between upward and downward changes; one of the unique features of our research is that we do distinguish between the two directions, and find that it is a mistake to assume that the factors associated to upward changes are somehow “equal and opposite” to the factors associated with downward changes.

So, what factors are associated with changes to childbearing plans? The first is age – as people get older, they are less likely to change their plans in either direction. This makes sense if we think of young adulthood as a time when people are learning a great deal, and adapting their plans accordingly. We did expect to see a decline in expected family size for women as they approach the end of their fertile years – a period during which some women will realise they are unlikely to achieve their previous plans. We *did* find a small decline in expectations around age 30, but this was greatly outweighed by the general age-related trend we discussed earlier.

We also investigated whether the presence or absence of a partner affected childbearing plans. We found that people who hadn’t had a partner the first time they were interviewed, but who had found a partner by the time of the second interview, hardly changed their expectations at all. The people who *did* change their expectations significantly were people

who had been living with a partner at the first interview, and who were living with a different partner at the second interview.

Social norms play a role: a strong norm of two children has emerged in Western countries, and expected family size tends to converge on this norm over their lifetime. People who originally expected to have smaller families tend to increase their expectations, while people who originally expected larger families tend to decrease.

Jobs and earnings are relatively unimportant for men. But they are much more important for women: women who have jobs and higher earnings are more likely to revise their childbearing expectations downwards, and their male partners are also more likely to revise downwards.

We also found that partners negotiate with one another. If the expectations of couples are mismatched, there is a tendency for the partner who initially wanted fewer children to revise his or her expectation upwards, and for the partner who initially wanted more children to revise downwards. There is no evidence that women rule the roost in this respect: both men and women change their expectations in response to their partners' expectations.

Finally, one of the most important factors affecting changes to childbearing plans is actually having a baby. People learn a great deal – about the joys and burdens of parenthood, about their own performance as a parent, about the juggling act between family and workplace – from the experience of having a child. Some people find that parenthood is easier and more pleasurable than they had expected, and as a result decide they would like more children than they had previously expected. Others find the reverse: that parenthood is more difficult than they had anticipated; these people would revise their expected family size downwards.

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## **Abstract**

People's childbearing intentions change over their lives. These changes are sometimes conceptualised as a response to constraints such as the biological clock or lack of a partner. However, we find that they are influenced by a much wider range of factors: social norms; adaptation to the wishes of a partner; re-partnering; and learning about the costs and benefits of parenthood. In a departure from existing studies we analyse increases in planned fertility separately from decreases; we conclude that the determinants of increases in planned fertility are not simply equal and opposite to the determinants of decreases.

## **Keywords**

fertility intentions, individual decision-making, constraints to childbearing, intention-behaviour mismatch

## **JEL codes:**

J12, J13

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## 1. Introduction

In recent years, birth rates have been falling across the developed world, to levels well below replacement in many countries (Kohler et al 2002, Billari and Kohler 2004). This has led to a renewed interest in fertility intentions as one determinant of achieved fertility. There is already a well-developed literature on how fertility intentions are formed, as well as on the relationship between intended and realised fertility (Morgan 2001, Hagewen and Morgan 2005, Micheli and Bernardi 2003).

However, there is as yet little research into the way in which individuals *revise* their fertility intentions over the course of their lives. This is potentially an important issue: failing to acknowledge that intentions change implies that they are formed early on, remain an essentially static goal to be pursued during one's reproductive life, and to be either fulfilled or unfulfilled at the end of it.

Lee (1980) makes a powerful argument that couples *should* be expected to revise their fertility plans in the light of changing circumstances and information, and there is evidence that individuals do indeed change their reproductive intentions over their lives: Westoff and Ryder (1977) and Berrington (2004) find that a substantial proportion of individuals revise their intentions, both upwards and downwards, over periods of five and six years respectively.

In this paper, we use a multivariate framework to analyse the determinants of revisions to fertility plans. This issue has been addressed in two recent papers: Heiland et al. (2008) and Liefbroer (2008). However, both these papers are based on models which conceptualise downward revisions in fertility intentions as equal and opposite to upward revisions – and which therefore constrain the determinants of upward and downward revisions to be equal and opposite. In this paper we use a more flexible multivariate framework, which allows us to analyse separately the determinants of upward and downward revisions in fertility intentions; we show clearly that they are not “equal and opposite” concepts, but that different factors are at play in the two scenarios.

Our analysis is based on longitudinal data from the British Household Panel Survey (BHPS). We exploit the fact that the BHPS is a household survey to analyse the effects on adjustments to expectations, not only of individuals' own characteristics, but also of the characteristics of their partners, showing that partner characteristics play an important role, and that there are important asymmetries between men and women.

## 2. Background

In the 1950s, questions on fertility intentions were introduced into the American Fertility Survey with the aim of improving fertility forecasts (Westoff and Ryder 1977). Following this, there has been a great deal of research into the relationship between fertility intentions and later outcomes. Despite a consensus that there is a strong link between intended and achieved fertility, it is recognized that there is a substantial discrepancy between the two: fertility intentions are far from being a perfect predictor of achieved fertility expectations (Morgan 2001), which generally falls short of reported intentions.

The gap between average intended and achieved fertility has increased over recent decades as the fall of fertility to below-replacement levels in many developed countries has not been accompanied by a corresponding fall in fertility intentions (Bongaarts 2001). This increasing gap has often been conceptualised as reflecting an “unmet need for children” arising from constraints - biological, economic and social - to childbearing (Coleman 2004; Bradatan and Firebaugh 2007; Liefbroer 2008; and Philipov et al 2009).

However, it is debatable whether these differences at the aggregate level do indicate a generalised unmet need at the individual level (Smallwood and Jefferies 2003). For a start, although on average achieved fertility falls short of intended fertility, this average is composed of some individuals falling short of their intended fertility, while others exceed it: Quesnel-Vallée and Morgan (2003) and Morgan and Rackin (2010) show that in the US, the relatively close congruence between aggregate intention and observed fertility is mainly explained by the fact that individual-level errors cancel each other out, rather than by the ability of American women to anticipate how many children they will have. Hagewen and Morgan (2005) make a similar argument, pointing out that although fertility plans may be attenuated by postponement, infecundity and competition with other activities, they might also be augmented by factors such as unwanted fertility: in the U.S. the latter factors compensate for the former, but this might not hold universally.

Another factor indicating that is problematic to interpret the gap between intended and realised fertility as indicating an unmet need at the individual level, is that the size of this gap varies according to the age at which individuals are asked to state their intentions: the gap is in general larger, the earlier in life that women are asked about their original intentions (Van Peer 2002, Smallwood and Jefferies, 2003). This suggests that fertility intentions are not static as is sometimes assumed, but may change over time. In studies which use data from repeated cross-sections, this inference may be drawn only tentatively, since it is not possible to disentangle age

and cohort effects. However, there also exist studies based on longitudinal data which demonstrate clearly that individuals revise their fertility intentions over their lives. Studies by Westoff and Ryder (1977), Monnier (1989), Berrington (2004), Heiland et al. (2008), Liefbroer (2008) and Hayford (2009) are based on samples taken at different times and from different countries; they share the finding that people do change their fertility intentions, and that while downward adjustments are more frequent than upward adjustments, adjustments in both directions are common.

In the light of this evidence that people adjust their fertility intentions over their lives, this paper asks: what are the determinants of these adjustments? Two recent studies have addressed this question. Heiland et al. (2008) hypothesise that life course experiences cause people to alter their perceptions of the costs and benefits of childbearing, thereby affecting desired fertility. They use a West German longitudinal survey to study changes in total desired fertility across interviews 6 to 7 years apart, estimating a linear probability model of whether a woman's total desired family size is unstable; and fixed and random effects models on desired family size. These models include covariates capturing education, employment status, income, marital status, age, health, rural location, traditional values, membership of the Catholic faith, characteristics of the family of origin, and the birth of children. Of these, only the last is consistently associated with changes in desired fertility; the evidence to support the hypothesis that life course events affect desired fertility is therefore rather weak.

Liefbroer (2008) uses data from a Dutch panel survey to examine the stability of family size intentions. His hypotheses are based on Heckhausen's (1999) life-span theory of control, and relate to the notion that individuals employ a number of control strategies in order to realise their goals. Downward revisions in fertility intentions are conceptualised as manifestations of 'compensatory secondary control' – activities which minimize the negative consequence of failing to achieve one's goals, by modifying the goals themselves. Random-slope multilevel Poisson regression models are estimated to examine whether the age-related change in family size intentions varies between respondents, and whether this variation can be explained by differences between individuals in their experiences in the family and the occupational life domains. Covariates include gender, cohort, living arrangements, marital/relationship status, labour market status, hours of work, education and fertility; the results show that adjustments to intended family size are common; that more individuals make downward than upward revisions; that living arrangements strongly structure family size intentions, while changes in the educational and occupational careers are of

lesser but still significant importance; and that the family size intentions of young people are strongly affected by events in the fertility career.

Our analysis differs from these two studies in a number of important respects. As mentioned above, we use a flexible analytical framework to analyse increases in expected fertility separately from decreases.

Another respect in which our analysis differs from other studies in this area is that we are able to assess the role of the characteristics and intentions of individuals' partners. Because the BHPS is a household data set, it provides full data for the partners of almost all respondents who are married or cohabiting. There is clear potential for factors such as partner's childbearing expectations to play a role in the formation of expectations; the partner's income may also be an important influence.

A third feature of this paper is that we examine the determinants of revisions in fertility separately for men and for women, by estimating separate models for each sex. We hypothesise that there are likely to be asymmetries here: if a couple has a child, the woman is likely to spend more time caring for the child, while the man is likely to be the principal breadwinner, at least temporarily: these differences in gender roles may affect the way women and men formulate and revise their childbearing expectations (Thomson and Hoem 1998).

The fourth notable difference between this paper and others in the field is that we conceptualise the role of time as being wider than the role of chronological age. The biological clock is clearly an important factor in relation to fertility intentions; however, we also consider the fact that women in modern Western society tend to have their children relatively close together, and that this spacing may be particularly close in Britain (Cigno and Ermisch 1988; Ekert-Jaffé et al 2002).

## **2.1 Conceptual framework and hypotheses**

We conceptualise changes in fertility intentions as occurring because people's circumstances change, or because they acquire new information. A similar idea underpins the intertemporal optimization models used in economics to analyse reproductive behaviour in an uncertain environment (e.g. Rosenzweig and Schultz 1989; see also Hotz et al. 1997). It also features in the demography literature (Lee 1980, Udry 1983, Morgan 2001).

Ajzen (2005) argues that the longer the time interval between the measurement of intention and the observation of the associated behaviour, the higher is the probability that unforeseen events take place; these, by bringing to light new information after the initial intentions were

formed, may reduce an individual's interest in pursuing his or her initial intention and may provide an impetus to change it. In the case of childbearing, the relatively long interval between the initial formation of intentions and their eventual realisation (Miller, 1992) means that changes to intentions are particularly likely in this sphere of life.

This argument is made by Ajzen (2005) in the context of the Theory of Planned Behaviour (Ajzen 1985, 1991). The Theory of Planned Behaviour (TPB) originates in the field of social psychology, but has proved useful to demographers (Barber 2001; Billari, Philipov and Testa 2009; Dommermuth, Klobas and Lappegård 2009), and provides a useful starting point for the hypotheses in this paper.

The TPB conceptualises an individual's intention to perform a behaviour as being determined by three sets of factors: personal factors (attitudes toward the behaviour); social influences and pressures (subjective norms); and the individual's sense of his or her own ability to perform the behaviour (perceived behavioural control). This last set of factors embodies the idea that people incorporate the constraints which they perceive to exist – biological, social, economic and other – into the formation of their intentions<sup>1</sup>.

In the context of childbearing intentions, we conceptualise changes to these intentions as arising from changes in three sets of factors: attitudes towards childbearing, perceived childbearing norms, and perceived constraints.

### **2.1.1 Attitudes towards childbearing**

The TPB conceptualises an individual's attitude towards a behaviour as the evaluation he or she makes of performing the behaviour, in light of their positive or negative beliefs about the consequences of that behaviour. An individual's attitude towards childbearing depends on a wide range of beliefs, including perceptions of how good he or she will be as a parent; the enjoyment to

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<sup>1</sup> In the TPB, individuals are assumed to have a good awareness of the obstacles to the realisation of their intentions which they face in practice, and to internalise these, incorporating them into the formation of intentions via the dimension of perceived behavioural control. However, in some cases, individuals may fail to understand or anticipate some of the constraints they face, and in these cases, perceived behavioural control may not reflect accurately the degree of control which they actually have over the realisation of intentions (*actual behavioural control*). Thus, while by far the most important determinant of behaviour is a person's intentions, behaviour may also be influenced by the dimension of actual behavioural control. Because this paper deals with revisions to intentions rather than the realisation of behaviours, we do not analyse actual behavioural control and associated factors.

be gained from children, both at birth and in the future, and the degree to which childbearing will impact on life, career and relationships.

These perceptions change over the life course in response to new information: people learn from their observations of the world, from the experiences of their contemporaries, from their own changing circumstances, and from insights into their own personalities. As it is likely that young adults acquire this type of new information at a faster rate than older adults, we hypothesise that this faster learning on the part of younger adults is associated with greater variability in their attitude towards childbearing and therefore with a higher probability of changing fertility expectations.

- Hypothesis 1: The probability of both downward and upward revisions falls with age.

One of the experiences which provides most information about the costs and benefits of children, and one's own fitness as a parent, is actually having a child oneself. Consequently, we may expect childbirth to be associated with revisions to fertility intentions. This is the idea underlying Udry's (1983) model of sequential decision-making (controlling for initial intentions, he finds that the number of children born in the period between interviews is the most important intervening event in predicting fertility intentions); Monnier's (1989) results also suggest that decisions are made sequentially and that intentions may be revised whenever a new baby is born.

We hypothesise that with the birth of a child some individuals will find parenthood to be a more difficult, more costly and/or less joyful experience than they had anticipated, and as a result will become less enthusiastic about the prospect of further children, with an increased probability of revising their intentions downwards. For others, the opposite may be the case, with the benefits outweighing the costs; these individuals will have an increased probability of revising their intentions upwards.

- Hypothesis 2: The birth of a child will be associated with both downward and upward revisions in expected fertility.

This effect may differ by parity. While people gain new information each time they have a child, we may expect them to learn more following the new experience of the birth of their first child, than following the birth of second or subsequent children. This would lead us to expect that the tendency to revise expectations in either direction would be greater after the birth of a first child, than after the birth of a subsequent child.

- Hypothesis 3a: The birth of a first child will have a greater effect on revisions to fertility expectations – in both directions – than subsequent births.

However, a rather different formulation of this hypothesis is also plausible. Kohler et al (2005) make two arguments as to why first births may be associated more than second and subsequent births with upward revisions. First, they note that second births are often motivated by a perceived need to provide companionship for a first child (which provides an impetus to have additional children after the first, but not after subsequent children). Second, they find that while first births have a positive effect on parents' well-being, additional children do not, and actually have a negative effect on mothers' well-being.

- Alternative Hypothesis 3b: First births are predominantly associated with increases in expected fertility, while second and subsequent births are predominantly associated with decreases in expected fertility.

### **2.1.2 Childbearing norms**

Many authors have noted the emergence in the UK and other developed countries of a two-child norm (Gauthier 2006; Berrington 2004). These norms apply both to intended and to realised fertility. As Morgan and Rackin (2010) point out, the strong normative ideal of the two-child family is the result of two forces: one the one hand, there is an upward pressure related to the concerns about raising a single child; and on the other hand, the view of four (or even three) children as a large family constitutes a downward pressure.

As individuals progress through life, we hypothesise that they become more aware of this norm, and that this increased awareness may be reflected in changes in their expectations of their own childbearing behaviour, namely that they conform to the social norm of two

- Hypothesis 4: Individuals who begin by wanting fewer than two children will have an increased probability of revising their expectations upwards, while those who begin by wanting more than two children will be more likely to revise their expectations downwards.

### **2.1.3 Perceived constraints to childbearing**

One of the most widely discussed constraints to childbearing is the fact that fertility – and particularly female fertility - declines with age. On approaching the end of their fertile lives, people who have not had all the children they once intended to have face an ever-declining prospect of realising their intentions, and may revise these intentions downwards in an attempt to come to terms with this fact (Heckhausen 1999). We would expect this tendency to be particularly pronounced for women, whose fertility declines more rapidly than men's. However, we may expect it to be present for men as well: after a man reaches a certain age, the majority of the women

with whom he might expect to have children would be of a similar age, and therefore subject to declining fertility.

- Hypothesis 5: The probability of downward revisions to expected fertility increases as individuals near the end of their fertile years.
  - Hypothesis 5b: This effect will be particularly pronounced for women.

Hypothesis 5 may appear to be in conflict with Hypothesis 1, which predicts that the probability of downward revisions will decrease with age. However, it is likely that we will be able to disentangle the two effects. We expect the age-related decrease in downward revisions predicted by Hypothesis 1 to be a steady decline over the adult life, including the twenties and early thirties when the biological clock does not tend to be an issue, whereas we expect the second effect – the increase in downward revisions associated with the biological clock – to manifest itself no earlier than the mid-thirties.

Another impediment to having children is the lack of a spouse or partner. For women this does not present an absolute impediment to parenthood; for men, it presents more of an impediment, although the fact that men are less constrained by the biological clock may mean that they are less likely than women at any given age to revise their expectations of childbearing downwards in the absence of a partner.

- Hypothesis 6: Compared with individuals who have a partner, individuals who do not have a partner, or who split from a partner, are more likely to revise their expectations downwards, and less likely to revise them upwards.

If a person does have a partner, a different constraint may come into play – namely, the childbearing intentions of that partner. Unless there is perfect assortative mating in respect of fertility preferences, partners' intentions are likely to differ (Voas, 2003). Miller and Pasta (1996) show clearly that childbearing outcomes are influenced by the intentions of both partners; Thomson (1997) shows that the explanatory power of models of childbearing intentions are significantly increased by the inclusion of the spouse's intentions, and that disagreement between partners tends to shift the couple's intentions towards not having a child. We hypothesise that where partners have different expectations of childbearing, a process of negotiation may take place, in the course of which, one or both partners may adjust their expectations – maybe as a concession to the partner.

- Hypothesis 7: Individuals will tend to adjust their expectations in line with the expectations of their partner. Individuals who originally want more children than their partners will tend to

reduce their expectations; individuals who originally want fewer children than their partners will tend to increase their expectations.

A further set of constraints to childbearing relate to economic circumstances, namely, to parents' ability or otherwise to support their children financially. People who experience unforeseen falls in their earning power may decide that they will not be able to support as large a family as they had previously thought, and their expected fertility may decrease as a result; for people who experience unforeseen rises in earning power, the opposite may be true. Unfortunately, the data we are using do not make it easy to analyse this relationship. There is, of course, plentiful information on income changes, job gains and losses, etc; however, for any individual, it is not possible to establish whether these changes occurred before or after any change of fertility plans; and there are good theoretical arguments why the causality may go either way.

However, we know that an individual's current labour market status is related to future status: in particular, current low wages are related to the probability of future low wages and unemployment (Gosling et al. 1997, McKnight 1997). Thus, we hypothesise that current measures of whether a person has a job, and his or her earnings, are associated with the probability later changes in his or her economic situation, and are also associated with revisions in expected fertility.

Of course, children require inputs of time as well as money. These inputs of time are provided primarily by mothers: women tend to reduce their hours of work after having children, while men do not (Paull 2008). The financial cost of these reductions in working hours persists over the life course (Connolly and Gregory 2008). Women who work more hours, or who have higher earnings to begin with, stand to lose more by reducing their hours. Therefore, different hypotheses would be in order for men and women.

- Hypothesis 8a: Men without a job or with lower incomes are more likely to decrease their expectations, and less likely to increase their expectations, than men with a job or with higher incomes.
- Hypothesis 8b: Women with a job or with higher incomes are less likely to increase their expectations, and more likely to decrease their expectations, than women without a job or with lower incomes<sup>2</sup>.

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<sup>2</sup> Hypothesis 8b, which has to do with the relationship between women's careers and families, is arguably related more to attitudes than to constraints. We place it in this section in order to keep it close to the corresponding hypothesis for men.

Another issue related to the costs of children involves the economies of scale involved in bringing up more than one child. Where children are spaced relatively close together, there may be economies of scale in the purchase of clothes, toys and childcare; there are also clear economies of scale in terms of a mother taking time out of the labour market to look after two children at the same time rather than sequentially, and of re-entering the labour market once rather than multiple times. All these may lead women to space children close together (Newman 1983; Miller and Pasta 1994; Troske and Voicu 2009), the result being that many people have all their children within a childbearing “window” which is far narrower than their biologically fertile window. We therefore hypothesise that if for any reason a substantial amount of time has elapsed since last childbirth, an individual may decide not to have any more children even if he or she had originally planned to do this. In the multivariate analysis we also include a variable indicating whether an individual had their last child four or more years previously, hypothesising that these people will be less likely to revise their intentions upwards than individuals who have either had no children yet, or who have had a child within the previous three years.

- Hypothesis 9: The probability of upward revisions is lower for individuals who have had their last child four or more years previously, than for individuals who have had no children, or who have had a child less than four years ago.

## **2.2 Expected, intended and desired fertility**

Before proceeding, we make one further observation, namely that the analysis in this paper relates to expected fertility (ie, the number of children people say they expect to have), rather than to intended or desired fertility. How far are these concepts comparable? There is a fairly clear difference between desired and intended fertility: desires may be thought of as unconstrained, whereas intentions incorporate factors such as individuals’ personal circumstances and their perceptions of their partner’s desires (Thomson 1997). The difference between intentions and expectations is much more subtle. Although expectations may be thought of as differing from intentions in that the former should acknowledge factors beyond an individual’s control, the difference between the two concepts is in fact extremely small: in practice, stated intentions are nearly identical to stated expectations (Morgan 2001). The analysis in this paper is based on expected fertility; however, we refer frequently to research based on measures of intended fertility. For practical purposes, these two concepts may be thought of as measuring the same thing.

### 3. Data

The data used in this analysis come from the British Household Panel Survey (BHPS), a UK-based survey which has been conducted each year since 1991 on a nationally representative sample of about 10,000 individuals in 5500 households. The BHPS is household-based, meaning that each year every member of sample households aged 16 years or over is interviewed. 17 waves of data are available, with the latest available wave being collected in 2007.

As well as a rich set of background variables, the BHPS asks a set of questions relating to expected fertility. Respondents aged 45 or under (women) and 50 or under (men) are asked: “Do you think you will have any [more] children?” and (if the answer to the first question is positive): “How many [more] children do you think you will have?”

The questions on expected fertility are asked in wave 2, and repeated in Waves 8, 12, 13 and 17, as well as Wave 11 for certain subsamples. These repeated observations potentially allow us to examine changes in fertility expectations over different time intervals: short-term year-on-year changes (between Waves 11, 12 and 13); medium-term changes (using the five- or six-year intervals between Waves 2 and 8, 8 and 13, and 12 and 17); and long-term changes (between Waves 2 and 17).

Among the 84% of eligible respondents who gave full answers to these questions in the relevant waves, there are several sources of ambiguity in the data. First, around 8% of respondents answered “don’t know” to the question on whether they expected to have any [more] children. Second, some respondents who had answered the first question in the affirmative went on to answer “don’t know” when asked how many [more] children they expected to have (here, the numbers were smaller, comprising under 2% of additional cases). These cases have been dropped from the sample. The third source of ambiguity relates to approximately 2% of respondents who were pregnant (or their partner was pregnant) at the time of interview. In these cases, it is not clear whether respondents include the already-conceived child when answering to the question “how many [more] children do you think you will have?”, or not. In fact, pregnant respondents report expecting rather fewer additional children than others, so we have assumed that their responses reflect additional children *over and above* the child already on the way. This assumption affects our estimates hardly at all.

For respondents with no existing children, these questions provide information on expected fertility; for respondents who do have one or more children, the answers to these questions must be added to the number of children they already have, in order to arrive at total expected fertility;

this is the same procedure followed by Quesnel-Vallée and Morgan (2003), Liefbroer (2008) and Morgan and Rackin (2010) in constructing their measures of intended parity.

Questions on total achieved fertility were not carried in every wave of the BHPS: they were carried at Wave 2, but not repeated again until Wave 8, after which the questions were asked annually to all new entrants to the survey (each respondent is asked this question only once over the course of the survey). For the years when a respondent did not reply to this question, we calculate a measure of achieved fertility as follows. Starting with the year in which a respondent was asked about the number of children he or she had had, we carry this number forward to the following year, increasing the total by one (or by two or more in the case of multiple births) if a new baby is present in the household who had not been born at the previous interview, and who is recorded in the household grid as being the child of the respondent. We carry this running total forward year by year, adding to the total each time a new baby is observed.

For women, this procedure is likely to be highly reliable; for men it will be slightly less so. There are two potential sources of error. Rendall et al. (1999) find evidence of under-reporting of achieved fertility among men, relating almost exclusively to children who no longer live with them. In addition, there is the possibility that we may miss some of the new babies fathered by men in the sample, who do not live in the same household as their female (ex-) partners. In fact, this second source of error appears extremely small in our survey; however, there does appear to be some under-reporting of achieved fertility, of the order of 0.3 children.

**Figure 1: Expected and achieved number of children by age and gender, for two cohorts.**

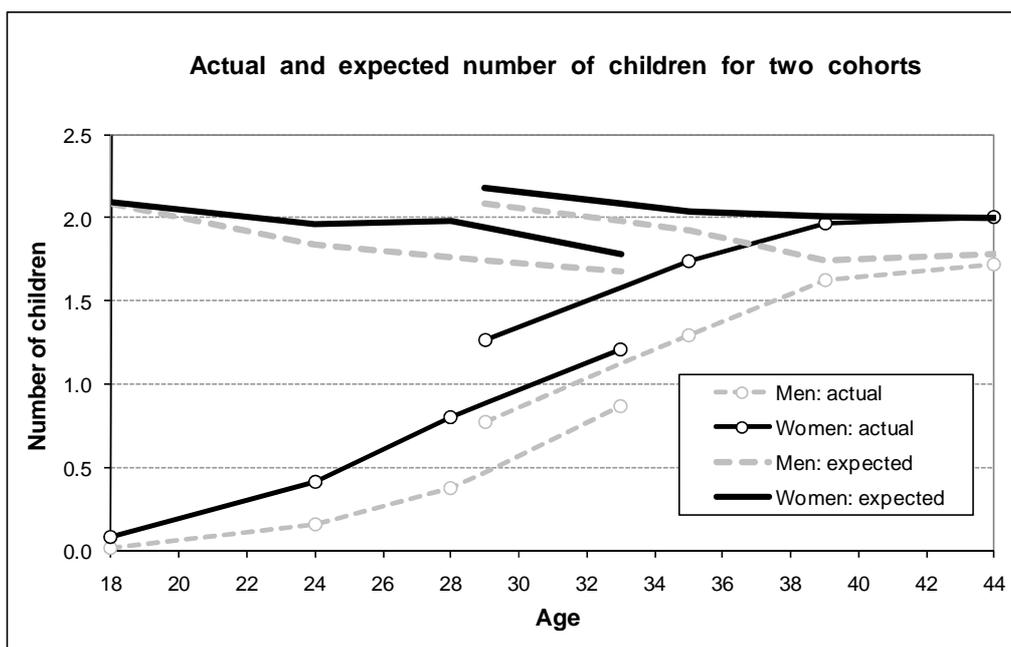


Figure 1 plots both expected and achieved fertility for two cohorts of men and women in the BHPS. The first series relates to those aged 17-19 in 1992, and plots expected and achieved fertility in waves 2, 8, 12 and 17. As the BHPS is not yet long enough to follow this cohort right through their reproductive lives – they are aged only 33 in Wave 17 - the second series presents the same information for an older cohort, who are aged 28-30 at Wave 2 and 43-45 in Wave 17.

In the absence of a cohort effect, these two series would overlap perfectly between ages 29 and 33, with no discontinuity. However, in the context of falling fertility, we do of course observe differences. At age 29, average actual fertility stands at 1.3 for the older cohort and 0.8 for the younger cohort; expected fertility stands at 2.2 for the older cohort against 1.9 for the younger.

Two further features of these graphs stand out. The decrease with age in the gap between expected and actual fertility arises partly because actual fertility increases with age, but also because expected fertility decreases. For the younger cohort, expected fertility falls by 0.3 children (women) and 0.4 children (men) between the ages of 18 and 33; for the older cohort it falls by around 0.2 children (women) and 0.3 children (men) between the ages of 29 and 44. This reduction is of the same order as the reduction recorded by Liefbroer (2008), although rather smaller.

Finally, we note that this graph presents evidence of the systematic under-reporting of fertility by men, as reported by Rendall et al. (1999). The vertical difference between the male and female graphs is around 0.5 children; however, because men have their children somewhat later than women, this gap does not properly represent the degree of under-reporting, which may be estimated by the gap between the male line and the female line shifted rightwards by two years. For both cohorts, this appears to be of the order of 0.2 or 0.3 children per man; this is also the order suggested by the gap between the graphs at age 44.

#### **4. Methods**

The majority of the multivariate results which we report in this paper are estimated using a multinomial logit model. Even though this model is in many ways more basic than some others which have been used in this type of analysis, it does have the important advantage of allowing us to examine increases in fertility expectations separately from decreases.

Our dependent variable is defined as changes in total expected fertility over a six-year period. Three outcomes are specified separately: the reference group consists of individuals whose expectations do not change over the period, while the other two groups are defined as individuals

whose expectations increase and decrease over the same period. We run these regressions separately on samples of men and women aged between 18 and 45.

We mentioned in the previous section that the timing of questions in the BHPS allows us to examine changes in expectations over the short term (one year); the medium term (five or six years) and the long term (fifteen years). The multivariate results we present focus on changes over the medium term: we achieve similar results if we switch the focus to short-term changes, although with a lower degree of precision, because fewer people amend their expectations in this shorter time-span. We did not feel it appropriate to estimate this model over long-term changes, because almost all the explanatory factors in the model are measured in the original time period, and the relevance of these factors over a period of fifteen years is unclear.

The estimates we report treat all individuals whose expectations increase as members of the same group, rather than distinguishing between people whose expectations increase by one, by two, and so on. We did experiment with a more refined version of the dependent variable which took this into account, in order to examine whether the determinants of large changes in expectations differ from the determinants of small changes. However, what little extra insight was gained from this approach was far outweighed by the loss in simplicity of the results.

## 5. Results

We begin this section with a set of descriptive statistics, to motivate and contextualise the later analysis. Expected fertility is tabulated in Table 1, using data taken from Wave 2 of the BHPS. There is a distinct modality at two children; however, people in the youngest group (63% of men and 54% of women) are more likely to expect to have two children than people in the oldest group (45% of men and 43% of women). By contrast, the older group are more likely to expect to have no children or only one child. About 13% of the youngest group expect to have no children or one child; this proportion is approximately double among the oldest group, around 26% of whom expect to have no children or one child.

**Table 1: Expected number of children (column %)**

	Men			Women		
	18-24	25-34	35-45	18-24	25-34	35-45
None	6.4	8.9	14.2	6.0	8.5	11.8
1	7.1	9.6	12.3	6.5	10.3	14.4
2	62.7	50.1	45.3	54.2	47.6	42.8
3	18.1	22.5	18.0	20.1	23.4	20.0
4	3.0	6.8	8.0	11.7	8.1	8.1
5+	2.7	2.1	2.1	1.5	2.9	2.9

Source: BHPS data, Wave 2.

Table 2 shows how expectations are revised between two observation periods six years apart. This table is based on a sample of individuals aged 18-39 (women older than 39 are not asked about their expected childbearing in the second observation period). The table is divided into four quadrants. The two upper quadrants relate to men, while the lower quadrants relate to women; the left-hand quadrants relate to the whole sample, while the right-hand quadrants relate to sample members who, in the first observation year, had not achieved their expected fertility.

Figures in the table are row percentages. In each quadrant, the figures on the diagonal, highlighted in bold type, represent the percentage of people in that group whose expectations do not change over the six-year period. Looking first at the left-hand panels relating to the whole sample, we see that those individuals who expect not to have any children are most likely to maintain that expectation six years later: 85% of men and 86% of women who expected to have no children in the first observation also expect to have no children at the second observation. There is also a relative degree of stability among those expecting two children, with 76% of men and 78% of women who expect to have two children also maintain that expectation six years later. However, expectations are less stable among those expecting to have larger families, with only 58% of men and 67% of women who expect to have three children maintaining that expectation at the second observation.

**Table 2: Changes in fertility expectations over a six-year period: individuals aged 18-39 (row %)**

		Expected fertility at second observation										
		Whole sample					Those who have not yet achieved expected fertility					
		None	1	2	3	4+	None	1	2	3	4+	
Expected fertility at first observation	Men	None	<b>85.0</b>	4.6	8.4	2.0	0.0	-	-	-	-	-
		1	9.0	<b>61.7</b>	23.2	6.2	0.0	24.3	<b>29.1</b>	36.4	10.2	0.0
		2	6.3	9.9	<b>75.8</b>	6.6	1.4	10.1	16.0	<b>64.8</b>	7.2	1.9
		3	1.9	4.9	31.5	<b>57.6</b>	4.2	3.3	8.4	54.1	<b>29.5</b>	4.8
		4+	1.9	2.3	14.5	21.2	<b>60.2</b>	3.1	3.8	24.2	35.4	<b>33.5</b>
Expected fertility at first observation	Women	None	<b>85.9</b>	7.7	5.6	0.8	0.0	-	-	-	-	-
		1	7.2	<b>72.6</b>	15.9	3.8	0.5	32.1	<b>32.3</b>	30.1	3.4	2.1
		2	3.5	7.2	<b>77.9</b>	10.3	1.1	7.1	14.6	<b>64.4</b>	12.4	1.6
		3	0.3	2.9	25.2	<b>66.6</b>	5.1	0.6	6.3	54.9	<b>32.9</b>	5.4
		4+	0.8	1.8	14.6	21.6	<b>61.2</b>	1.6	3.6	28.9	42.8	<b>23.1</b>

The figures relating to the whole sample include individuals who have already completed their families, and who are therefore less likely to change their expectations. Restricting the sample to those people who have fewer children in the first observation period than they say they expect

to have, changes the picture considerably. Among this group, expectations are much less stable. Around 65% of people expecting two children maintain that expectation in the second period – but – only around 30% of people expecting one child, or three or more children, maintain their expectation in the second period.

As well as showing that people do change their fertility expectations, Table 2 shows clearly that these changes occur in both directions. It is not possible to make an overall calculation of the relative importance of upward and downward revisions from Table 2, because the figures are presented as row percentages. This information is presented in Table 3.

**Table 3: Changes in fertility expectations over a six-year period, by age group**

		Revise down	Stay the same	Revise up	Revise down by 2 or more	Revise up by 2 or more
Men	18-24	33.0	54.5	12.5	11.3	3.7
	25-29	25.5	55.8	18.7	7.1	4.5
	30-34	19.9	70.3	9.9	5.2	2.2
	35-39	7.8	87.9	4.4	2.4	0.7
Women	18-24	27.5	50.5	22.0	9.5	3.9
	25-29	21.6	63.4	15.0	4.9	1.8
	30-34	14.6	76.5	8.9	2.5	1.3
	35-39	4.8	92.4	2.8	1.0	0.2

The first three columns in Table 3 each sum horizontally to 100%, and show the percentages who revise their expectations downwards; whose expectations stay the same; or who revise them upwards. The proportion of people whose intentions are stable over time is much higher among older age groups, ranging from 55% for the youngest men up to 88% for the oldest men; and from 51% for the youngest women up to 92% for the oldest women. The proportion of people changing their expectations is correspondingly larger among the younger groups – both upward and downward revisions are much more common in the younger than in the older age groups.

Table 3 also shows that while more people revise their expectations downwards than upwards, upward revisions account for up to 40% of all changes (the exception being the youngest group of men, among whom they account for only about 28% of revisions). This fact provides additional motivation for analysing the determinants of changes in both directions separately.

Finally, the two right-hand columns show the percentages of people who adjust their fertility expectations over this period by more than one child. These figures serve to demonstrate that although the majority of people who change their expectations do so by only one child, a substantial minority – 20 to 25% of people who change their expectations – do so by two or more children.

## 5.1 Multivariate analysis

In this section we estimate multinomial logit regressions with the dependent variable being whether an individual's fertility expectations remain stable over the six-year observation period [reference group]; decrease; or increase. We estimate several specifications. The first is very simple, including only a quadratic in age; variables denoting whether the person has a job or not, and their monthly earnings; and four variables to capture partnership status. The reference category is an individual who has the same partner in both the first and second observation periods; other variables indicate respondents who (a) had a different partner at the second than at the first interview; (b) had no partner at the first interview but had a partner at the second; (c) had no partner in either interview; and (d) who had a partner in the first interview, but who had no partner in the second interview<sup>3</sup>.

The second specification includes an additional variable indicating whether the individual's youngest child is aged 4 or over (the reference category consisting of those who have not yet had children, or whose youngest child is aged below 4). This variable aims at capturing the effect of the childbearing "window". The third specification also includes variables relating to the individual's partner. In this specification, people without a partner are retained in the sample, and the relevant variables are set to the mean or mode for sample members who do have a partner – dropping unpartnered people from this specification produces similar results. We control for the age of an individual's partner by including two binary variables indicating whether the partner is more than seven years older, or younger, than the individual. We include variables indicating whether the individual's partner has a job, and his or her monthly earnings; and a pair of dichotomous variables indicating whether an individual's partner expects to have more, or fewer, children than the individual him- or herself.

The fourth specification is identical to the third, except that it also controls for the number of children the individual expected in the first year he or she was observed. The reference group consists of people who wanted two children; dichotomous variables are included indicating those

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<sup>3</sup> It is worth mentioning the additional covariates which we found not to be significantly associated with changes in expectations. These include a more sophisticated specification for partnership status, including variables distinguishing between marriage and cohabitation, and variables identifying complex trajectories through partnership formation and dissolution; indicators of ethnicity; and educational attainment, which was significant when included on its own but which served only to confound our estimates when labour market status and earnings were also included. We also tried including an indicator of the size of the individual's family of origin, an indicator of the individual's birth order in his or her family of origin, and a set of variables capturing the Big Five personality traits; all were significant in regressions in which fertility expectation is the dependent variable, but none were significant when the locus of interest switched away from fertility expectations to changes in these expectations.

who wanted fewer than two, or more than two, children. Including these variables in a regression which examines changes in a very similar variable is potentially problematic: it is likely that the variable “expected number of children” will be correlated with the other explanatory variables in the regression, in ways which may make the other estimates difficult to interpret. However, it does provide an idea of whether there is a degree of regression to the mean - in other words, of whether individuals stating that they expect to have few children tend to change their expectations in an upwards direction, while individuals stating that they expect to have many children tend to revise downwards.

The fifth and sixth specifications examine the role of the biological clock in more detail, adding firstly dichotomous variable indicating the approach of the end of the fertile years (Specification V) and a full set of age interactions (Specification VI). Finally, the seventh specification adds a set of variables relating to births occurring between the two observation points. The construction of these variables is rather complex, and is explained in detail in Section 5.3, where the results are also presented.

The means of the dependent and explanatory variables are presented in the Appendix, in Table A1.

Estimates from the first four specifications are presented in Table 4. The coefficients for men are presented in the upper panel and for women in the lower panel. Estimates relating to decreases in expectations relative to no change in expectations are shown in the three left-hand columns; estimates relating to increases in expectations, again relative to “no change”, are shown to the right.

We have performed chi-squared tests comparing coefficients in the “decrease” and “increase” equations; for each of the four specifications, the column on the far right of the table reports whether the hypothesis that the coefficients in the two equations are equal and opposite is rejected (✓) or not rejected (✗). The fact that in many cases the test rejects that the coefficients are equal and opposite makes clear the need for an approach which estimates the two sets of coefficients separately.

The effect of age is clear: for both men and women, the probability of changing expectations in either direction increases in age and decreases in age squared. The turning point in this function occurs in the early to mid twenties for men, and around the age of 20 for women – in other words, this confirms the earlier descriptive finding that revisions in expectations in both upward and downward directions are more common in younger than in older individuals. We return to the

issue of age in more detail later; for the moment, we note that Hypothesis 1 is confirmed, namely that, after an initial phase, the probability of both downward and upward revisions falls with increasing age.

**Table 4: Results from multinomial logit regressions (I)**

	DECREASE EXPECTATIONS				INCREASE EXPECTATIONS				X <sup>2</sup>	
	MEN	I	II	III	IV	I	II	III		IV
Age		0.343***	0.273**	0.304**	0.316**	0.530***	0.476***	0.496***	0.488***	✓✓✓✓
Age squared		-0.008***	-0.006***	-0.007***	-0.006***	-0.011***	-0.009***	-0.010***	-0.010***	✓✓✓✓
Youngest child is aged 4+		-	-1.448***	-1.311***	-1.657***		-1.100***	-0.923***	-0.828**	-✓✓✓
Gets a different partner		0.485	0.549	0.245	0.556	1.129***	1.193***	1.029**	0.918*	✓✓✓x
Gets a partner		0.371	0.266	0.196	0.825**	0.367	0.286	0.283	0.045	✓xxx
No partner		0.211	0.061	0.010	0.817**	-0.252	-0.368	0.365	-0.815*	xxxx
Loses a partner		0.488	0.407	0.533	0.644*	-0.088	-0.152	-0.213	-0.327	xxxx
Monthly Income x 100		0.001	-0.003	-0.005	-0.003	0.009	0.005	0.003	0.004	xxxx
Has a job		-0.294	-0.292	-0.245	-0.165	-0.282	-0.287	-0.110	-0.053	xxxx
Partner wants more children				0.143	0.499			1.304***	1.028***	--✓✓
Partner wants fewer children				1.502***	0.665*			0.790*	0.900*	--✓✓
Partner > 7 yrs younger				1.066***	1.082***			0.833*	0.867*	--✓✓
Partner > 7 years older				-0.649	0.013			-0.832	-1.470*	--xx
Partner has job				-0.459*	-0.155			-0.668**	-0.837**	--✓✓
Partner monthly income x 100				0.043**	0.065***			0.028	0.029	--✓✓
Expected < 2 children					-1.204***				1.306***	---x
Expected > 2 children					1.666***				0.292	---✓
Constant		-4.400**	-3.577**	-4.110**	-5.546***	-7.769***	-7.154***	-7.708***	-6.905***	
Pseudo R-squared		0.134	0.154	0.185	0.259					
<b>WOMEN</b>										
		I	II	III	IV	I	II	III	IV	
Age		0.325**	0.321**	0.284*	0.312*	0.317*	0.324*	0.342*	0.333*	✓✓✓✓
Age squared		-0.008***	-0.008***	-0.007**	-0.007***	0.008***	-0.008**	-0.008**	-0.008***	✓✓✓✓
Youngest child is aged 4+			-0.946***	-0.980***	-1.045***		-0.506*	-0.500*	-0.530**	-✓✓✓
Gets a different partner		-0.032	-0.008	-0.018	0.111	0.816**	0.833**	0.824**	0.737**	xxxx
Gets a partner		-0.193	-0.131	0.677*	0.938**	0.340	0.382	0.525	0.400	xx✓✓
No partner		0.157	-0.207	1.003**	1.376***	0.010	0.045	0.182	0.045	xx✓✓
Loses a partner		-0.088	-0.069	-0.054	-0.053	-0.404	-0.393	-0.366	-0.373	xxxx
Monthly Income x 100		0.049***	0.030*	0.032*	0.065***	0.027	0.015	0.015	0.007	✓✓✓✓
Has a job		-0.447**	-0.331	-0.357*	-0.091	-0.652***	-0.579**	-0.574**	-0.614**	✓✓✓✓
Partner wants more children				0.131	0.386			0.683*	0.621*	--x✓
Partner wants fewer children				1.463***	0.747**			0.279	0.507	--✓✓
Partner > 7 yrs younger				0.040	-0.036			1.300	1.266	--xx
Partner > 7 years older				-0.142	0.267			-0.245	-0.321	--xx
Partner has job				0.608*	0.691*			0.047	-0.002	--xx
Partner monthly income x 100				-0.016	-0.016			-0.001	-0.000	--xx
Expected < 2 children					-1.117***				0.620***	--xx
Expected > 2 children					1.776***				-0.225	--x✓
Constant		-3.705*	-3.925*	-4.078*	-8.160***	-3.767*	-4.023*	-4.388*	-4.199*	
Pseudo R-squared		0.107	0.114	0.134	0.205					

Notes: based on samples of 2304 individuals (men) and 2291 individuals (women)

Turning to the variables describing partnership status, the most robust finding is that changing partners between the two observations is significantly associated with increases in expected fertility. This holds for both women and men, though the coefficient is larger for men, and it is robust across all specifications; it is consistent with the literature on repartnering and stepfamilies (Thomson et al. 2002), where children are seen as consolidating a new union. For men, none of the other partnership variables are significant; for women, both getting a partner and not having a partner are significantly associated with reducing expectations in the third specification.

Our hypothesis 6 predicted that compared with individuals who have a partner, individuals who do not have a partner, or who split from a partner, would be more likely to revise their expectations downwards, and less likely to revise them upwards. Table 4 provides some rather limited support for Hypothesis 6: women without a partner do appear more likely to reduce their expectations than women who have a partner throughout<sup>4</sup>.

The coefficients on the employment and income variables are insignificant for men, but play a significant role for women. Women who have a job are less likely to increase their expectations, while women with higher earnings are more likely to decrease their expectations. Counterbalancing this second result is the fact that women with a job are less likely to decrease their expectations. At levels of earnings up to about 75% of the average for women in the sample who have a job, women with a job are less likely to revise their intentions downwards; at levels of earnings higher than this, women with a job are more likely to revise their intentions downwards.

In the second specification, the results show that the variable indicating whether the individual's youngest child is aged 4 or older is highly significant for both men and women, being associated with a reduced likelihood of revising fertility intentions either upwards or downwards. The same is true in all specifications. Moreover, this variable does not change the other estimates substantially. We hypothesised earlier (Hypothesis 9) that this result would provide evidence that people prefer to limit their childbearing to a period of their lives shorter than their reproductively fertile lives; this is strongly confirmed<sup>5</sup>.

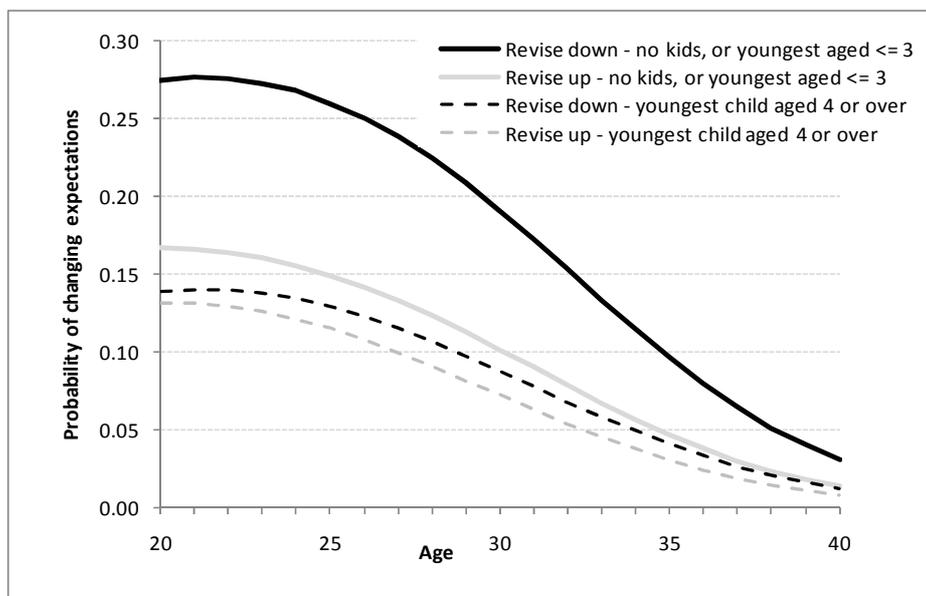
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<sup>4</sup> In Specification IV, men who do not have a partner, or who lose a partner, are also more likely to reduce their expectations; however, we have acknowledged that there may be difficulties with this specification, and any conclusions drawn from these results must be considered tentative at best.

<sup>5</sup> People whose youngest child is aged 4 or older also have a reduced likelihood of revising their expectations downwards. This effect occurs because this group of people are more likely already to have achieved their expected fertility, and therefore cannot revise downwards. If we look separately at the group

In order to assess the relative importance of the coefficients on chronological age and the coefficient on the childbearing “window”, we calculate estimated probabilities of revising expectations upwards and downwards for a woman who has lived with the same partner throughout, who has a job, and who has average earnings. We do this under the scenario that the woman has no children [yet]; and under the alternative scenario that that her youngest child is four or over. These estimated probabilities are plotted by age in Figure 2. The two solid lines relate to the probability of revisions for a woman who does not have children; the probability that she will revise her expectations falls steeply with age, and that the probability that she will revise downwards is higher than the probability that she will revise upwards. The broken lines relate to the scenario where the woman’s youngest child is aged 4 or over. Again, the downward slope indicates that the probability of revisions in both directions declines with age, and again, the probability of downward revisions is higher than the probability of upward revisions. However, the most noteworthy feature of this graph is the fact that the probability of revising both downwards and upwards is much lower for those whose youngest child is aged 4 or over. Thus, it is clear (a) that both biological age and the notion of the childbearing “window” are important; and (b) that the effect associated with the childbearing “window” is sizeable in relation to the effect associated with biological age.

**Figure 2: Estimated probabilities of revising expectations by age, for women whose youngest child is aged 4 or over, and others**



who have *not* yet achieved their expected fertility, having a youngest child aged 4 or older is associated with a slightly higher probability of reducing one’s expectations.

Turning to the third specification, which includes partner variables, we see clear evidence that people adjust their expectations in accordance with those of their partners, which confirms our Hypothesis 7. Both men and women whose partners expect to have more children than they do are likely to revise their expectations upwards; and both men and women whose partners expect to have fewer children than they do are likely to revise their expectations downwards. The effect appears to be stronger in the downwards direction, indicating that one reason for the general downward trajectory of expectations over the reproductive life may be associated with couples' expectations tending to adjust towards the lower of the two individual expectations.

We also observe that the age of the partner plays a role: for men, having a partner more than 7 years younger than oneself is associated with a higher probability of revising expectations in both directions. The coefficients for women have the same sign, but they are not statistically significant. Finally, we consider the variables relating to partner's income and employment status. These reveal an asymmetry between men and women which at least partly mirrors our findings on individuals' own incomes and employment. The incomes and employment of women are significantly associated with revisions in expectations for their male partners, in both upward and downward directions, with female employment and/or higher earnings being positively associated with downward revisions, and negatively associated with upward revisions. Men's incomes do not affect revisions for their female partners, and their employment affects only revisions in the downward direction – women whose partners have a job are more likely to revise their expectations downwards.

Thus our Hypothesis 8b, which predicts that women who are more attached to the labour market are more likely to revise downwards and less likely to revise upwards, is confirmed, both in respect of individuals themselves and in respect of partners. However, our hypothesis 8a, making the opposite prediction in relation to men, is not.

In the fourth specification, two variables are added indicating whether individuals said at the first observation that they expected to have fewer than two, or more than two, children (the reference group is people who said they expected to have exactly two children). People who expected to have fewer than two children are less likely than people in the reference group to revise their expectation in a downwards direction, and more likely to revise it upwards; people who expected to have more than two children are more likely than people in the reference group to revise their expectation downwards, and no more likely to revise it upwards. This provides evidence for our hypothesis 4, that revisions in expectations embody a regression to the mean.

## 5.2 Age interactions: the biological clock

The next set of results, presented in Table 5, takes as its starting point estimates from Specification III, in order to investigate the role of the biological clock. Following from the work of Liefbroer (2008) we are particularly interested in the interactions between age and partnership status.

We start by adding a dichotomous variable indicating that an individual is of an age where the biological clock becomes an issue. We experimented with cut points for this variable ranging from age 29 to age 44; for men, this variable was *never* significant, whereas for women, the *only* formulation which provided a significant coefficient was a variable indicating if the individual was aged 30 or over – this is in line with the results of (Rodgers et al. 2007) which suggest that until the age of 30 women do not have yet concerns over their upper biological limits ; even in this case, the coefficient was relatively small compared to the size of the coefficient on age. These estimates are presented in Column 1 as Specification V; they provide some evidence, although fairly weak, in favour of Hypotheses 5 and 5b, namely that the probability of downward revisions does increase as women approach the end of their fertile years.

This specification indicates that after age 30, women have a slightly increased probability of revising their expectations downwards, but it does not allow for the fact that this change in probability may increase with age after this point. In order to explore this possibility, we included an interaction term between the “30-plus” variable and the linear age variable, and various spline functions in age; these did not uncover any significant or interesting relationships, and are not reported in Table 5.

We also estimated models which included a full set of interactions between age and all the other variables; and between the “30-plus” indicator and all other variables. Interactions between the “30-plus” indicator and other variables are almost uniformly insignificant, and we have not included these in the table. However, a few of the interactions with the linear age variable are significant; these are presented as Specification VI. Results are presented in two columns side by side, the first column presenting the main coefficients, and the second column presenting the interaction terms.

**Table 5: Results from multinomial logit regressions (II) – interaction effects**

	DECREASE EXPECTATIONS			INCREASE EXPECTATIONS			
	MEN	V	VI – main	VI - interactions	V	VI – main	VI - interactions
Age		0.304**	0.26		0.549***	0.131	
Age squared		-0.007***	-0.006		-0.010***	-0.002	
Over 30		0.057	1.261	-0.033	-0.499	4.307	-0.157
Youngest child is aged 4+		-1.311***	3.384*	-0.134**	-0.903**	2.843	-0.109
Gets a different partner		0.248	2.421	-0.076	0.993**	1.4	-0.016
Gets a partner		0.199	-0.094	0.009	0.267	-1.641	0.07
No partner		0.01	-1.336	0.049	-0.349	-1.85	0.051
Loses a partner		0.532	-0.044	0.02	-0.186	2.437	-0.089
Monthly Income x 100		-0.005	-0.061	0.002	0.004	-0.049	0.002
Has a job		-0.244	0.524	-0.027	-0.123	1.257	-0.046
Partner wants more children		0.145	1.329	-0.041	1.300***	2.095	-0.027
Partner wants fewer children		1.506***	4.623**	-0.100*	0.763*	-1.062	0.059
Partner > 7 yrs younger		1.063***	-7.801**	0.247***	0.863*	0.089	0.02
Partner > 7 years older		-0.646	6.199	-0.234	-0.85	13.362	-0.521
Partner has job		-0.461*	-1.143	0.023	-0.673*	-1.045	0.014
Partner monthly income x 100		0.043**	0.052	0.000	0.029	0.022	0.000
Constant		-4.088**	-3.332		-8.758***	-3.468	
N		2304	2304		0.549***		
Pseudo R-squared		0.186	0.194				

	V	VI – main	VI - interactions	V	VI – main	VI - interactions
<b>WOMEN</b>						
Age	0.306*	0.213		0.344*	0.064	
Age squared	-0.008***	-0.006		-0.009***	-0.003	
Over 30	0.471*	1.054	-0.02	0.211	0.836	-0.018
Youngest child is aged 4+	-1.002***	0.763	-0.054	-0.510*	5.059***	-0.184***
Gets a different partner	-0.022	-0.721	0.026	0.823**	1.11	-0.015
Gets a partner	0.679*	-2.449	0.114	0.526	-1.093	0.065
No partner	0.995***	-1.446	0.085	0.178	-1.297	0.054
Loses a partner	-0.054	1.731	-0.067	-0.36	0.032	-0.013
Monthly Income x 100	0.034*	-0.163	0.006*	0.015	-0.128	0.005
Has a job	-0.358*	2.006*	-0.079*	-0.584**	0.947	-0.048
Partner wants more children	0.137	1.017	-0.033	0.686**	-0.837	0.051
Partner wants fewer children	1.467***	2.012	-0.016	0.279	1.246	-0.034
Partner > 7 yrs younger	0.105	18.514	-0.509	1.319	443.383	-13.722
Partner > 7 years older	0.14	0.469	-0.011	-0.249	2.618	-0.101
Partner has job	0.606*	-1.616	0.079	0.045	1.193	-0.039
Partner monthly income x 100	-0.016	0.065	-0.003	-0.001	-0.027	0.001
Constant	-4.046*	-2.638		-4.282*	-0.767	
N	2291	2291				
Pseudo R-squared	0.135	0.145				

Of the remaining interaction effects, the majority are also insignificant, with a number of interesting exceptions.

In previous specifications, the “youngest child aged 4+” coefficient was negative and significant in both increasing and decreasing equations. With the addition of the age interaction, the coefficients become positive, with a negative age interaction. A simple manipulation of the coefficients reveals that until the mid-twenties, individuals whose youngest child is aged 4 or over are more likely than others to revise their intentions both upwards and downwards. This relates to a small percentage of women (i.e. those who first gave birth before age 21) and an even smaller percentage of men. After the mid-twenties, the interaction effect becomes progressively larger than the main effect, showing that the negative effect of having passed one’s childbearing “window” increases with age. In other words, even after controlling for biological age, the effect of having had one’s youngest child more than four years ago is larger for an individual of (say) 38 than for an individual of (say) 28.

For men, the interaction coefficient on “partner wants fewer children” is significant in the “decreasing” equation. The main effect is still positive – men whose partners want fewer children are more likely to decrease their own expectations – but this effect decreases with age. For men there is also a significant interaction effect on “partner over 7 years younger”. In the previous specification the coefficient in the “decrease” equation was positive; here it is negative, with a positive age interaction. This shows that men whose female partners are much younger than they are, are less likely to revise their intentions downwards until the age of 30 (their partners would be under 23), but more likely to revise their intentions downwards thereafter.

For women, there are significant age interactions on the job and income coefficients for women in the “decrease” equation. The combined effect of these is difficult to quantify, depending, as it does, on both the woman’s age and her income. Women on the lowest incomes are more likely to revise their expectations downwards than women without a job; however, this effect falls with age. Women on the much higher incomes are less likely than other women to revise their expectations downwards; however, this effect decreases with age.

The main point which may be drawn from these results is that they do not provide evidence that revisions to fertility intentions are strongly influenced by the biological clock. Our attempts to model the effect of the biological clock produced at best weak results for women, and there is no evidence that any of the partnership variables have a greater effect towards the end of the fertile years.

This is not to say that the biological clock is not an important factor in determining women’s (or men’s) expectations of fertility. But rather, it appears that if people do revise their expectations in anticipation of the end of their fertile lives, many of them do so well in advance.

The average decline in fertility expectations is smooth, from the early twenties onwards, and there is no evidence, either from the descriptive data or from the multivariate analysis, of a sudden decline in expectations as people approach the end of their fertile years.

### 5.3 The role of childbirth

In this final section of results, we examine the role of childbirth in changes to planned fertility. Arguing that one of the principal ways in which people learn about joys and hardships of parenthood is by actually becoming parents, we hypothesised that the birth of a child would be associated with both upward and downward revisions (H2). We also hypothesised that these revisions may differ by parity. We proposed two alternative formulations, the first (H3a) hypothesising that a first birth will have a greater effect than subsequent births in both directions; and the second (H3b) that first births will be predominantly associated with upward revisions, while second and subsequent births will be predominantly associated with downward revisions.

Constructing an appropriate set of variables with which to examine these effects is not altogether simple. By definition, expected fertility will increase between the two observation points for all individuals who did not expect to have any [more] children at the first observation point, but who did have more children. These individuals, we exclude from the analysis. We also exclude individuals who had more than one birth during the observation window, since it leads to estimates almost identical to those which we obtain by including them, and means we are able to estimate a much simpler and intuitively clear specification. The reference group consists of people who had no birth.

We need to distinguish between people who had a birth bringing them up to the total number of children they expected to have at the first observation point (and who therefore, by construction, cannot experience a fall in expected fertility at the second point) and those who had a birth which did not bring them up to their original expectation (and who therefore, may experience changes in expected fertility in both directions). Thus, distinguishing between these two groups is necessary in order to obtain meaningful estimates in the “revise down” equation.

We also distinguish between first births and subsequent births (we also tried distinguishing between second and higher order births, but did not find this improved the specification at all). This leads to the following grouping:

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	Reference group: no birth
First child - Hit Target	Had a first child: achieved previously expected fertility
First child - Still Short	Had a first child: still short of previously expected fertility
Second/Subs – Hit Target	Had a second or subsequent child: achieved previously expected fertility
Second/Subs – Still Short	Had a second or subsequent child: still short of previously expected fertility
	Dropped from sample: had more than one child, or had a birth bringing them above their previously expected total

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**Table 6: Results from multinomial logit regressions (III) – the role of childbirth**

	MEN		WOMEN	
	Decrease	Increase	Decrease	Increase
Age	0.347***	0.414*	0.293*	0.268
Age squared	-0.007***	-0.008**	-0.007**	-0.008
Youngest child is aged 4+	-1.285***	-2.636**	-0.914***	-0.762
Gets a different partner	0.463	2.161***	0.008	1.384***
Gets a partner	0.794**	2.067***	0.861*	0.822
No partner	0.789*	2.079***	1.360***	0.596
Loses a partner	0.757*	1.100	0.234	0.306
Monthly Income x 100	0.005	0.022	0.022	0.030
Has a job	-0.346	-0.157	-0.159	-0.004
Partner wants more children	0.233	1.719***	0.411	0.483
Partner wants fewer children	1.580***	1.755**	1.471***	1.172**
Partner > 7 yrs younger	1.409***	1.272*	-0.018	1.703
Partner > 7 years older	-0.883	-0.416	0.327	0.101
Partner has job	-0.071	-0.174	0.616	-0.034
Partner monthly income x 100	0.040*	0.054	-0.011	0.029*
Had first child - Hit Target	-	2.331***	-	2.007***
Had first child - Still Short	1.062***	1.625***	0.884***	0.726*
Had 2nd/subs child – Hit Target	-	-0.026	-	0.230
Had 2nd/subs child – Still Short	5.789***	5.068***	5.576***	3.138**
Constant	-5.524**	-9.191***	-4.721*	-4.698
N	2112		2039	
Pseudo R-squared	0.3329		0.2857	

Results are presented in Table 6. The coefficients on these new variables are large and highly significant. First births to people who only expected to have one child are associated with increases in expectations, while first births to people who originally expected to have more than one child are associated with both upward and downward revisions. Second and subsequent births which “hit the target” – that is, which bring a person up to the number of children he or she previously expected to have – are not associated with any revision to expectations. However, second and subsequent births, after which the individual remains short of his or her previous expectation, are significantly associated with both upward and downward revisions.

These results confirm the findings of Udry (1983) and Monnier (1989) who suggest that childbearing decisions are made sequentially and revised on the arrival of a new child. However, they run counter to the findings of Gisser et al (1985)<sup>6</sup>, who do not find evidence in support of the “baby shock hypothesis” (i.e, that a first birth may reduce the ideal number of children). This

<sup>6</sup> Quoted in Heiland et al (2008)

difference may be due to the fact that we use a specification which does not constrain the coefficients in the “increase” and “decrease” equations to be equal and opposite; constraining estimates in this way may clearly have yielded a very different result.

How do these results fare in relation to our hypotheses? Hypothesis 2, that births are associated with both upward and downward revisions, is strongly supported-

We proposed two alternative formulations for Hypothesis 3, relating to parity. In fact, neither of these hypotheses is clearly supported. Of births which “hit the target”, it is only first births which are associated with revisions to expectations. However, of births which fall short of the original target, the coefficient on second and subsequent births is much larger than the coefficient on first births. Thus, there appears to be no systematic relationship between parity and the propensity to revise one’s expectations; the variation appears to be mediated less by parity, and more by a person’s proximity to their original target.

## **6. Conclusions**

This paper has examined the determinants of changes in expected fertility. We have found that both downward and upward adjustments to expected fertility occur, and that adjustments in both directions are much more common at younger than at older ages. This finding – of greater variability in both directions at younger ages – dominates the much smaller effect that we find – for women only – of a tendency to reduce expectations after the age of 30, as the end of the fertile years begins to approach. The fact that we find only a very modest drop in expectations after age 30 does not mean that people don’t adapt their expectations in response to the constraints imposed by the biological clock. Rather, it appears that this adjustment is a gradual process, taking place at different ages for different people, and leading to a smooth decline in average fertility expectations from the early twenties onwards.

We also find evidence of a childbearing “window” – a period during which a person is likely to make most of the decisions relating to childbirth, and during which he or she is likely to actually have most or all of their children. This window is much narrower than the window defined by biological fecundity: once it is drawing to a close (defined here as a person’s youngest child reaching four years old) people are less likely to revise their expectations either upwards or downwards.

Economic constraints are perhaps less important than we might have anticipated, although this is an area where we find asymmetries between men and women. The probability that men revise their expectations does not appear to be related to their incomes or employment status.

However, for women, having a job and earning higher wages are associated with a higher probability of revising expectations downwards, and a lower probability of revising upwards – evidence of the difficulty in reconciling paid work and family responsibilities. Women’s incomes and employment also affect the probability that their *partners* will revise their expectations; again, female employment and higher earnings are associated with a greater probability of downward, and a lower probability of upward, revisions. The corresponding effect – the effect of male labour force characteristics on their female partners’ expectations – is much smaller; it is only men’s employment, rather than earnings, which play a role, and only downward revisions are affected.

Partnership is related to the revision of expectations in several ways. Although we expected the presence or absence of a partner to be a fairly important factor, in fact it was not. The notable exception to this is that both men and women who split and re-partner during the period of observation are very much more likely than those who remain with the same partner throughout to increase the number of children they expect to have.

It is also clear that people take their partner’s childbearing plans into account when revising their own plans. People whose partners expect more children than they do are more likely to revise upwards; people whose partners expect fewer children than they do are more likely to revise downwards.

We find evidence of regression to the social norm of two, with people who started out expecting smaller numbers of children more likely to revise upwards, while people who started out expecting larger numbers revising downwards.

Finally, we find that the process of becoming a parent itself influences future childbearing plans. Having a child is associated with both upward revisions in expected fertility (on the part of those who learn that parenthood is a more positive experience than they had anticipated) and with downward revisions (on the part of those who find it less positive).

Two more general findings emerge. The first relates to the way in which changes to fertility intentions are conceptualised and modelled. We find very strong evidence that upward and downward changes in intentions are not equal and opposite, and that in empirical research, they need to be modelled separately. A number of factors (age, childbirth and the age of the youngest child) affect both upward and downward revisions *in the same direction*; the effect of these factors may not be properly estimated or may be missed altogether in a specification which does not allow for upward and downward revisions to be estimated separately.

Finally, we move on to one of the debates which motivated this research: the way in which we should interpret the gap between individuals' reported fertility expectations early in life, and their realised fertility at the end of their reproductive years. This gap is often conceptualised as representing an unmet need for children. It is clear that many individuals *do* fail to have some, or all, of the children they would have liked, due to obstacles which may include social, economic or biological constraints. However, our results demonstrate that it would be wrong to represent the entire gap between expected and achieved fertility as arising from an unmet need for children. We conceptualised the existence of three sets of factors which might be associated with changing expectations: people's attitudes about childbearing, social norms around childbearing, and constraints. We found evidence to suggest that *all* these factors are indeed associated with revisions to expectations. People do change their expectations, and constraints do matter; but other things matter too. Some people decide to have fewer children than they originally wanted and some more; some find new partners and some negotiate with existing partners; some learn on the job about children and parenthood. In other words, while some people clearly experience constraints to achieving their planned fertility, we have shown that many people simply change their minds.

## 7. References

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## Appendix

**Table A1: Summary statistics**

	Men	Women
Revise expectations downwards	15.1%	15.2%
Revise expectations upwards	7.8%	10.8%
Age	34.0	30.6
<i>Number of children at first observation point</i>		
None	39.7%	35.0%
One	16.3%	18.4%
Two	29.1%	28.9%
Three	10.1%	12.6%
Four	4.8%	4.8%
Youngest child 4 years old or over (coded as zero for individuals with no children)	38.0%	37.0%
<i>Partnership</i>		
Same partner at both waves [reference category]	67.2%	59.1%
Different partner at 2 <sup>nd</sup> than at 1 <sup>st</sup> wave	3.0%	4.3%
No partner at 1 <sup>st</sup> wave, partner at 2 <sup>nd</sup> wave	10.6%	11.9%
No partner at either wave	14.4%	17.8%
Partner at 1 <sup>st</sup> wave, no partner at 2 <sup>nd</sup> wave	4.8%	6.8%
Has a job	88.0%	66.1%
Monthly earnings (coded as zero for those without a job)	1345	581
<i>Births between the two observations</i>		
Did not have a baby [reference category]	78.5%	73.2%
Had first child - Hit Target	1.4%	0.9%
Had first child - Still Short	5.3%	6.3%
Had 2nd/subs child – Hit Target	4.6%	5.7%
Had 2nd/subs child – Still Short	2.8%	3.0%
Had birth in excess of expected total, or had more than one child [excluded]	7.4%	10.9%
<i>Partner variables [means over people who have a partner]</i>		
Partner wants more children than respondent	12.7%	9.1%
Partner wants fewer children than respondent	6.8%	10.7%
Partner more than 7 years younger than respondent	7.3%	0.9%
Partner more than 7 years older than respondent	3.0%	12.0%
Partner has a job	69.2%	84.7%
Partner's monthly income from job	602	1299

**Table A2: Hypotheses**

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H1	The probability of both downward and upward revisions falls with increasing age	Confirmed
H2	The birth of a child will be associated with both downward and upward revisions in expected fertility.	Confirmed
H3a	The birth of a first child will have a greater effect on revisions to fertility expectations – in both directions – than subsequent births.	Not confirmed
H3b	First births are predominantly associated with increases in expected fertility, while second and subsequent births are predominantly associated with decreases in expected fertility.	Not confirmed
H4	Individuals' expectations of childbearing tend, over time, to conform to the social norm of two. Individuals who begin by wanting fewer than two children will have an increased probability of revising their expectations upwards, while those who begin by wanting more than two children will be more likely to revise their expectations downwards.	Confirmed
H5	The probability of downward revisions to expected fertility increases as individuals near the end of their fertile years.	Weakly confirmed
H5b	This effect will be particularly pronounced for women.	Weakly confirmed
H6	Compared with individuals who have a partner, individuals who do not have a partner, or who split from a partner, are more likely to revise their expectations downwards, and less likely to revise them upwards.	Partially confirmed
H7	Individuals will tend to adjust their expectations in line with the expectations of their partner. Individuals who originally want more children than their partners will tend to reduce their expectations; individuals who originally want fewer children than their partners will tend to increase their expectations.	Confirmed
H8a	Men with a job or with higher incomes are more likely to increase their expectations, and less likely to decrease their expectations, than men without a job or with lower incomes.	Not confirmed
H8b	Women with a job or with higher incomes are less likely to increase their expectations, and more likely to decrease their expectations, than women without a job or with lower incomes.	Confirmed
H9	The probability of upward revisions is lower for individuals who have had their last child four or more years previously, than for individuals who have had no children, or who have had a child within the last three years.	Confirmed

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