Employment Opportunities and Pre-marital Births in Britain

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Abstract

In 1999, nearly two-fifths of births in Britain were outside marriage. This study estimates the impact of employment opportunities in the local labour market on the probability that a childless never married woman has a birth outside marriage. It uses the unemployment rate in the travel-to-work area in which the woman lives as the indicator of employment opportunities. The estimates indicate poorer employment opportunities increase the pre-marital first birth rate and discourage union formation.

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Non-technical Summary

In 1999, 39% of births in Britain were outside marriage. Children born outside marriage spend a longer average time living with one parent than those born within marriage and this appears to have long-term consequences to have long term consequences for the children. This paper studies the impact of employment opportunities on the decision to become a mother outside marriage.

There are at least two ways in which economic opportunity may affect childbearing outside marriage. Poor employment opportunities for young men may discourage marriage, thereby increasing the population of young women at risk to have a birth outside marriage and making it more likely that a pregnant woman does not marry the father of the child. In addition, poorer employment opportunities for young women, which tend to go hand-in-hand with poorer opportunities for young men, reduce women's opportunity cost of childbearing, thereby tending to increase childbearing directly. The present study estimates the impact of employment opportunities in local labour markets on the pre-marital first birth rate in Great Britain. It exploits variation in the unemployment rate in 300 "travel-to-work areas" over time and space to identify this effect. The data come from matching the first eight years of the British Household Panel Study (1991-98) and the NOMIS (National On-line Manpower Information Service) travel-to-work area data.

The results suggest that poorer local employment opportunities encourage pre-marital childbearing and discourage the formation of cohabiting unions, which delays marriage. In particular one percentage point higher local unemployment rate increases the annual probability of having a pre-marital first birth by about 0.4 percentage points, which represents a 10% increase in the pre-marital first birth rate. Put differently, a sustained one percentage point higher local unemployment rate would

increase the percent of women having pre-marital birth before their 27th birthday by about 2-3 percentage points. . It would also reduce the probability of having a live-in partnership before her 27th birthday by about 3 percentage points. Because, at each age, first marriage rates are much higher among cohabiting women than those without a live-in partner, delayed entry to a cohabiting union also delays marriage. Thus, these results are consistent with both poorer marriage opportunities and lower opportunity costs encouraging pre-marital childbearing. The analysis also indicates that women who have unobserved attributes that make them more likely to start a cohabiting union are also more likely to have a pre-marital birth.

1. Introduction

In 1999, 39% of births in Britain were outside marriage. Children born outside marriage spend a longer average time living with one parent: 6.6 years for those born outside a live-in partnership and 4.3 years for those born in cohabiting unions, compared with 1.7 years for those born in marriage (Ermisch, 1999). These differences appear to have long-term consequences. For example, Ermisch and Francesconi (2001) show that a child experiencing a one parent family, particularly in the pre-school ages, ends up with lower educational attainments and poorer labour market and health outcomes as young adults than a child from an intact family. This paper studies the impact of employment opportunities on the decision to become a mother outside marriage.

The idea that employment opportunities may affect marriage and childbearing decisions is well known. There are at least two ways in which economic opportunity may affect childbearing outside marriage. As emphasised by Wilson (1987), poor employment opportunities for young men may discourage marriage, thereby increasing the population of young women at risk to have a birth outside marriage and making it more likely that a pregnant woman does not marry the father of the child. Willis' (1999) theoretical analysis also concludes that out-of-wedlock childbearing will be more prevalent when the gains to marriage are small because male incomes are low, and Rosenzweig (1999) produces indirect evidence that young women with poorer marital prospects are more likely to have births before marriage.

But Olsen and Farkas (1990) remind us that there is another channel of influence. Poorer employment opportunities for young women, which tend to go hand-in-hand with poorer opportunities for young men, reduce women's opportunity cost of childbearing, thereby tending to increase childbearing directly. While Olsen and Farkas (1990) find evidence among low-income American black youth that supports both channels of influence, they find that the opportunity cost effect is the primary channel through which poorer employment opportunities increase births outside marriage. This result may, however, reflect their particular sample, in which very few women form unions during the window of observation.

Duncan and Hoffman (1990) also find that poorer "future economic opportunities", as measured by predicted family income at age 26, increase the out-of-wedlock birth rate of black teenagers. Note that their measure of economic opportunity combines both channels of influence. Finally, Ermisch (1991) produces British evidence that higher unemployment encourages pre-marital childbearing, but the evidence is weak because it is only able to use time variation in the national unemployment rate to identify this effect.

The present study estimates the impact of employment opportunities in local labour markets on the pre-marital first birth rate in Great Britain. It exploits variation in the unemployment rate in 300 "travel-to-work areas" over time and space to identify this effect. The data come from matching the first eight years of the British Household Panel Study (1991-98) and the NOMIS (National On-line Manpower Information Service) travel-to-work area data. The results suggest that poorer local employment opportunities encourage pre-marital childbearing and discourage the formation of cohabiting unions, which delays marriage. The results are consistent with both poorer marriage opportunities and lower opportunity costs encouraging pre-marital childbearing.

The second section discusses the factual and theoretical background. The third section describes the data used in the empirical analysis, the fourth presents the estimates of a model of the pre-marital first birth rate, and a final section presents the conclusions.

2. Background

First marriage rates of British women aged under 30 have fallen dramatically. For instance, 84% British women born in 1956 had married by their 30th birthday; but this proportion is only 63%for those born 11 years later. In purely accounting terms, the increase in the proportion of the population who are single accounts for over four-fifths of the increase in the proportion of births born outside marriage since 1975 (Ermisch, 1999) . In behavioural terms, marriage and childbearing decisions are, of course, interdependent, and this is explored further below.

Analysis by Ermisch and Francesconi (2000) shows that the shift to cohabitation (without legal marriage) as the most common mode of first partnership has played an important role in the delay of first marriage in Britain. Among first unions formed in the 1970s, about one-third cohabited in their first partnership, but in the 1990s three-fourths of first partnerships were cohabiting unions. The time spent living together in cohabiting unions before either marrying each other or the union dissolving is usually very short, the median duration being about 2 years. Overall, just over half of the cohabiting unions starting in the 1990s turned into marriage, with the remainder dissolving. These short spells of cohabitation are consistent with these unions providing a learning experience before stronger commitments are made.

There has also been a large increase in childbearing within first cohabiting unions. About one in five of such unions now produce children, compared with one in ten about a decade earlier (Ermisch, 1997). Currently, 22% of births in Britain are in cohabiting unions, and these births make up 60% of all non-marital births. But the unions that produce children are much less likely to be converted into marriage and more likely to break up than childless ones (Ermisch and Francesconi, 2000). About 65% of these fertile unions dissolve, compared with 40% of childless unions. Thus, having a child in a cohabiting union is not indicative of a long-term partnership. In the American context, Brien, Lillard and Waite (1999) also find that cohabiting white women who fail to marry by the time a child is born have marriage rates below those among cohabiting women who did not have a birth.

A possible explanation for the low rate of conversion into marriage among cohabiting unions that produce children comes from a two-sided matching model. Suppose there is a generally agreed ranking of men and women by "quality" and that a person's utility from the match is equal to her/his partner's "quality". Burdett and Coles (1999) show that people of higher quality tend to marry each other. Indeed, marriages take place within quality "classes", with the number of classes being larger when the rate of "encounters" between single men and women is larger.[1] Sahib and Gu (1999) extend this framework to incorporate cohabiting unions, which are used to learn the true value of the partner's quality. Cohabiting unions also occur between members of the same "class", and there is overlap between the classes formed by marital unions and those formed by cohabiting unions. After a period of cohabitation, during which she learns about the man's quality (and *vice versa*), a woman may reject the man as a husband. Men who turn out to be of a lower quality class than the woman will be rejected, and men will reject women who turn out to be of a lower quality class than them.

If a woman receives higher utility per period as a single mother than she receives when single and childless, and if being a mother does not reduce her

[1] Burdett and Coles (1999; p.F320) note that this "class result" holds for some more general utility functions than the one assumed here.

subsequent encounter rate by "too much", then she would be willing to have a child with the man she rejects as a husband. She would also be willing to have a child with a man who rejects her as a wife. Cohabiting couples who find each other to be mutually acceptable are, however, likely to wait to have children within marriage. If this were the case, then women becoming mothers in a cohabiting union would be much less likely to marry the father of the child than childless women, which is what is observed in Britain and the USA.[2] Furthermore, Ermisch and Francesconi (2000) show that cohabiting women with unemployed partners are much more likely to have a child. This association is also consistent with the argument here if unemployed men are more likely to be perceived as "low quality" and rejected as marriage partners.

Single women who reject a man as a cohabiting partner, or who are rejected by him, face a similar option to have a child. As Sahib and Gu (1999) show, women are more choosy when forming marriages (i.e. the reservation quality of a man for a marriage exceeds the reservation expected quality of a man for a forming a cohabiting union). Consider a woman who has a higher expected discounted lifetime utility as a single mother than as single and childless. If she first encounters a man whose expected quality is larger than her reservation value, she would enter a cohabiting union childless, but she would later have a child when his true quality turns out to be less than her reservation value for entering marriage. If, however, she first encounters a man whose expected quality is below her reservation value, she would not move in with him, but would have child on her own. This reasoning suggests that the decision

[2] Note that this "selection effect" would not be present if couples had children during the learning period of the cohabiting union rather than after the partner's quality was revealed, because in this case fertile unions would be equally likely to convert into marriage as childless unions.

to have a child outside marriage is structurally similar for both women in cohabiting unions and those who do not have a live-in partner.[3]

Poor employment opportunities are likely to affect adversely women's marriage prospects in terms of the "quality" of men that they encounter, and they also reduce the opportunity cost of having a child on her own. Thus, we would expect women living in labour market areas with higher unemployment rates to be more likely to have a child outside marriage.

In order for the marital prospect and opportunity cost effects on pre-marital childbearing to operate, there must, however, be sufficient income to make single motherhood feasible. This is one of the necessary conditions for an "out-of-wedlock equilibrium" in Willis' (1999) analysis. In Britain, the vast majority of single mothers receive substantial means-tested welfare benefits (e.g. averaging £310 per month (1998 prices) of state benefits in our sample of women who have a first birth outside a live-in partnership). We have seen that those who have their birth in a cohabiting union face a high probability of being a single mother in the near future. Even while cohabiting, these mothers average £145 per month in state benefits, because of the substantial minority (30%) of these families in which the father is out of employment, for which state benefits average £270 per month.

Welfare benefits to single mothers do not vary geographically in Britain, but we can obtain some indirect evidence of their influence. Because the British benefit system taxes away other income at a 100% rate, non-labour income if the woman becomes a single mother is primarily determined by the welfare benefit system,

[3] Because the reservation value for rejecting a person as partner in a cohabiting union is lower than that for rejecting him/her as a spouse, the theory also suggests that the single mother option is likely to be chosen less often among single women than among women about to dissolve their cohabitation.

making it relatively constant across women. Thus, higher personal non-labour, non-benefit income in the childless state is usually associated with a smaller difference in non-labour income between having and not having a child. We would, therefore, expect that higher non-labour, non-benefit income for a woman when childless would be associated with a lower pre-marital first birth rate. Also, because living with their parents is a real option for most of our sample of young women, measures of family background that are related to parents' income are likely to affect the pre-marital birth decision. The expectation is that higher parental income will make the pre-marital birth option less attractive (see Rosenzweig, 1999).

3. Data

The empirical analysis uses the first eight annual waves (1991-98) of the British Household Panel Study (BHPS), which provide 3,526 woman-year observations on 1,075 never married childless women aged 16-25, who are at risk of a pre-marital first birth in the forthcoming year. Of the 98 pre-marital first births observed, 44 were born to women who were either in a cohabiting union in both years (33) or entered one during the year of the birth. Overall, the annual pre-marital first birth rate was 2.8 per cent.[4] The rate was much higher for those were in a cohabiting union in the previous year, 7.5% compared with 2.1% for those not in a live-in partnership. About one-half of the pre-marital first births were to teenagers. Over 90% of women having a pre-marital first birth remained unmarried one year later.

Table 1 shows the association between the pre-marital first birth rate and the primary economic activity of the woman. Unemployed young women (in the previous year) were three times more likely to have a pre-marital first birth than women in

[4] Another 0.3% both have a child and marry between annual waves of the BHPS, while 3.9% married childless each year.

employment, while full-time students (in the previous year) had the lowest birth rate.[5] Table 2 shows that young women who had a pre-marital first birth tend to have been unemployed more weeks in the previous year than those who remained childless.[6] While these associations are consistent with poor employment opportunities lowering the opportunity costs of childbearing, they may just reflect unobserved differences between women. Women who do not have a job may have attributes that directly affect their chances of becoming a mother outside marriage. The analysis of the next section attempts to circumvent this endogeneity problem by examining the impact of the unemployment rate in the local labour market. Table 2 shows that the mean unemployment rate among those giving birth was indeed higher than that for women who remained childless, with the difference being statistically significant (p=0.03).

It is also clear from Table 2 that young women who had a pre-marital birth tend to have lower pay (if they worked in the previous year) than those who remained childless. In line with a negative association with the wage rate, young women who had obtained qualifications below A-level (as of the previous year) had a higher risk of giving birth outside a partnership (Table 3) than those with A-level or higher qualifications, particularly those who had no qualifications.

As we would expect from previous studies (e.g. see Lundberg and Plotnick, 1995; Ermisch, 1997) and the theoretical reasoning of the previous section, family background is also important. In the sixth wave of the BHPS (1996), all respondents were asked whether they lived with both natural parents up to the age of 16. Panel A of Table 4 shows that young women who did not live with both parents throughout

[5] Observations on two women who reported being on maternity leave in the previous year are omitted from the analysis because they appear to be pregnant at t-1.
[6] As there are only 11 pre-marital births among full-time students (in the previous year), Table 2 and the analyses which follow also show results which exclude woman who were full-time students in the previous year.

their childhood were much more likely to have had a pre-marital first birth. On average, parental incomes are lower in such families.

For 70% of the observations, the young woman was living with at least one of her parents in the previous year. Panel B of Table 4 shows that young women who lived with their parent(s) in social housing had a pre-marital first birth rate which was much larger than that of the rest. Having parents who lived in social housing is associated with coming from poorer families. For instance, such women are much more likely to have fathers in low skill manual occupations. It appears that the variables indicating whether a young woman was from a non-intact family and whether she was living with parents in social housing capture a great deal of family background information.

As expected from the discussion of welfare benefits above, Table 5 indicates that having access to non-labour, non-benefit income was associated with a much lower pre-marital birth rate. Also, Table 2 shows that young women who had a pre-marital first birth tend to have had lower personal non-labour, non-benefit income than those who remained childless.[7]

The next section presents an empirical model in which we may be able to give these associations some structural interpretation. In particular, we wish to estimate the “causal impact” of employment opportunities on first births outside marriage.

4. Estimates of a Pre-marital First Birth Rate Model

The measure of employment opportunities faced by women and their potential marriage partners is the unemployment rate in the “local labour market” (one of 300 travel-to-work areas) in which they lived (in the year preceding any birth). These are

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[7] Non-labour, non-benefit income for these women is primarily private income transfers, education grants (for students) and investment income.

wide areas defined by commuting patterns, and so variation in the unemployment rate among women should not reflect the varying prosperity of residential areas within a labour market. This unemployment rate is, therefore, taken to be exogenous for these young women's decisions concerning marriage and pre-marital childbearing. It is similar to the measure of employment opportunity used by Olsen and Farkas (1990), although theirs was age-specific and measured monthly from their survey data.

It is, of course, possible that unobservable attributes that affect these demographic decisions (such as "career motivation") may also affect migration decisions and therefore the type of labour market in which the women reside. For example, more career-oriented women may move to areas with better employment opportunities (a lower unemployment rate) and also be less likely to have a child outside marriage. If so, the estimates of the impact of the unemployment rate on the pre-marital birth rate would be inconsistent and tend to overstate the impact. In our data, 14.4% of women (11.2% of those who were not full-time students in the previous year) moved between travel-to-work areas each year. There is no evidence that movement was significantly related to the unemployment rate of her area in the previous year or whether she had a pre-marital birth. Nor is the area unemployment rate significantly lower in the following year amongst those who moved between areas (after controlling for the local unemployment rate in the previous year and the average unemployment rate in the following year).[8]

As argued earlier, the utility flow when single and childless is affected by a woman's non-labour income in this state, which is measured by personal non-labour, non-benefit income in the previous year. It is also affected by parental income, which is assumed to be related to the family background variables, namely whether or not a woman lived with both natural parents throughout her childhood and whether or not she lived with parents in social housing in the previous year. There is, however, some doubt about the exogeneity of these variables, particularly personal non-labour, non-benefit income and residence with parents in social housing. For instance, women with unobserved attributes that improve their labour market opportunities are more likely to have accumulated savings and less likely to live with their parents, while at the same time they are less likely to have children. The sensitivity of the results to the maintained hypothesis that these variables are exogenous is discussed below.

A measure of educational attainment as of the previous year is also available, but this is also problematic, because educational attainment may be endogenous for these young women. For instance, women with high subjective discount rates may both have low reservation marriage offers and invest less in education. The primary analysis omits educational variables, but the results from an analysis that treats education (in the previous year) as exogenous are also shown.

The analysis focuses on woman-years in which the woman was not in full-time education (in the previous year), because such women are more likely to be influenced by marriage prospects and their own contemporary employment opportunities in the area in which they reside. The results are, however, qualitatively similar when full-time students are retained in the sample. The model takes the following form:

$$b_{it}^* = \mathbf{X}_{bit-1}\beta_b + u_{it-1}\alpha_b + e_{bit} \qquad (1)$$

where b_{it}^* is a latent variable indicating the propensity for the i-th woman (who is never married and childless at t-1) to have a pre-marital birth in year t; b_{it} is a

[8] This is true for the sample excluding full-time students in the previous year, which is the primary one used in the analysis that follows. In the sample including full-time students, women who moved had an

dichotomous indicator of a birth with $b_{it}=1$ if $b_{it}^*>0$ and $b_{it}=0$ otherwise. The local unemployment rate is u_{it-1}. The vector $\mathbf{X}_{bit-1}$ contains exogenous variables such as age, family background and non-labour, non-benefit income.

Despite the fact that we know that pre-marital first birth rates are higher in cohabiting unions (see Table 2), an indicator of whether a woman was cohabiting in the previous year is not included in $\mathbf{X}_{bit-1}$, because it is very likely to be endogenous. In order to explore this possibility further, and also to improve the efficiency of our estimates of β_b and α_b, we estimate the following equation jointly with (1):

$$c_{it-1}^* = \mathbf{X}_{cit-1}\beta_c + u_{it-1}\alpha_c + e_{cit} \tag{2}$$

where c_{it-1}^* is a latent variable indicating the propensity for the i-th woman to cohabit in year t-1; c_{it-1} is a dichotomous indicator of cohabitation with $c_{it-1}=1$ if $c_{it-1}^*>0$ and $c_{it-1}=0$ otherwise. The stochastic components e_{bit} and e_{cit} are assumed to have a bivariate normal distribution with correlation coefficient ρ. The data used to estimate the model are annual observations on never married childless women.

The estimates of α_b and α_c in Tables 6 and 7 respectively indicate that living in labour market with poorer employment opportunities increases the pre-marital birth rate and the likelihood of cohabiting (in the previous year). On average, a one percentage point higher unemployment rate in the previous year increases a woman's probability of a pre-marital first birth in the coming year by about 0.4 percentage points according to the model in the first column.[9] This effect is large relative to the average annual percentage having a pre-marital first birth (3.8% for this sample).

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area unemployment rate 0.2% lower in the following year (t=-3.52).

[9] Using the sample including full-time students in the previous year, the effect of the unemployment rate is 10-20% smaller, but still relatively well-determined, as Table A1 shows for the two simplest specifications.

The effects of family background on the pre-marital first birth rate are relatively large. Being from a non-intact family increases the birth rate by about 1.3 percentage points (although this effect is not precisely estimated), and a woman living with her parents in social housing in the previous year has a birth rate which is 4.7 percentage points higher than other women's. Lundberg and Plotnick (1995) find that poorer background tends to raise the probability of becoming pregnant and to reduce the probability of abortion and the probability of marrying the father. Finally, higher non-labour, non-benefit income reduces the probability of becoming a mother outside marriage, as we might expect from the reasons given in section 2 above. An extra pound per month reduces this probability by 0.6 percentage points.

The exogeneity of these last two variables may be doubtful. The second column of Table 6 drops the variable concerned with residence with parents in social housing, and the third one also drops personal non-labour, non-benefit income. The effect of the local unemployment rate is larger in these specifications than in the first one. The fourth column only includes the age and unemployment variables, and the unemployment effect remains large. When combined with estimates of a model for the first marriage rate (in which the estimated impact of unemployment is small and insignificant), the estimates from this specification suggest that a sustained one percentage point higher local unemployment rate would increase the percent having pre-marital birth before their 27th birthday by about 2 percentage points.

The fifth column of Table 6 presents estimates of the model when educational attainments are included as explanatory variables. They indicate that the higher the level of qualifications, the lower the risk of a pre-partnership birth. While the effect of the unemployment rate is smaller, it remains relatively large (0.35 per one percentage point rise in unemployment) and well-determined in this specification.

In all of the specifications, women who have unobserved attributes that make them more likely to live in a cohabiting union are also more likely to have a pre-marital birth. Thus, as suspected, being in a cohabiting union is endogenous. Treating cohabitation status as exogenous would overstate the impact of being in a union on the pre-marital birth rate.[10]

Table 7 provides estimates of the parameters of equation (2), which relates the local unemployment rate and other variables to the probability of a never married childless woman cohabiting in the previous year (in the sample, 19% cohabited). Poorer employment opportunities significantly increase the probability that the woman is cohabiting in all specifications. As the analysis below shows that poorer employment opportunities *discourage* entry to cohabiting unions, their positive effect on the state probability of cohabiting is somewhat puzzling. This effect is identified by both temporal and spatial variation in the unemployment rate. In order to explore it further, the unemployment rate in the previous year was decomposed into two parts: the average across all labour markets in a particular year and the deviation from the annual average in a woman's particular labour market. Their respective coefficients (standard error) in the cohabiting status equation (corresponding to the specification in column (4)) are –3.50 (2.12) and 5.86 (1.49). Thus, the positive effect comes entirely from the spatial variation.[11] It appears to reflect the outcome of complex past dynamics relating to the formation and dissolution of childless cohabiting unions,

[10] Brien, Lillard and Waite (1999) also identify a "structural effect" of cohabiting union status on the pre-marital birth rate, in addition to the "selection effect".
[11] That is, an increase in the unemployment rate over time tends to reduce the prevalence of cohabitation. In the sample, the average local unemployment rate rose from 8.1% in 1991 to 9.6% in 1993, and then fell to 4.9% in 1997.

which result in a higher prevalence of cohabiting unions among childless never married women in local labour markets with poorer employment opportunities.[12]

It is also clear that women from non-intact families are more likely to cohabit at any given age. Childless never married women who have access to more personal non-labour income are less likely to be cohabiting at any given age.[13] The probability of cohabiting increases (at a decreasing rate) throughout the age range of our sample.

Rather than estimating the effect of employment opportunities on the *state probability* of cohabiting in the previous year, we can consider their effect on the probability of starting a cohabiting union. That is, we now interpret $c_{it-1}*$ in equation (2) as a latent variable indicating the propensity for the i-th woman to begin a cohabiting union between t-1 and t, and we restrict the sample to those unmarried women who did not live with a partner at t-1. Equations (1) and (2) are again estimated jointly.

Estimates of the two simplest specifications are shown in Table 8. These indicate that, as measured by a high local unemployment rate, poor employment opportunities discourage the formation of cohabiting unions and encourage childbearing outside marriage. The estimate of α_b in this sample is even larger than the comparable specification in Table 6, and it changes little with inclusion of various combinations of the other explanatory variables in Table 6.[14] Table 8 also indicates that women who have unobserved attributes that make them more likely to start a

[12] An analysis of the outcomes of cohabiting unions indicates that a higher local unemployment rate reduces the rate of conversion of the union into marriage and increases the union dissolution rate. But these effects are small and statistically insignificant.
[13] As few women in cohabiting couples live with their parents, "living with parents in social housing" was excluded from the cohabitation equation. Also, educational qualifications had virtually no impact on the probability of cohabiting.
[14] While the estimates of α_b and α_c are 20-30% smaller in a sample including women who were full-time students in the previous year, they are still well-determined, as Table A2 shows for the two simplest specifications.

cohabiting union are also more likely to have a pre-marital birth, a result similar to that found by Brien, Lillard and Waite (1999). The search model sketched above would suggest such interdependence between union formation and pre-marital childbearing decisions. Finally, while direct marriage is now a minority activity, it does represent a competing risk to entering a cohabiting union and/or having a pre-marital first birth. Estimates indicate that poor employment opportunities also discourage direct marriage, but the effect is not statistically significant (the unemployment rate coefficient is about –1.4, with a standard error of about 2.2).

According to the estimates in Table 8, a one percentage point higher local unemployment rate reduces the annual rate of inflow to cohabiting unions by about 0.8 percentage points and increases the annual pre-marital first birth rate by 0.4 percentage points.[15] If sustained, this higher local unemployment rate would increase a woman's probability of having a pre-marital birth before her 27th birthday (from outside a live-in partnership in the previous year) by about 3 percentage points. It would also reduce the probability of having a live-in partnership before her 27th birthday by about 3 percentage points. Because, at each age, first marriage rates are much higher among cohabiting women than those without a live-in partner, delayed entry to a cohabiting union also delays marriage. Thus, these results suggest that, in addition to the direct opportunity cost effect, the effect of poorer local employment opportunities on marital prospects may also be important for pre-marital first births. The findings by Olsen and Farkas (1990) that opportunity cost effects dominate may reflect the young age of their sample relative to the one used in this study.

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[15] In relative terms, this represents a 7% fall in the union formation rate and a 13% rise in the pre-marital first birth rate.

5. Employment opportunities, unemployment experience and earnings

If we are to interpret the positive coefficient of the local unemployment rate on the pre-marital birth rate as affecting it through marital prospects or the opportunity cost of childbearing, some evidence is required that the local unemployment rate affects these. Random effects models of young men's and women's own pay and unemployment experience as a function of their age, the local unemployment rate and whether they came from a non-intact family were estimated for young, never married childless men and women. These show that the local unemployment rate has a negative and statistically significant effect on women's pay (among workers) and a positive and significant impact on the probability of being unemployed and the number of weeks unemployed in a year among young men.[16] It also has a negative impact on men's pay and a positive impact on young women's probability of being unemployed and number of weeks unemployed, but these effects are not well-determined. Thus, there is evidence that local employment opportunities are indeed affecting variables that are associated with marital prospects and opportunity costs of childbearing, namely men's unemployment experience and women's pay respectively.

6. Conclusion

At the beginning of the new millennium, nearly four of ten births in Britain are outside marriage. This study uses exogenous variation in unemployment rates among 300 labour market areas over 7 years to identify the impact of employment opportunities on the pre-marital first birth rate. It finds that poor employment opportunities encourage childbearing outside marriage and discourage the formation of cohabiting unions, which delays marriage. A one percentage point higher local

[16] A one percentage point higher local unemployment rate reduces young childless women's monthly pay by about £9 per month ("t-value"=3.08), and it increases a young man's probability of unemployment by one percentage point ("t-value"=4.69).

unemployment rate increases the annual probability of having a pre-marital first birth by about 0.4 percentage points, which represents a 10% increase in the pre-marital first birth rate. Put differently, a sustained one percentage point higher local unemployment rate would increase the percent of women having pre-marital birth before their 27th birthday by about 2-3 percentage points.

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Table 1: Percentages of never married childless women with pre-marital birth by woman's main economic activity

Status$_{t-1}$:	Per cent having birth	N
In job	3.0	1790
Unemployed	10.5	247
Full-time student	0.8	1364
Other*	4.1	98

*Mainly long term sick or disabled and on government training schemes.
Pearson Chi-square=77.76 (*p*=0.000)

Table 2: Means [Std. Dev.], Continuous Variables by Pre-marital Birth Outcome

Variable:	Birth	Remain childless	Birth*	Remain childless*
Weeks unemployed in past year$_{t-1}$	11.3 [18.8] N=95	2.7 [9.2] N=3301	11.8 [19.0] N=84	4.2 [11.2] N=1975
Usual monthly pay$_{t-1}$, workers only	440 [218] N=60	494 [418] N=2312	467 [200] N=56	617 [414] N=1718
Age$_t$	20.5 [2.6] N=98	20.8 [2.8] N=3428	20.8 [2.6] N=87	21.9 [2.6] N=2053
Percent cohabiting$_{t-1}$	34.4 N=96	12.0 N=3404	36.8 N=87	18.7 N=2050
Non-labour, non-benefit monthly income$_{t-1}$	4.9 [19.9] N=95	41.1 [174] N=3324	1.4 [5.5] N=84	11.4 [67.3] N=1995
"Local" unemployment rate$_{t-1}$	0.084 [0.025] N=88	0.078 [0.028] N=3300	0.084 [0.025] N=80	0.078 [0.027] N=1981

*Excludes those who are full-time students in previous year

Table 3: Percentages of never married childless women with pre-marital birth by highest qualification obtained to-date

Highest qualification$_{t-1}$	Per cent having birth	N	Per cent having birth*	N*
Degree or higher	0	235	0	198
Teaching/other higher	2.3	431	2.1	336
A-level or Nursing	1.0	980	1.8	508
O-level/GCSE or other	3.6	1605	5.6	935
No qualification	16.9	83	19.4	72
Still at school	2.2	63	0	9

*Excludes those who are full-time students in previous year
Pearson Chi-square=84.02 (*p*=0.000); *69.32 (*p*=0.000).

Table 4: Percentages of never married childless women with pre-marital birth by family background

A: By whether woman lived with both parents throughout childhood

Status:	Per cent having birth	N	Per cent having birth*	N*
Yes	2.4	2461	3.5	1478
No	4.4	596	6.1	375

*Excludes those who are full-time students in previous year
Pearson Chi-square=6.85 (p=0.009); *5.61 (0.018)

B: By whether lived with parents in social housing

Status$_{t-1}$:	Per cent having birth	N	Per cent having birth*	N*
Yes	7.8	436	9.8	305
No	2.0	3070	3.1	1824

*Excludes those who are full-time students in previous year
Pearson Chi-square=47.87 (p=0.000); *30.86 (p=0.000)

Table 5: Percentages of never married childless women with pre-marital birth by whether woman had non-labour, non-benefit income in previous year

Status$_{t-1}$:	Per cent having birth	N	Per cent having birth*	N*
Yes	1.1	1899	1.7	980
No	4.9	1520	6.1	1099

*Excludes those who are full-time students in previous year
Pearson Chi-square=44.24 (p=0.000); *25.42 (p=0.000)

Table 6: Estimate of pre-marital first birth rate equation (1), excluding full-time students in previous year

	(1)	(2)	(3)	(4)	(5)
Age of woman$_t$	-0.022	-0.043	-0.059	-0.063	-0.010
	[0.99]	[1.94]	[2.68]	[2.87]	[0.39]
Local labour market unemployment rate$_{t-1}$	5.569	6.300	5.928	5.883	4.546
	[2.81]	[3.22]	[3.25]	[3.24]	[2.19]
Did not live with both parents up to age 16	0.166	0.169	0.206	--	0.108
	[1.29]	[1.30]	[1.60]		[0.80]
Non-labour, non-benefit income$_{t-1}$	-0.078	-0.095	--	--	-0.081
	[3.01]	[3.59]			[3.03]
Lives with parents in social housing$_{t-1}$	0.614	--	--	--	--
	[4.48]				
No qualifications$_{t-1}$	--	--	--	--	1.196
					[5.17]
Qualifications below A-level$_{t-1}$	--	--	--	--	0.511
					[3.65]
Constant	-1.752	-1.215	-1.054	-0.922	-2.171
	[3.42]	[2.38]	[2.09]	[1.88]	[3.53]
Rho	0.395	0.307	0.317	0.321	0.351
	[5.11]	[3.99]	[4.22]	[4.34]	[4.56]
N	1763	1768	1794	1794	1760
Wald chi-square (df)	196.59 (10 df)	169.49 (9 df)	161.16 (7 df)	153.75 (5 df)	196.24 (11 df)

*****Ratio of coefficient to robust standard error in brackets.
Average marginal effects can be approximated by multiplying coefficient by 0.076.

Table 7: Estimate of cohabiting status equation (2), excluding full-time students in previous year

	(1)	(2)	(3)	(4)	(5)
Age of woman$_t$	0.772	0.787	0.819	0.811	0.786
	[2.79]	[2.85]	[2.98]	[2.95]	[2.80]
Age-squared/100	-1.339	-1.377	-1.457	-1.452	-1.370
	[2.16]	[2.23]	[2.37]	[2.36]	[2.18]
Local labour market	3.430	3.473	3.246	3.069	3.437
unemployment rate$_{t-1}$	[2.57]	[2.60]	[2.46]	[2.34]	[2.57]
Did not live with both	0.299	0.299	0.291	--	0.300
parents up to age 16	[3.40]	[3.40]	[3.33]		[3.41]
Non-labour, non-benefit	-0.002	-0.002	--	--	-0.002
income$_{t-1}$	[1.97]	[1.95]			[1.94]
Constant	-11.61	-11.77	-12.09	-11.86	-11.77
	[3.78]	[3.85]	[3.96]	[3.89]	[3.77]
Rho	0.395	0.307	0.317	0.321	0.351
	[5.11]	[3.99]	[4.22]	[4.34]	[4.56]
N	1763	1768	1794	1794	1760
Wald chi-square (df)	196.59	169.49	161.16	153.75	196.24
	(10 df)	(9 df)	(7 df)	(5 df)	(11 df)

*****Ratio of coefficient to robust standard error in brackets.
Average marginal effects can be approximated by multiplying coefficient by 0.25.

Table 8: Estimate of joint union formation, premarital first birth rate model, excluding full-time students in previous year

	Spec 1 Eq.(1) PMB	Eq.(2) Cohab	Spec 2 Eq.(1) PMB	Eq.(2) Cohab
Age of woman$_t$	-0.087	0.055	-0.069	0.069
	[3.14]	[3.53]	[2.40]	[4.09]
Local labour market unemployment rate$_{t-1}$	6.360	-4.564	8.275	-4.470
	[2.94]	[2.95]	[4.05]	[2.70]
Did not live with both parents up to age 16	--		0.267	0.077
			[1.74]	[0.70]
Constant	-0.601	-2.071	-1.192	-2.365
	[0.96]	[5.86]	[1.81]	[6.04]
Rho	0.251		0.252	]
	[2.67]		[2.52]	
N	1652		1429	
Wald chi-square (df)	44.89		55.07	
	(4 df)		(6 df)	

*****Ratio of coefficient to robust standard error in brackets
Average marginal effects can be approximated by multiplying coefficients in equation (1) by 0.06 and coefficients in equation (2) by 0.19.

Table A1: Estimate of joint union status, premarital first birth rate model, including full-time students in previous year

	Spec 1 Eq.(1) PMB	Eq.(2) $Cohab_{t-1}$	Spec 2 Eq.(1) PMB	Eq.(2) $Cohab_{t-1}$
Age of woman$_t$	-0.001	1.165	0.002	1.173
	[0.07]	[4.82]	[0.12]	[4.84]
Age-squared	--	-0.0215		-0.0215
		[3.94]		[3.94]
Local labour market	4.840	2.573	4.928	2.778
unemployment rate$_{t-1}$	[3.23]	[2.15]	[3.26]	[2.31]
Did not live with both	--	--	0.282	0.281
parents up to age 16			[2.50]	[3.48]
Constant	-2.330	-16.379	-2.475	-16.587
	[6.01]	[6.14]	[6.17]	[6.19]
Rho	0.381		0.376	]
	[5.53]		[5.38]	
N	2930		2930	
Wald chi-square (df)	283.75		289.91	
	(5 df)		(7 df)	

*Ratio of coefficient to robust standard error in brackets
Average marginal effects can be approximated by multiplying coefficients in equation (1) by 0.06 and coefficients in equation (2) by 0.17.

Table A2: Estimate of joint union formation, premarital first birth rate model, including full-time students in previous year

	Spec 1 Eq.(1) PMB	Eq.(2) Cohab	Spec 2 Eq.(1) PMB	Eq.(2) Cohab
Age of woman$_t$	-0.019	0.111	-0.005	0.122
	[0.88]	[9,39]	[0.21]	[9.58]
Local labour market	4.700	-3.123	5.972	-3.037
unemployment rate$_{t-1}$	[2.73]	[2.41]	[3.71]	[2.19]
Did <u>not</u> live with both	--		0.354	0.072
parents up to age 16			[2.69]	[0.70]
Constant	-2.087	-3.508	-2.554	-3.721
	[4.29]	[13.55]	[4.85]	[13.06]
Rho	0.301		0.297	
	[3.57]		[3.32]	
N	2915		2546	
Wald chi-square (df)	100.22		113.40	
	(4 df)		(6 df)	

*****Ratio of coefficient to robust standard error in brackets

Average marginal effects can be approximated by multiplying coefficients in equation (1) by 0.04 and coefficients in equation (2) by 0.14.