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# Socio-Economic Variation in the Effect of Economic Conditions on Marriage and Non-marital Fertility: Evidence from the Great Recession

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# Socio-Economic Variation in the Effect of Economic Conditions on Marriage and Non-marital Fertility: Evidence from the Great Recession

## **Abstract**

The United States has become increasingly characterized by stark class divides in family structure. Poor women are less likely to marry than their more affluent counterparts, but far more likely to have a birth outside of marriage. Recent theoretical and qualitative work at the intersection of demography and cultural sociology suggests that these patterns are generated because poor women have high, nearly unattainable, economic standards for marriage, but make a much weaker connection between economic standing and fertility decisions. We use the events of the Great Recession, leveraging variation in the severity of the crisis between years and across states, to examine how exposure to worse state-level economic conditions is related to poor women's likelihood of marriage and of having a non-marital birth between 2008 and 2012. In accord with theory, we find that women of low socio-economic status (SES) exposed to worse economic conditions are indeed somewhat less likely to marry. However, counter to theoretical expectations, we do not find evidence that economic standing is disconnected from non-marital fertility. Unmarried low-SES women exposed to worse economic conditions significantly reduce their fertility. Further, the relationship between recessionary conditions and non-marital fertility is of a similar magnitude to the relationship between marriage and economic conditions among low-SES women and the negative relationship between economic conditions and non-marital fertility among low-SES women is larger than the negative association between recessionary economic conditions and fertility among more advantaged women.

**Keywords: Non-Marital Fertility, Marriage, Recession**

# Introduction

Research on the effects of economic recession on the family has coalesced around the idea that economic shocks will tend to reduce fertility and marriage as a bad economy renders both economically unaffordable. Evidence of such negative effects has been found during normal business cycles (Schaller, 2012a; 2012b), in past recessions (Sabokta et al, 2011), and during the Great Recession (Sutton et al, 2011; Morgan et al, 2011; Cherlin et al, 2013; Schneider, 2014). It perhaps then follows that these negative effects on fertility and marriage would also be present among individuals of more limited economic means, and would perhaps be even stronger since these low-SES individuals are likely have the fewest economic reserves to buffer against such shocks (Lusardi, Schneider, and Tufano, 2011).

However, in the complex cultural environment that shapes family formation in the United States, these expectations may be far too simplistic. In the last decade, scholars of the family have suggested that socio-economic status shapes decisions to have children and to marry in counter-intuitive ways. Specifically, Kathryn Edin, Cristina Gibson-Davis, and colleagues have argued that fertility has become relatively decoupled from economic concerns among economically disadvantaged unmarried women. Faced with few opportunities for social mobility and few reasons to defer fertility, disadvantaged unmarried women do not delay births even in the face of limited economic resources. In contrast to fertility, Andrew Cherlin and Kathryn Edin argue that marriage has come to be tied to a universal and high economic standard. Adherence to this “marriage bar” then depresses marriage among the most disadvantaged who have great difficulty meeting the economic standard. The resulting class divides in marriage and non-marital fertility are important because the family settings in which young children are born and raised appear to have important effects on their development and later life outcomes (McLanahan, Tach, and Schneider, 2013). These arguments about the meanings and pre-requisites of marriage and fertility are powerful and important. Yet, they have been subject to few empirical assessments (but see Gibson-Davis, 2009) outside of the motivating body of qualitative and ethnographic studies (e.g. Edin and

Kefalas, 2005; Gibson-Davis, Edin, and McLanahan, 2005).

We leverage the sharp deterioration in macro-economic conditions during the Great Recession, changes that are plausibly exogenous to any individual-level characteristics, to assess these arguments. We draw on individual-level data from the 2008-2012 American Community Survey linked to state-level data on unemployment rates and other measures of area-level economic conditions. We use this data to assess if exposure to recessionary economic conditions is related to the fertility and marital behavior of low-SES unmarried women. Theory would suggest that marriage entry among low-SES women would be negatively affected by recessionary economic conditions, while the non-marital fertility of low-SES women would be unresponsive, or at least less responsive, to the recessionary shock of incredible growth in unemployment rates during the Great Recession.

In accord with theory, we find that marriage entry by low-SES women was negatively related to state-level economic conditions. However, the findings for fertility do not support the idea that births to low-SES unmarried women would be relatively unresponsive to economic conditions. Instead, we find evidence of a significant negative relationship between state-level unemployment and non-marital fertility for low-SES women. Further, whereas a weaker version of the decoupling theory might suggest any negative effect of economic shocks on the fertility of low-SES women would be smaller than the effect on marriage, we show that the relationship between state-level unemployment and marriage among low-SES women is similar in magnitude to the relationship between state-level unemployment and non-marital fertility among low-SES women. Finally, we present evidence that recession-induced reductions in non-marital fertility among low-SES women were at least as large as those induced in married high-SES women and larger than those induced in married low-SES women and unmarried high-SES women. In sum, using the circumstances of the Great Recession, we show that low-SES unmarried women are less likely to marry when faced with poor economic conditions but that economic concerns are by no means decoupled from fertility decisions among the disadvantaged.

# Marriage, Fertility, and Socio-Economic Status

## Theories of SES and Family Formation

One set of explanations for contemporary socio-economic divides in family formation focuses on culture, narrowly defined. Commentators such as Charles Murray (2012) posit that the rise in non-marital fertility and declines in marriage are attributable to cultural divergence by class in the United States. The more dominant account within sociology focuses on the pronounced deterioration in the economic standing of less educated and minority men, creating a shortage of marriageable men in disadvantaged communities (e.g., Wilson, 1987).

A relatively new line of research in sociology offers a culturally informed account of how economic opportunity (or the lack thereof) may shape divides in marriage and non-marital fertility. Scholars argue that economic opportunities structure transitions to marriage and parenthood but that economic conditions affect these different demographic behaviors very differently (i.e., Edin and Kefalas, 2005). Low-SES individuals are deterred from marriage because of high normative economic standards for respectable matrimony that prove difficult to satisfy given material deprivation (Edin and Kefalas, 2005). But, limited economic resources do not similarly deter non-marital fertility because having a child is seen as a means of meaning-making for women with few opportunities for social and economic mobility. In this account, low-SES unmarried women may not set out to become pregnant, but given limited chances for economic and educational attainment and the high value placed on motherhood, are not strongly opposed either and these ambiguous feelings about pregnancy and childbirth can then lead to motherhood (Edin et al, 2007).

More specifically, Edin and colleagues suggest that Americans of all backgrounds continue to place a high value on marriage and that over time marriage has come to be seen as the “capstone” to early economic attainment rather than as a stepping stone to economic success (Edin and Reed, 2005). Marriage then has come to be normatively defined as a “luxury good,” a status reserved for those who have finished school, gotten a steady job,

and accumulated basic assets (Cherlin, 2004; Furstenberg, 2003). Given the very poor labor market prospects faced by many low-SES men, the priority placed on these markers of economic success may also be driven by women's reluctance to marry men that they may end up having to support (Edin, 2000). Disparities in marriage by SES are then generated by the extreme difficulty that many less advantaged men and women face in meeting this economic bar (Edin, Keflas, and Reed, 2004; Edin and Tach, 2012). In the broader vocabulary of cultural sociology, women of high and low-SES share a common schema for marriage, but low-SES women are constrained by limited access to the materials this schema demands for respectable marriage (Johnson-Hanks et al, 2011).

Scholars suggest that high-SES women have similarly high economic bars for childbearing and good parenting as they do for marriage (Lareau, 2003; Johnson-Hanks et al, 2011). However, the same appears not to be the case among low-SES unmarried women. Though low-SES unmarried women see marriage as normatively "expensive," the economic bar for fertility among poor unmarried women is much lower. The strong version of this argument suggests that among low-SES unmarried women, the decision to have a child is effectively decoupled from economic concerns (Gibson-Davis, 2009; Edin and Kefalas, 2005). Carlson (2012) succinctly summarizes this apparent puzzling difference in the marriage and fertility schemas of unmarried low-SES women, writing that what is "particularly notable in light of the 'marriage bar' is that there appears to be no corresponding 'fertility bar,'...This contrast is especially striking since marriage could potentially save money (given the economies of scale), while children objectively cost money" (p. 222). Similarly, Gibson-Davis (2009) argues that, in contrast to marriage, for low-SES unmarried women, "childbearing is an accepted and expected part of the life course and is independent of financial circumstances" (147). A somewhat more conservative statement of the argument is that though economic factors might matter for non-marital childbearing, such economic factors matter still more for marriage among low-SES unmarried women.



## Prior Empirical Research

Much of the evidence for these theories of economic disadvantage and family formation comes from qualitative and ethnographic research with poor and working class young people in the United States. A consistent narrative emerges in this work that tightly couples marriage with economic attainment. For these relatively disadvantaged young people, respectable marriage has steep qualifications. For instance, one respondent notes that, “We both want very good jobs, and we both want a house, we both want reliable transportation,” and another also explicitly couples marriage with asset ownership, stating, “I didn’t want to get married and go living in an apartment or townhouse. I wanted to save on up to, you know, buy a home, start a family” (p. 690) (Smock, Manning, and Porter, 2005). The idea that steady work and the accumulation of wealth must precede marriage is also noted among the poor men and women studied by Gibson-Davis, Edin, and McLanahan (2005), with one informant reporting that, he “like[s] to do things right though [when it comes to marriage], instead of cutting corners and doing everything half-assed. I’d rather get engaged for two years, save money, get a house” (1012). This schema of marriage accords primary importance to economic factors. For these low-SES couples, economic resources are a necessary condition of marriage.

The narratives of childbearing offered by these very same young people are starkly different. In these reports, it is not so much that unmarried low-SES women say that economic resources are immaterial for childbearing, but that economic resources are rarely mentioned at all when discussing having children. Rather, the economically disadvantaged young women that Edin and Kefalas (2005) study talk about how having children would provide them with intimacy and love otherwise missing in their lives and give them a sense of purpose in the face of limited economic opportunity, as “economic reality has infused poor youth with the sense that they have nothing to lose by an early or ill-timed birth” (p. 1014) (Edin, Keflas, and Reed, 2004). This is not to say that these unmarried low-SES women necessarily set out to have children in the face of economic scarcity. Rather, many of these births are unplanned

and appear to occur because of inconsistent contraceptive use or non-use of contraception without a clear intention to become pregnant (Edin et al, 2007).

Striking in this ethnographic work is the role of class rather than race. Edin and Kefalas (2005) construct a sample with relatively equal numbers of Black, white, and Hispanic respondents and report examining their data for evidence of differences in orientations towards marriage and fertility between these racial/ethnic groups. However, they argue that such differences are simply not present, that there is broad similarity across racial/ethnic groups in the key results that they report, remarking that their “data show few differences across racial and ethnic groups in the attitudes and world views that are the subject of this book” (p. 212).

In sum, the idea that emerges from the qualitative evidence is that, among unmarried low-SES women, economic factors are enormously consequential for restraining marriage, but matter less or little for childbearing. These compelling ideas and findings have proved difficult to test with large-scale representative data and the standard tools of demographic analysis. However, several studies, generally focusing on either fertility or marriage and using varied analytical approaches, provide preliminary support.

Focusing on the idea that the normative standard for respectable marriage is quite high, Schneider (2011) shows that personal assets, in addition to income and employment, are important predictors of first marriage, that assets appear to matter equally for marriage for blacks and whites and for those with higher and lower educational attainment, but that inequalities by race and education in the ownership of assets explains some of the divides in marriage entry along those dimensions of SES. In follow-up work, Schneider (2013) finds similar wealth effects on marriage using the Fragile Families Study and shows that personal wealth, while predictive of marriage, does not predict entry into cohabitation, evidence, perhaps, of the unique cultural value of marriage. Watson and McLanahan (2011) take a different tack in examining social standards for marriage. Using data from the Current Population Survey, they find that men with incomes below the area-level median are much less

likely to be married, controlling for their absolute level of income, evidence, they suggest, that normative and relative standards of marriageability reduce marriage among those of lower SES. Combined with the extensive literature documenting a positive relationship between men and women's own income and employment and marriage (e.g., Burstein, 2007), there is significant support for the idea that there is a high economic standard for marriage, embraced across the SES distribution, that leads to less marriage among the poor.

There is less research that investigates the link between economic distress and non-marital fertility among low-SES women. In one novel test, Kearney and Levine (2014) empirically examine the proposition that fertility among low-SES women may be a response to limited opportunities for upward mobility and report that low-SES women living in more economically unequal places are more likely to have a birth as a teenager or outside of marriage. While the qualitative work suggested that economic concerns and fertility were relatively decoupled, Kearney and Levine's (2014) findings in some ways go further, suggesting that fertility may increase in response to poor economic prospects, as captured by high levels of local inequality. Similarly, Billy and Moore (1992) analyze data from the 1982 NSFG and find that tract-level female unemployment rates were positively associated with non-marital fertility among non-Black women, a result they attribute to "perceptions of blocked opportunities" (1992: 997). In some contrast, Curtis and Waldfogel (2009) use data from the Fragile Families and Child Wellbeing study to analyze the relationship between male unemployment rates and the transition to second births or higher parity and find evidence that higher rates of unemployment are associated with significantly lower risks of subsequent births among women who were unmarried, though these effects appear to be driven by strong negative associations with having a third or higher order birth, rather than a second birth. In one of the few studies to jointly examine non-marital fertility and marriage using this theoretical formulation, Gibson-Davis (2009) uses data from the Fragile Families Study and finds that income gains and transitions to homeownership among unmarried parents were predictive of entry into marriage, but not of having a higher order birth.

Together, these studies provide some support for the idea that broad subscription to high economic standards of marriage reduce marriage for those at the bottom of the SES distribution, but that economic resources are relatively decoupled from fertility decisions for those unmarried women of low SES, perhaps because of perceptions of limited economic opportunity.

## **Contributions of the Current Study**

We advance this line of research by using the circumstances of the Great Recession to assess the effects of exposure to very poor economic conditions on fertility and marriage among unmarried low-SES women. While the Great Recession marked a pronounced departure from the normal business cycles under which the preceding theory was developed, we argue that exposure to these recessionary economic conditions provide an opportunity to test some of these ideas in a rigorous manner.

First, we suggest that theory would predict that state-level economic conditions, such as unemployment rates, should be negatively related to marriage entry among low-SES unmarried women as deteriorating economic conditions make marriage still more “unaffordable” given the high economic standards for marriage held by this already disadvantaged population. We would also expect that state-level economic conditions should be negatively related to marriage among high-SES women as theory suggests similarity in the marriage bar across socio-economic status.

Second, the strong version of the theories above, as articulated by Edin and Kefalas (2005), Gibson-Davis (2009), and Carlson (2012), holds that non-marital fertility among low-SES women and economic conditions are effectively decoupled. We would expect then that there will not be a negative relationship between state-level unemployment and having a non-marital birth for low-SES women.

However, this may be too demanding a test of the idea that economic conditions differentially affect the fertility and marriage of unmarried low-SES women. Rather than being

an issue of the presence or absence of effects, we might instead expect a difference in the degree of the effect of economic conditions on marriage and fertility. Consequently, it is also possible that poor economic conditions have negative effects on the fertility of low-SES women, but that:

1. the negative effects of state-level unemployment on the marriage entry of low-SES unmarried women are larger than the negative effects of state-level unemployment on the fertility of unmarried low-SES women
2. the negative effects of state-level unemployment on the fertility of low-SES unmarried women are smaller than those on higher-SES women or married women.

This work is one of a small number of studies to consider the class dynamics of marriage and fertility in the context of the Great Recession. The only other work that we are aware of that comes close is a recent demographic investigation using data from North Carolina that does not examine marriage but finds evidence of reductions in births to African American teens during the Great Recession (Ananat et al, 2013), research using the National Survey of Family Growth (2006-2010) that finds a negative associations between state-level unemployment and married women's pregnancy and a positive association with teen pregnancy, and a negative association between state-level foreclosure and unpartnered women's pregnancy (Percheski and Kimbro, 2014), and a descriptive analysis that shows reductions nationally in fertility among women living in poverty during the years of the Great Recession (Cherlin et al, 2013).

## **Data and Analysis**

### **American Community Survey**

We use the public-use microdata of the American Community Survey (ACS) from 2008-2012, using data made available by IPUMS (Ruggles et al, 2010). Each sample is a 1-in-100

national random sample of the population with a greater than 97% response rate.

The ACS is well suited for our purposes because it contains representative samples of women in all states, collects information on both marriage and fertility, includes multiple measures of socio-economic status, and covers the full time period of poor macro-economic conditions that marked the Great Recession. While the NBER dates the Great Recession as only including the period from December of 2007 through June of 2009, the experience of the Recession for households, as captured by poor macro-economic conditions, extended far longer and in fact, national unemployment rates did not reach their peak until October of 2009 and only fell below 8% in late 2012 (Bureau of Labor Statistics, 2014). These features make the ACS preferable to the vital statistics data on births and marriages which provide few measures of SES in state-linked files. While the National Survey of Family Growth contains detailed data on marriage and fertility, the latest births captured in the 2006-2010 cycle were conceived in early 2009 - before unemployment peaked - and so miss the effects of exposure to high levels of unemployment, above 8%, in all of 2009, 2010, and 2011. Longitudinal data sets such as Add Health and NLSY-97 contains very good data on socioeconomic status, marriage, and fertility, but are limited to specific cohorts of young people and have smaller sample sizes.

We are primarily interested in marriage and non-marital fertility, so we keep only the “at risk” women in our main analysis. That is, women who are not married (never married, divorced, or widowed) or who were married in the previous 12 months. However, we exclude women who became divorced or widowed in the previous 12 months because their exposure to the “risk” of marriage or having a non-marital birth is unclear. There is also some ambiguity regarding how to treat women who married within the past year when estimating the likelihood having a non-marital birth, as it is unclear how much of that year was spent “at risk” of a non-marital birth. We include these women to keep our analysis sample the same between models estimating marriage and non-marital fertility, but our results are robust to excluding them.

As is consistent with existing fertility literature, we exclude all women over 44. We also exclude women under the age of 19, since these women are predominately still in high school and we seek to disentangle enrollment from attainment. Thus all of the analysis presented here is for women ages 19-44. We also remove some of the potentially confounding effects of migration, which shifted in response to the Great Recession (Cherlin et al, 2013), by excluding foreign born women who migrated to the United States after 2006 from our analysis. However, foreign born women who migrated earlier are included. Finally, we exclude currently enrolled students from the analysis.<sup>1</sup> After imposing these sample restrictions, the total available sample of women 19-44 at risk of marriage or a non-marital birth is 805,445.

### *Fertility and Marriage*

Beginning in 2008, the ACS collected information on births and marriages in the 12 months prior to the survey. We use these two items to construct our dependent variables. The item on fertility asks the respondent, of each woman on the household roster between the ages of 15 and 50, “has this person given birth to any children in the past 12 months?”<sup>2</sup> Similarly, the item on marriage asks of each adult on the household roster: “In the past 12 months did this person get married?”

These questions are relatively recent additions to the ACS, but are beginning to be deployed in demographic research. For instance, Cohen (2014) uses a similar question on divorce in his analysis of the effects of the Great Recession. These questions were however extensively tested by Census and are well validated (Elliott et al, 2010). In our sample of women “at risk” of a marriage or non-marital birth, 7% reported a marriage and 6% reported a birth in the previous 12 months.

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<sup>1</sup>We primarily focus on unmarried women with no more than a high-school degree. Among these women ages 19-44, 13% report still being in school. Among unmarried women ages 19-44 with at least a high school degree, 39% reported being in school (with 77.5% working towards on an undergraduate degree and 22.5% working towards a graduate degree).

<sup>2</sup>In 2012 there were problems in the collection of data on women who gave birth in the past 12 months in 59 of the ACS Public Use Microdata Areas within states Florida, Georgia, Kansas, Montana, North Carolina, Ohio and Texas. This led to the suppression of 0.5% of the data and we omit affected cases from the analysis of both fertility and marriage.

### *Socio-Economic Status*

While there is a voluminous literature on the role of race/ethnicity in structuring marriage and fertility (e.g., Schneider, 2011; Wu, 2008), the literature reviewed above is careful to focus on class rather than race/ethnicity. We follow this work and focus on class, which we conceptualize principally based on educational attainment. Specifically, we construct a measure of socio-economic status as defined by women’s educational attainment where women with less than a high school degree or only a high school degree (and no time in college) at the time of the survey are categorized as low SES and women with a bachelors degree or more education are categorized as high SES.

We also assess the robustness of our results to alternatively defining socio-economic status by women’s own income, by household poverty, and by constellations of poverty and education. For women’s own earned income over the prior twelve months, we code women into quartiles and focus on the bottom quartile of earners. We also measure household poverty status as a function of household income over the prior twelve months. Low-SES respondents were coded as the family’s total income being either less than 200% of the official federal poverty level (FPL) or less than 100% of the FPL.<sup>3</sup>

As described below in our overview of analytical methods, we use these individual-level measures of SES in the ACS data to stratify the sample and examine the relationship between state-level unemployment and marriage and fertility in these low-SES subsamples. But, some discussion of the limitations of these measures is appropriate here. The measures of education, own income, and household poverty are almost certainly correlated with a large number of unobserved individual-level characteristics. We note that we do not attempt to estimate the causal effect of education, income, or poverty on marriage and fertility using these individual-level markers. Rather, as noted below, we examine the association

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<sup>3</sup>Among the unmarried women in our sample, 1707 lived in a household at exactly 200% of FPL. Among those, the median household income was \$45,000 and the median individual income was \$22,000. In our analysis of the first income quartile, the cutoff varied slightly by year because we took the bottom quartile in each year, but cutoff varied between a personal income of \$6910 and \$8500.



between recessionary economic conditions and marriage and fertility among low-SES unmarried women. We use these individual-level measures of education, income, and poverty as markers of class, but not as independent causal factors.

Additionally, all of the individual-level socio-economic variables are measured at the time of interview while our outcome measures of fertility and marriage capture events that took place as many as 12 months prior to interview. There is, then, some risk that the event of birth or marriage might have affected women’s measured socio-economic status. This is unlikely to be the case for educational attainment which is a fairly stable measure of SES and we focus on education as the most useful stratifying variable.

#### *Individual-Level Controls*

We adjust our models for individual-level measures from the ACS of respondent’s age in years, age squared, and race/ethnicity, parity (a measure of “own children living in the household” coded no children, one child, or 2+) that excluded children born in the previous 12 months, number of previous marriages (none, 1, 2+) that excluded a marriage in the last 12 months, and an indicator for whether the woman was foreign born.

For our race/ethnicity measure, we use a six category measure of race, classifying respondents as either, (1) white, non-Hispanic, (2) Black, non-Hispanic, (3) Asian, non-Hispanic, (4) non-Hispanic Native American or Other (5) multi-racial, non-Hispanic, or (6) Hispanic. Groups (4) and (5) are both very small, each making up <2% of the sample. For our parity measure, some women had been recorded as having no children but also having had a child in the previous 12 months. For these women, we assumed that prior parity equaled zero if a birth was reported in the last twelve months.

Table 1 contains summary statistics for all of our individual-level measures, stratifying the sample into low- (a high school education or less) and high-SES (a BA or more) unmarried women. The mean age of the sample is 30, approximately half are white-non-Hispanic, 20% are non-Hispanic, Black, 18% are Hispanic, and smaller shares are of other race/ethnicities.

Unsurprisingly, the very large majority of these unmarried women have never been married (81%). The sample of low-SES women, as defined by education, is composed of larger shares of race-ethnic minorities and is more likely to have had a previous birth than the high-SES sample of women.

## **State-Level Unemployment**

We operationalize exposure to the economic shocks of the Great Recession with data on state-level unemployment rates for the states in which ACS respondents resided. This state-level unemployment data is drawn from the Bureau of Labor Statistics Local Area Unemployment Statistics program, which publishes monthly unemployment rates for every state and the District of Columbia. These unemployment rates are model-based estimates derived from data from the Current Population Survey, official unemployment statistics, and the Current Employment Statistics. These data have been widely used in recent studies of recession effects (i.e., Cohen, 2014; Pilkauskas, Garfinkel, and Currie, 2012).

We expect that state-level unemployment rates capture multiple ways in which the Great Recession affected individuals' economic positions. Perhaps most clearly, area-level unemployment captures a diluted measure of the potentially strong effects of individual-level unemployment on these demographic outcomes. While unemployment is experienced by a minority of state residents, the effects are potentially large.

But, state-level unemployment likely also captures aspects of household economic distress, short of unemployment, such as lost income, job immobility, the need to provide (or the loss of) social support within one's network, and even feelings of economic insecurity and uncertainty. While some prior work on the Great Recession has sought to disentangle the effects of economic hardship from those of uncertainty (Schneider, 2014; Schneider, Harknett, and McLanahan, 2014), here we consider the combined effects of the multiple dimensions of the recession as captured by state-level unemployment rates. Importantly, whatever the mechanism by which state-level unemployment rates affect individual behavior, these mea-

asures of the recession are plausibly exogenous to individual-level behavior. We do not expect that a respondent’s marriage or birth would shift state-level economic conditions nor would such conditions suffer from problems of omitted variable bias at the individual level.

We link these measures of state-level economic conditions during the Great Recession to ACS respondents using information on respondents’ state of residence and year of interview. In this way, we exploit temporal and geographic variation in the severity of the recession across places and years to estimate the association between economic conditions and marriage and fertility.<sup>4</sup>

Though we do not know a woman’s residence during the period of a potential conception or decision to marry, we do know her state of residence one year prior to completing the survey, so we use this as state of residence rather than state of residence at time of survey. We are interested in the prevailing economic conditions at the time of conception or decision to marry. The ACS does not release the month in which a respondent was surveyed or the month in which a birth or marriage occurred, but we know ACS surveys are distributed equally by month during the year. By assuming that women who report having a child or a marriage in the last 12 months are equally likely to have done so in any of the those preceding months, we calculate a lagged indicator of unemployment for a woman’s state of residence, weighted by the probability that one could have given birth for each month (see Appendix 1 for additional detail and derivation). We then lag the weighted average of monthly unemployment by 9 months to account for gestation. For marriage, it is less clear

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<sup>4</sup>We also considered measuring unemployment at a smaller geographic aggregation, but settled on the state-level measure for three reasons. First, as noted above, there are theoretical reasons to prefer the state-level of aggregation over smaller units such as counties. Second, while BLS releases both state and county-level measures of unemployment, different methodologies are used to generate these estimates. For states, the BLS uses a relatively straightforward “signal plus noise” model based on the CPS, CES, and UI data at the state-level. For substate labor market areas, the estimation is done differently and less directly given the absence of representative household-level survey data at the sub-state level. Finally, and perhaps most importantly, the ACS releases state of residence data for all respondents, but does not release counties in the micro data that we use for these analyses. The ACS does release Public Use Microdata Areas (PUMAs) codes which are geographic entities of at least 100,000 people. But, this means that counties are identifiable only if they are coterminous with a single identifiable PUMA or they contained multiple PUMAs, none of which extended into other counties. Estimating the models at the county-level would mean limiting the sample to only those women in these (generally very large) counties and that would result in excluding 46% of the analysis sample.

what the appropriate lag should be and so we primarily also use a 9-month lag. However, we also consider alternative lags in our robustness checks.

Our analysis merges state-level unemployment rates to respondents interviewed in the years 2008-2012. The first of these surveys were conducted between January and December of 2008 and, in asking about births and marriages that occurred 12 months prior, measures births and marriages that took place as early as January 2007. If we assume a 9-month lag, then we are interested in the economic conditions as early as May of 2006. The beginning of that time period pre-dates the Great Recession, whether it is measured by the NBER's official definition or as marked by rising rates of unemployment. In sum, most of the period we observe is during the Recession, but the nature of the ACS data and the fertility process also mean that our earliest measures of behavior occur before the country was in recession.

Figure 1 charts the monthly unemployment rate nationally as well as for three states with high (Michigan), medium (New York), and low (Wyoming) unemployment rates over the months from which we draw data for our analyses (May 2006 to Dec 2012). Over this period we observe monthly state-level unemployment rates from 1.8% to 14.5%. This translates in our weighted state-level unemployment rates to a measure with a range from 2.6% to 13.4% (with mean 6.2% and standard deviation 2.3%).

## **Alternative Measures of State Economic Conditions**

In addition to the unemployment rate, we also assess the sensitivity of our results to a number of other measures of the state macro-economy. In our preferred measure, we use the unadjusted monthly unemployment rates to calculate our weighted average. We also test an alternative construction that uses the seasonally adjusted unemployment rate. Beyond unemployment, we also use the employment to population ratio. To construct this measure, we use monthly estimates of state population and of the number of residents who are employed, both drawn from the Bureau of Labor Statistics Current Employment Statistics (CES). We calculate a state-level measure of the employment-to-population ratio using the

same methods as we employed in creating the unemployment measure.

We also create several measures of state-level housing distress. To construct these measures, we make use of the Mortgage Bankers Association's (MBA) National Delinquency Survey, a quarterly survey of lenders. Our first measure is the mortgage delinquency rate, defined as the end of quarter inventory of all mortgage loans on one to four unit residential properties that are delinquent as a share of all such outstanding mortgage loans. The second measure is the mortgage foreclosure rate, similarly defined as the end of quarter inventory of all mortgage loans in the foreclosure process as a share of all such outstanding loans. Because these measures are only reported quarterly, but monthly data are needed to construct our preferred measures, we linearly interpolate between quarters to spread out the inventories across months. Our third measure is the mortgage foreclosure start rate, defined as the share of mortgages that began the foreclosure process during the quarter. Here, we use the Denton method for interpolating quarterly flow data into a monthly time series. The method allows for expression of the time trend of the quarterly flows in the imputed monthly time series (Bloem et al, 2001).

We follow the same weighting procedure as with state-level unemployment to construct our preferred measure and, as with the state-level unemployment data, we match these state-level measures of housing distress to respondents' states of residence one year prior to completing the survey and then lag these measures by nine months.

## **Analytic strategy**

### **Main Models**

Our basic analytic approach is to estimate logistic regression models of the association between state-level unemployment and the likelihood that unmarried women married and the likelihood that unmarried women had a child in the prior twelve months. We run models by SES subgroup as defined by the individual measures of educational attainment reported in the ACS and described above.

Let the subscripts  $i$  and  $j$  refer to person  $i$  who, one year before the survey, lived in state  $j$ . The individual-level regression equation we estimate is

$$\ln\left(\frac{P_{ij}}{1 - P_{ij}}\right) = \alpha + \beta_1 U_{ij} + \sum_p \pi_p Z_{ijp} + \sum_j \gamma_j D_j.$$

$P_{ij}$  is the probability of a marriage or non-marital birth (depending on the model) for person  $i$  in state  $j$ .  $U_{ij}$  is the lagged weighted unemployment rate for state  $j$  (described above and in Appendix 1) for person  $i$ 's survey year.  $Z_{ijp}$  are the individual-level controls of age in years, age squared, race/ethnicity, foreign born, and number of previous births and marriages for person  $i$  in state  $j$ , and  $D_j$  is a dummy variable for state  $j$ . Our focus is on  $\beta_1$ , the coefficient on the lagged weighted state-level unemployment rate.

We weight individuals to represent the national population and adjust the standard errors for the clustering within states. The state fixed effects deal with unobserved time-invariant state-specific factors that could bias the relationship between unemployment and our outcomes. Year fixed effects would net out unobserved year-specific factors common across all states. However, since we employ a very short panel (2008-2012) that coincides with the period of the Great Recession, including year fixed-effects would risk over-controlling and minimizing recession effects.

We begin by examining the relationship between state-level unemployment and marriage among women with a high school diploma or less education. We next estimate the likelihood of having a non-marital birth as a function of state-level unemployment for women with a high school diploma or less education.

## Robustness

We next assess the robustness of our results to a wide variety of modeling and measurement alternatives. First, we examine several alternative operationalizations of individual-level socio-economic status using the measures (described above) of women's own income, house-

hold poverty, and poverty and education. We also examine the robustness of the results to focusing on first marriages and first births.

Since marriage and non-marital fertility are intertwined, we recognize that some of the association between unemployment rates and non-marital fertility could be sorting effects resulting from the effects of unemployment rates on marriage. For example, there may be women who in better economic times would have gotten married and had children. If the Great Recession affects low-SES women's decisions about marriage but does not affect their decisions about having children, then these women might not marry but still have a child. Mechanically, this would increase non-marital fertility as marriage decreases. Conversely, one could imagine that women who put off marriage during the Great Recession are also more likely to postpone having a child. This would then decrease non-marital fertility. To address this concern, we calculate the propensity of unmarried women to marry independent of state-level unemployment, and then calculate the association between state-level unemployment and non-marital fertility only among those women with a low propensity to marry, thus removing women who "would have gotten married" had state-level unemployment been lower.

Finally, we also present evidence of the robustness of our results to different measures of macro-economic conditions, showing how marriage and fertility among unmarried low-SES women responds to the employment-to-population ratio, mortgage delinquencies, and mortgage foreclosures. We also investigate if percent changes in unemployment are related to our key outcomes and if the results are sensitive to alternative lags in unemployment.

### **Models of the Relative Impacts of Unemployment**

The models described above test what we suggest is the "strong" version of the decoupling argument: that exposure to poor economic conditions will have no relationship with non-marital fertility among low-SES women. We also test two slightly weaker versions of the decoupling theory: (1) weak macro-economic conditions will have stronger effects on marriage than on non-marital fertility among low-SES women and (2) that any negative effects

of economic conditions on low-SES women’s non-marital fertility will be weaker than the negative effects of exposure to such conditions on other women, whether married or high-SES, but that the effects of economic conditions on marriage will be similar for women of different socio-economic statuses.

To test the first proposition, we calculate the differences in the predicted probability of marriage and non-marital fertility for varying levels of unemployment. If unemployment matters more for marriage than non-marital fertility, we would expect that the plot of the differences would be increasing with unemployment. If the line is flat or even negatively sloped, that would be evidence against even this weak version of decoupling theory. We conduct this test for the preferred models and each of the robustness checks using alternative operationalizations of individual-level socio-economic status.

To test the second proposition, that any negative association between unemployment rates and non-marital fertility among low-SES women might be much smaller than any negative association with the fertility of other women, we pool women of different marital statuses and educational attainments, categorizing them as low-SES married women, high-SES unmarried women, and high-SES married women and estimate an interaction between this categorical measure of state and the state-level unemployment rate.

Such an analysis would traditionally be accomplished either by including an interaction between SES and state-level unemployment or estimating separate logistic regression models for different groups of women and comparing the coefficients or odds ratios. However, because of the non-linearity of logistic regression, interaction terms cannot be evaluated by looking at their sign, magnitude, or statistical significance and it is problematic to directly compare logistic regression coefficients between different subgroups because traditional tests can confound the magnitude of regression coefficients with unobserved heterogeneity (Ai and Norton 2003; Mood 2010; Long 2009). To avoid this problem, we instead estimate a linear probability model (LPM) with interaction terms (Angrist and Pischke, 2009). While the LPM has some limitations, we note that for our models the coefficients from the LPM



match almost exactly with average marginal effects calculated from logistic regression models (results available on request), which gives us more confidence in the suitability of the LPM.

## Results

### **Exposure to Recessary Economic Conditions and Marriage and Non-Marital Fertility among Low-SES Women**

We begin by examining the relationship between state-level unemployment and the likelihood that low-SES women would have transitioned to marriage in the prior twelve months. The first column of Table 2 presents the results from a logistic regression model of the likelihood of marriage on state-level unemployment rates for women with a high school diploma or less education. The results show that state-level unemployment has a negative association with the likelihood of marriage among women with no more than a high school degree.

Unmarried low-SES women residing in states with higher levels of unemployment are less likely to transition to first marriage. But, theory would predict that similar economic conditions would not reduce fertility among these women because fertility is relatively decoupled from economic factors. Column 2 of Table 2 presents a model that tests this proposition. Here, we see a negative relationship between state-level unemployment and the likelihood that low-SES women will have a non-marital birth.

To size these relationships, Figure 2 plots the predicted probability of marriage and of non-marital fertility across observed levels of state unemployment rates for women with a high school degree or less education. We find that the probability of marriage for women with no more than a high school education declines with rising unemployment, falling from 5.2% when unemployment is 4% (the closest integer to the 5th percentile of the unemployment distribution) to 4.0% when unemployment is 12% (the closest integer to the 95th percentile). We also find that the probability of a birth declines significantly as unemployment increases (solid line). The probability of a birth for unmarried women with a high school degree or less

falls from 9.2% when unemployment is 4% to 7.5% when unemployment is 12%, an 18.5% reduction in fertility.

## Robustness

### Alternative Measures of Socio-Economic Status

Our preferred models operationalize low socio-economic status using women's own education. Education has the advantage of being a relatively stable measure and of being a clear marker of disadvantage. We also re-estimated the models focusing on low-SES women defined in several alternate ways: (1) women in the bottom quartile of income, (2) women living in households with incomes of less than 200% of the FPL, (3) women living in households with incomes of less than 100% of the FPL, and (4) women living in households with incomes of less than 200% of the FPL who themselves did not have more than a high school education. The first four rows of Table 3 present the results. As with our preferred measure of low-SES, there are significant negative associations between state-level unemployment and non-marital fertility among low-SES women when SES is defined in each of the ways above.

For entry into marriage, the operationalization of SES matters somewhat more. There are negative associations of a similar magnitude to the preferred model when we use income, but the coefficients appear smaller, though still negative and significant, when we use 200% of FPL and the combined poverty and education marker. Interestingly, we find no evidence of associations between state-level unemployment and marriage for women living in households with incomes of less than 100% of the FPL.<sup>5</sup>

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<sup>5</sup>Though prior theory and empirical research focus on class, rather than race, we also assess if our results hold when the models are estimated separately for Non-Hispanic whites only, Non-Hispanic Blacks only, and women who are Hispanic only. Within the Hispanic sub-group, we also separately examine women who migrated from abroad and native born Hispanics. In each case, we observe significant and similar negative relationships between state-level unemployment and non-marital fertility among women with a high-school degree or less education. We also find similar negative relationships with marriage, though the coefficient on unemployment for non-Hispanic Black women is not significant.

## **First Births and Marriages**

We also assessed the sensitivity of the results to focusing on first marriages and first births. As shown in rows 5 and 6 of Table 3, there are similar negative associations between state-level unemployment and first marriages and first births.

## **Marital Sorting**

The results above suggest that the fertility of unmarried low-SES women is quite responsive to economic shocks. However, it is possible that the apparent negative consequences of unemployment rates on fertility among unmarried low-SES women are an artifact of recession effects on marriage among low-SES women. Specifically, the estimates presented in Table 2 show that the Recession reduced marriage among low-SES women. If women who would have married and had children but for the recession, do not have children because they do not marry, then non-marital fertility among low-SES women would decline, but that decline would be due to marital sorting effects not to direct effects on fertility. We test this possibility by re-estimating our key fertility models on the subgroup of low-SES women with relatively low propensity to marry.

To estimate the propensity, we run a logistic regression model predicting marriage using only our individual-level covariates of age, age squared, race/ethnicity, foreign born, number of previous marriages, number of previous children, and state of residence 12 months prior to the survey. Using the resulting coefficients, we calculate the predicted probability of marriage in the past 12 months for each woman, and then separate the women into four quartiles based on this probability. If the fertility rate during periods of high state-level unemployment are affected by women who would have gotten married had state-level unemployment been lower, then we should see that when we remove the women most likely to get married, the effect of state-level unemployment on non-marital fertility is different than in the full model of non-marital fertility. To conduct this test, we rerun the fertility model for low-SES women twice, first excluding the top two quartiles of women most likely to marry and then excluding

the top three quartiles of women most likely to marry.

As in Table 2, there are significant negative associations between state-level unemployment and the likelihood of a non-marital birth among low-SES women. Row 7 of Table 3 shows a significant negative link between state-level unemployment and non-marital fertility among low-SES women in the bottom two quartiles of women by propensity to marry. Row 8 shows a significant negative association among the bottom quartile of women by propensity to marry. In all, these results do not support the idea that the negative consequences of state-level unemployment for non-marital fertility are brought about simply through sorting women out of marriage.

### **Alternative Macro-Economic Measures**

Our preferred models use a 9-month lagged measure of state-level unemployment to allow for gestation. However, marriage may be responsive to a shorter lag. Row 9 of Table 3 shows that the results for marriage are robust to using a five rather than nine month lag.

Our results have also focused on the levels of unemployment rates in the states as a proxy for the severity of the crisis. Other research has suggested that the speed of change in unemployment may also be quite important for understanding the social effects of the Great Recession (e.g. Schneider, Harknett, and McLanahan, 2014). Row 10 of Table 3 includes a measure of the percent change in unemployment calculated as  $(\text{state\_unemployment}_{t-9} - \text{state\_unemployment}_{t-21}) / \text{state\_unemployment}_{t-21}$ . The coefficients are negative, indicating that worsening unemployment lowers the likelihood of marriage and non-marital fertility among low-SES women. But, the estimates for fertility are not significant.

The main results, reported above, gauge exposure to recessionary economic conditions based on state-level unemployment rates. However, the Great Recession was marked by lower labor force participation and by housing distress. Rows 11-15 of Table 3 show the results of re-estimating our models of marriage and non-marital fertility among low-SES women (defined by education) using several alternative measures. We find quite similar results

when using the seasonally adjusted unemployment rate and the employment-to-population ratio. Employing our three measures of housing distress - the mortgage delinquency rate, the foreclosure inventory rate, and the foreclosure start rate also return similar results. Exposure to worse housing distress was associated with less marriage by low-SES women and with less non-marital fertility.

## **Relative Impacts of Unemployment on Marriage and Non-Marital Fertility**

Contrary to some articulations of decoupling theory, we find strong negative associations between state-level economic conditions and the non-marital fertility of low-SES women. However, the standard of evidence of no association may be too demanding. Below, we test the alternative formulation that while economic conditions may be negatively related to non-marital fertility, the relationship between economic conditions and marriage will be stronger.

In Figure 3, we plot the differences between the probability of a birth and of a marriage based on the coefficients presented in Table 3. Figure 3 plots 5 lines, one for the probabilities based on Table 2, and then one for each of the first four rows of Table 3 (the models that estimate both marriage and non-marital fertility using our preferred unemployment measure, but alternative operationalizations of socio-economic status). A positively sloping line would indicate that the negative association between unemployment and marriage was increasingly stronger than the negative association between unemployment and non-marital fertility, an expectation in-line with decoupling theory. We find, in general across the 5 models, *negatively* sloping lines for low-SES women. The least negatively sloping line is from our primary model based on defining low-SES by education—but even so we do not find any support that economic shocks might have more pronounced consequences on marriage than on non-marital fertility among low-SES women. We also conducted a similar exercise based on the models using alternative macro-economic indicators (Rows 11-15 of Table 3)

and found similar results (available upon request). The only exception to this was with our model using proportional change, which had an upward sloping line that would be consistent with this weaker version of decoupling theory.

## **Relative Impacts of Unemployment for High- and Low-SES Women**

The results presented in Tables 2 and 3 show negative associations between state economic conditions and the fertility of unmarried low-SES women. However, it is possible that while these relationships are negative rather than null, they might be very small compared with recession effects on other women who were more advantaged or married. Such an empirical pattern would fit much more closely with the predictions of decoupling theory. We test this possibility by comparing the size of the relationship between recessionary economic conditions and the fertility of (1) low-SES unmarried women as compared with: (2) married low-SES women, (3) unmarried high-SES women, and (4) married high-SES women, where low SES is defined as having a high school diploma or less education and high SES is defined as having at least a bachelors degree. We note that members of group (3), unmarried high-SES women, are at a very low risk of a non-marital birth. But, we include them for completeness sake. For marriage, we have only two groups, (1) low-SES unmarried women and (2) high-SES unmarried women.

This check requires that we examine the interaction of state economic conditions and our categorical measure of marital status by socio-economic status. Here we employ the LPM, which is better suited for making comparisons of estimates across groups. We re-estimate our preferred models from Table 2, but now include an interaction term between the state-level unemployment rate and either the four category measure of SES x marital status (for fertility) or the two category measure of SES (for marriage).

Table 4 presents these comparisons. The first column shows that state-level unemployment has a negative association with low-SES women's marriage and that, in accord with theory, this relationship is not significantly different from the relationship with the marriage

entry of high-SES women - the interaction term is close to zero and non-significant.

The second column of Table 4 considers fertility as the outcome. Examining the interaction terms shows that compared with low-SES unmarried women, unemployment rates have a smaller and significantly different relationship with fertility for both married low-SES women and unmarried high-SES women. The relationship between state-level unemployment and fertility is no different for unmarried low-SES women and married high-SES women, it is significant and negative for both.

In sum, we find evidence of negative associations between the state-level unemployment rate and the fertility of both high and low SES and both married and unmarried women. But, rather than unemployment having the weakest relationship with the fertility of unmarried low-SES women it has, if anything, the strongest. We do not find support for the idea that the negative association of economic shocks with low-SES women's non-marital fertility would be weaker than the negative association of such shocks with the fertility of other women, whether married or high-SES. Instead, the results continue to support the finding that poor unmarried women's fertility was responsive to recessionary economic shocks, both absolutely and relatively.

## Discussion

An influential body of theory and qualitative research has advanced the idea that economically disadvantaged women have a very high, nearly unattainable, economic standard for marriage, but have few such economic pre-requisites for fertility. This theory artfully integrates structural economic constraints and cultural schemas to explain important demographic divides in marriage and non-marital fertility by class in the contemporary United States.

We leverage the sharp economic downturn of the Great Recession to test some of the key ideas of this theory. We find that low-SES women exposed to worse economic conditions

were somewhat less likely to marry than those living in relatively less distressed states and at less distressed times. The relatively modest size of this effect is somewhat surprising given the emphasis in recent literature on marriage and socio-economic status on the role of economic prerequisites for marriage.

We also find robust evidence of negative associations between exposure to poor economic conditions and non-marital fertility among low-SES women. It does not appear that these relationships are confined to higher order births or are due solely to marital sorting. Further, the impacts of poor economic conditions on the fertility of unmarried low-SES women are generally equal to or larger, rather than smaller, than the recession effects on marriage among low-SES women and are also larger, rather than smaller, than recession effects on the fertility of married women and high-SES women. Our results suggest that economic factors are both absolutely and relatively important in shaping the non-marital fertility of poor women.

This finding differs from the results of prior qualitative research. We discuss several possible reasons for this discrepancy. One possibility is that while the poor women interviewed in prior qualitative work have effectively decoupled fertility and economic standing, their male sexual partners have not. Recent work provides some hint that this may be the case as interviews with low-SES men find some evidence that economic resources play a larger, if still minor, role in their discussions of non-marital fertility (Augustine, Nelson, and Edin, 2009).

Another possibility is that while low-SES women encounter a steady economic deprivation in their normal lives that has become decoupled from fertility decisions, the economic shocks of the Great Recession were so strong as to upset this dynamic and lead low-SES women (as well as higher-SES women) to forgo births, at least in the short term (Myrskylä et al, 2013). Indeed, the idea that the Recession could have generated delays in non-marital fertility among low-SES women rather than a permanent effect on quantum, goes some ways towards reconciling these results. Such a dynamic would not conflict with the empirical reality that many poor unmarried women have children, but would provide important nuance to the



theory in so far as low-SES women do moderate fertility in the face of sudden economic disruption.

At the same time, it could also be the case that apart from sharp increases in material deprivation and economic uncertainty, the Great Recession brought with it a new cultural narrative, one that linked reduced fertility and the recession and was at odds with any prevailing schema among low-SES women that decoupled economic resources and fertility. It is certainly the case that popular media was replete with stories on how the recession might affect and was affecting family life. Could such narratives and depictions have generated a kind of performativity in the the fertility response of low-SES women to the recession?

But, perhaps the clearest way to reconcile these findings is simply to note that the samples used in the motivating qualitative research are quite different from the broadly representative sample that we employ. The poor women interviewed by Edin, Kefalas, Gibson-Davis, and others were generally selected on already having a non-marital birth and on being poor. In our work, we focus on all low-SES women at risk of a non-marital birth - a pool that includes both those who had a baby and those who did not. Certainly some women had children despite the economic recession, but we show that many delayed fertility because of it. In short, our work points to the importance of recognizing heterogeneity within the population of poor unmarried women. While some may have children despite experiencing real economic hardship, our results show that the average effect of an economic shock is indeed negative. We do not seek to limit our analysis sample using exactly the same criteria as Edin and Kefalas (2005). Part of this hesitancy is based on data limitations in the ACS. While Edin and Kefalas (2005) limit their sample to women who have had a non-marital birth (and generally focus on those who have had a teen birth), it is difficult to identify women based on those characteristics in the ACS. But, we also stop short of attempting such an analysis because one contribution of this research is to apply ideas developed on non-representative samples to the broader population and to avoid this sort of selection on the outcome variable.

Our work is subject to several limitations. First, there are limitations to the ACS data. The ACS does not release the month in which a given interview occurred and does not contain data on the month in which a birth took place, so our measure of state-level unemployment is necessarily imprecise. We construct a weighted average of monthly state-level unemployment for each state and survey year, but it would be far better to create such an average based on each survey month. Unfortunately, such data is not available (Citro and Kalton, 2007). However, we expect that this primarily serves to introduce imprecision rather than bias into our estimates. The ACS also contains no retrospective information on socio-economic status, only measuring education, poverty, and income at the time of interview. Ideally, we would be able to ascertain women’s socio-economic status in the period prior to conception and so avoid the risk that the occurrence of marriage or non-marital fertility affected socio-economic status. While our use of education as the primary stratifying variable minimizes these concerns, this remains a limitation of the data. The ACS also does not contain county or MSA identifiers for large proportions of the sample. Our focus on state-level measures allows us to include all women, but our work is somewhat limited by our inability to examine how economic conditions at smaller levels of geographic aggregation affect marriage and non-marital fertility.

Second, in our analysis comparing the effects of the Great Recession on high and low-SES women and married and unmarried women, we implicitly assume that state-level unemployment rates capture shocks equally felt across these groups. It is certainly possible though that the shocks of the Recession were more strongly felt by some than others. However, the direction of that inequality is ambiguous. Unemployment increased by a larger amount among the poor than among the affluent (though the proportional increase in the unemployment rate was similar), but the housing crisis and shocks to the stock market were likely to affect higher-SES women more than their lower-SES counterparts and our results using markers of housing distress are quite similar to our results using unemployment.

Third, we are not able to uncover the mechanisms by which low-SES unmarried women

reduced their fertility since data on sexual behavior, the use of contraceptive technology, and miscarriage and termination are not included in the ACS. While prior qualitative research has attributed some of the supposed disconnect between economic standing and fertility to inconsistent use of contraception, our results strongly suggest that low-SES unmarried women or their partners must have taken steps to purposefully reduce fertility in the face of the Recession. Demographers have long studied the proximate determinants of fertility (Bongaarts, 1978) and we can draw from that literature to consider likely mechanisms of fertility reduction in response to the Recession.

Marriage has classically been seen as an important proximate determinant of fertility (Bongaarts, 1978) and we find some evidence that it did indeed decline among this low-SES sub-group as a result of the recession. However, we show that the Recession-related declines in non-marital fertility are apparent even among the sub-group of low-SES women least likely to wed, suggesting that the marriage mechanism is an unlikely pathway to these reductions in non-marital fertility. Another explanation, for which there is some evidence, is that the recession changed fertility intentions (Guzzo, 2011) and so we might then expect that declines in fertility operated through an increased or more effective use of contraceptive technology or an increased use of abortion. There is relatively little work on how abortion changed during the recession, though Ananat et al (2013) infer an increase in abortion from the fact that economic conditions zero to four months after expected conceptions are related to observed teen births in North Carolina. There is also relatively little work on how the Recession might have affected the use of contraceptive technology, though hints of an increase in usage have been found (Finer et al, 2012). Yet another possibility is that fertility could have been reduced through more stress-induced miscarriage. There is a literature that shows that miscarriage increases in response to exogenous stressors, but it has not been extended to the Great Recession. Future work, perhaps using the NSFG, would benefit from examining how the recession influenced the use of contraceptive technology among this population and perhaps even shifted the proportion of births to low-SES women that was intended rather

than un-intended.

In sum, we exploit the largest increases in unemployment since the Great Depression to conduct one of the only quantitative tests of the idea that economic resources are tightly linked with normative standards of marriageability but decoupled from fertility decisions among unmarried low-SES women. We find evidence of a negative association between area-level unemployment and marriage. But, we also find similar relationships between area-level unemployment and low-SES women's non-marital fertility, suggesting that economic considerations are not decoupled from non-marital fertility among the disadvantaged. While future work should further investigate this phenomenon, our results are robust to alternative model specifications and hold up to additional tests of the theory that compare recession effects on marriage and fertility among unmarried low-SES women and compare recession effects on the fertility of unmarried low-SES women with married and higher-SES women.

## Appendix 1

The procedure we develop for estimating state-level unemployment is complex and necessarily indirect, but it is the best approach given the particular data limitations inherent in the ACS. Respondents to the ACS are interviewed throughout a calendar year, yet no information on the month of interview is publicly released. For example, a 2011 survey could have been completed as early as January of 2011 or as late as December of 2011. Further, our key outcome measures, a birth or marriage in the prior twelve months, with no information on the month of occurrence, introduces additional imprecision. In the example above, given the range of interview dates in 2011, a reported birth or marriage could have occurred as early as January of 2010 (12 months prior to the earliest 2011 interviews) or as late as December of 2011 (the same month as the latest 2011 interviews). Thus, the reference period for our outcome for any given survey year spans 24 months. In the case of births we must account for gestation, so the corresponding economic conditions at the time of conception in the example above were experienced between May of 2009 and April of 2011 (we ultimately use the same lag for marriages, but consider alternatives in our robustness checks). Our approach is to average the unemployment conditions recorded over the full 24 month period.

We construct a weighted average of monthly unemployment rates because the probability is much greater that the event occurred near the center of that time range than near the beginning or end (for example, there is only one way that a birth could have occurred in December 2011—an interview in December 2011 and a birth in the same month. But there are twelve ways that a birth could happen in January of 2011—interview in December 2011 and birth 11 months prior, interview in November 2011 and birth 10 months prior, interview in October 2011 and birth nine months prior, etc. In practice, this means that for the earliest possible pregnancies in a given survey year, we are only using a single month of “relevant” unemployment data (though many months of unemployment data following insemination). For the very large majorities of births, however, multiple lagged months of unemployment

data are used in the weighted average.<sup>6</sup>

More generally, for year  $Y$ , a marriage or birth could be as recently as December of  $Y$ , or as far back as January of  $Y-1$ . We can think of this like rolling two die. The first is numbered from 0 to 11 and represents the number of months prior to December of year  $Y$  that the survey was completed. The second is numbered from 0 to 12 and represents the number of months prior to the survey that the event (a birth of marriage) occurred. The distribution of the sum of these two is given by the following probability generating function:

$$\begin{aligned}
G(x) = & \frac{1}{156}(P = 0) + \frac{2}{156}(P = 1) + \frac{3}{156}(P = 2) + \frac{4}{156}(P = 3) + \frac{5}{156}(P = 4) \\
& + \frac{6}{156}(P = 5) + \frac{7}{156}(P = 6) + \frac{8}{156}(P = 7) + \frac{9}{156}(P = 8) + \frac{10}{156}(P = 9) \\
& + \frac{11}{156}(P = 10) + \frac{12}{156}(P = 11) + \frac{12}{156}(P = 12) + \frac{11}{156}(P = 13) + \frac{10}{156}(P = 14) \\
& + \frac{9}{156}(P = 15) + \frac{8}{156}(P = 16) + \frac{7}{156}(P = 17) + \frac{6}{156}(P = 18) + \frac{5}{156}(P = 19) \\
& + \frac{4}{156}(P = 20) + \frac{3}{156}(P = 21) + \frac{2}{156}(P = 22) + \frac{1}{156}(P = 23)
\end{aligned}$$

In other words, for a woman surveyed in year  $Y$ , there is a 1 in 13 chance that the birth was 11 months prior to December of  $Y$  in January of  $Y$ . In that case, lagging by additional 9-months, means we are interested in the unemployment rate in April of  $Y-1$ , which we give a weight of 1/13. On the other extreme, a birth in December of  $Y$  or January of  $Y-1$  is least likely, and we give the unemployment rates in March of  $Y$  and April of  $Y-2$  each a weight

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<sup>6</sup>An alternative approach would be to simply lag economic conditions to be one year prior to the survey year. So, annual state-level unemployment for 2010 would be matched to respondents surveyed in 2011. This is the approach of some other recent work using the ACS to study divorce and it is quite clear and intuitively appealing. However, this lag structure does not closely correspond to the appropriate period of influence. Recall that respondents surveyed in 2011 report on births that were conceived between May of 2009 and April of 2011. Unemployment in 2010 is relevant for some, but by no means all of these births. An alternative might be to use a two-year lagged measure. So, we could use annual state-level unemployment for 2009 matched to respondents surveyed in 2011. This measure would do a better job of approximately the influencing economic conditions for conceptions in 2009 and perhaps early 2010, but might be too long a lag for births conceived in late 2010 or early 2011. A compromise then could be to use an average of the 2010 and 2009 annual rates. This then sets us back on the path towards using the more complex monthly weighted average that we actually employ. Nevertheless, we tested the robustness of our key results to the use of these simpler alternatives and find similar negative and significant relationships between state-level unemployment and marriage and non-marital fertility. Full results are available upon request.

of  $1/156$ . Using this overall distribution of probabilities, we weight the economic calendar months appropriately in creating our lagged economic indicators.

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# Tables and Figures

Table 1: Descriptive Statistics for Women “At Risk” of Marriage or a Non-marital Birth (2008-2012)

	Range	Low SES Mean	High SES Mean	All Mean
<i>Dependent Variables</i>				
Married in past year	0-1	0.05	0.09	0.07
Birth in past year	0-1	0.09	0.02	0.06
<i>Individual-Level Independent Variables</i>				
Age	19-44	29.7	31.2	30.4
Proportion Born in the United States	0-1	0.82	0.88	0.86
<i>Race/Ethnicity (proportions)</i>				
Non-Hispanic White	0-1	0.46	0.69	0.55
Non-Hispanic Black	0-1	0.23	0.12	0.20
Non-Hispanic Asian	0-1	0.02	0.08	0.04
Non-Hispanic Native American and Other	0-1	0.01	0.01	0.01
Non-Hispanic Multirace	0-1	0.02	0.26	0.02
Hispanic	0-1	0.26	0.09	0.18
<i>Previous marriages (proportions)</i>				
Never married	0-1	0.81	0.85	0.81
Married once	0-1	0.15	0.13	0.16
Married 2+ times	0-1	0.04	0.02	0.04
<i>Previous children (proportions)</i>				
No children	0-1	0.61	0.85	0.68
One child	0-1	0.17	0.09	0.15
2+ children	0-1	0.21	0.07	0.17
N		335047	226862	805445

Note: Low SES is defined as having no more than a High School diploma or equivalent. High SES is defined as having at least a Bachelors degree. The total sample includes all women “at risk” of marriage or a non-marital birth, regardless of education level. Descriptives are weighted to account for sampling. Proportions may not add to 1 due to rounding.

Table 2. Coefficients from Logistic Regression Models predicting Fertility and Marriage for Low-SES Women (2008-2012)

	Marriage	Fertility
State-Level Unemployment	-0.033***	-0.028***
Age	-0.011	0.156***
Age squared	-0.001*	-0.004***
<i>Race: Baseline is Non-Hispanic White</i>		
Non-Hispanic Black	-1.077***	0.321***
Non-Hispanic Asian	-0.047	0.056
Non-Hispanic Native American and Other	-0.221**	0.386***
Non-Hispanic Multirace	-0.360***	0.184***
Hispanic	-0.318***	0.379***
Born in the United States	-0.441***	-0.202***
<i>Previous marriages: Baseline is never married</i>		
Married once	0.418***	0.116***
Married 2+ times	0.569***	-0.270***
<i>Previous children: Baseline is no children</i>		
One child	0.785***	0.323***
2+ children	0.890***	0.114***
State Fixed Effects	Yes	Yes
N	335047	335047

\* p <0.05, \*\* p <0.01, \*\*\* p <0.001

Note: Logistic Regression model accounts for survey weights and standard errors are adjusted for the clustering within states. State Fixed Effects and Constant term are not shown.

Table 3. State-level Unemployment Coefficient for various Robustness Checks

	Marriage	Fertility	N
<i>A. Other definitions of low-SES</i>			
1. Bottom income quartile	-0.036***	-0.039***	202626
2. Below 200% of Poverty Line	-0.012*	-0.034***	358268
3. Below 100% of Poverty Line	0.003	-0.041***	191247
4. Below 200% of Poverty Line and no more than HS degree	-0.014*	-0.032***	244142
<i>B. Other subgroups</i>			
5. First Marriage	-0.034***		269704
6. First Birth		-0.033***	208345
7. Low Propensity to Marry (bottom 50%)		-0.024***	167642
8. Very Low Propensity to Marry (bottom 25%)		-0.038***	83856
<i>C. Alternatives to unemployment rate</i>			
9. Five month lag	-0.036***		335047
10. Proportion Change (% change over 12 months)	-0.079*	-0.014	335047
11. Seasonally Adjusted	-0.033***	-0.028***	335047
12. Employment to Population Ratio	0.035***	0.029***	335047
13. Delinquency inventory	-0.024***	-0.019***	335047
14. Foreclosure Starts	-0.552***	-0.389**	335047
15. Foreclosure Inventory	-0.037***	-0.029**	335047

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

Note: Each cell contains the estimate from a separate logistic regression model of the effect of state-level unemployment on marriage or fertility for women with the specified characteristics. Each model controls for the same of individual-level characteristics and state fixed effects as in Table 2. Each model accounts for survey weights and standard errors are adjusted for the clustering within states.

Table 4. Coefficients from Linear Probability Models of State-Level Unemployment on Marriage and Fertility for different SES by marital status subgroups (baseline is unmarried low-SES women).

	Marriage	Fertility
State-Level Unemployment (UR)	-0.0015***	-0.0019***
Married Low SES X UR		0.00080*
Unmarried High SES X UR	-0.00016	0.0015***
Married High SES X UR		0.00046
N	564652	1279593

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Note: Both models control for the same individual-level characteristics and state fixed effects as in Table 2, as well as the main effects for SES and marital status. Both models account for survey weights and standard errors are adjusted for the clustering within states.

Figure 1. Monthly Unemployment Rates nationally and for three states with High, Medium, and Low levels of Unemployment (May 2006–December 2012)

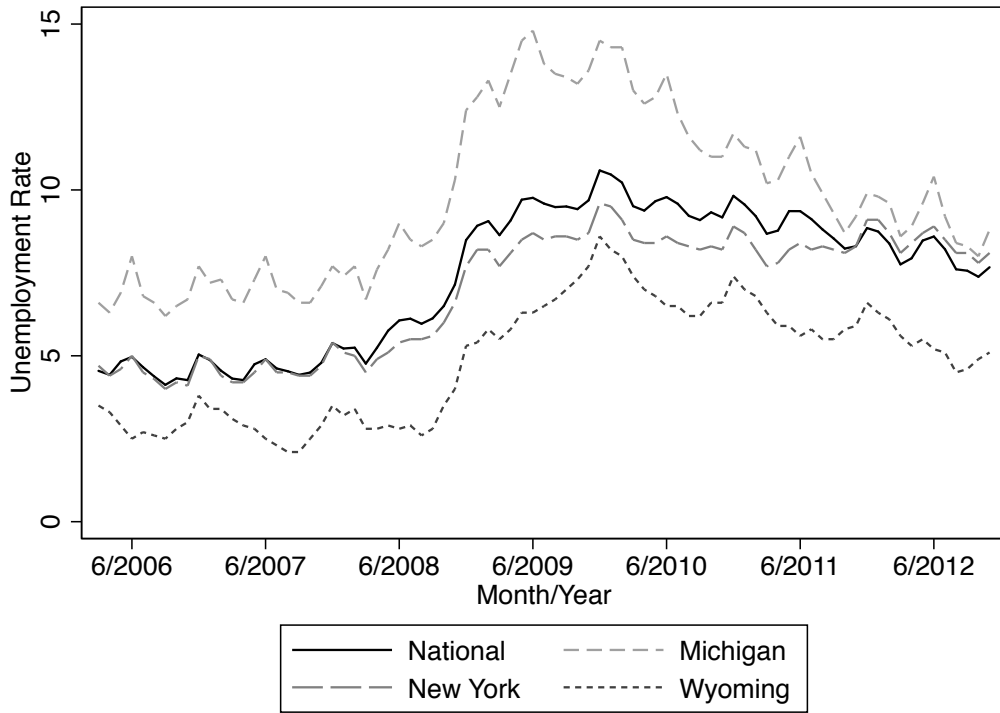




Figure 2. Predicted Probability of Marriage and Non-Marital Fertility for Low-SES Women by State-Level Unemployment Rate (Shading shows the 95% Confidence Intervals)

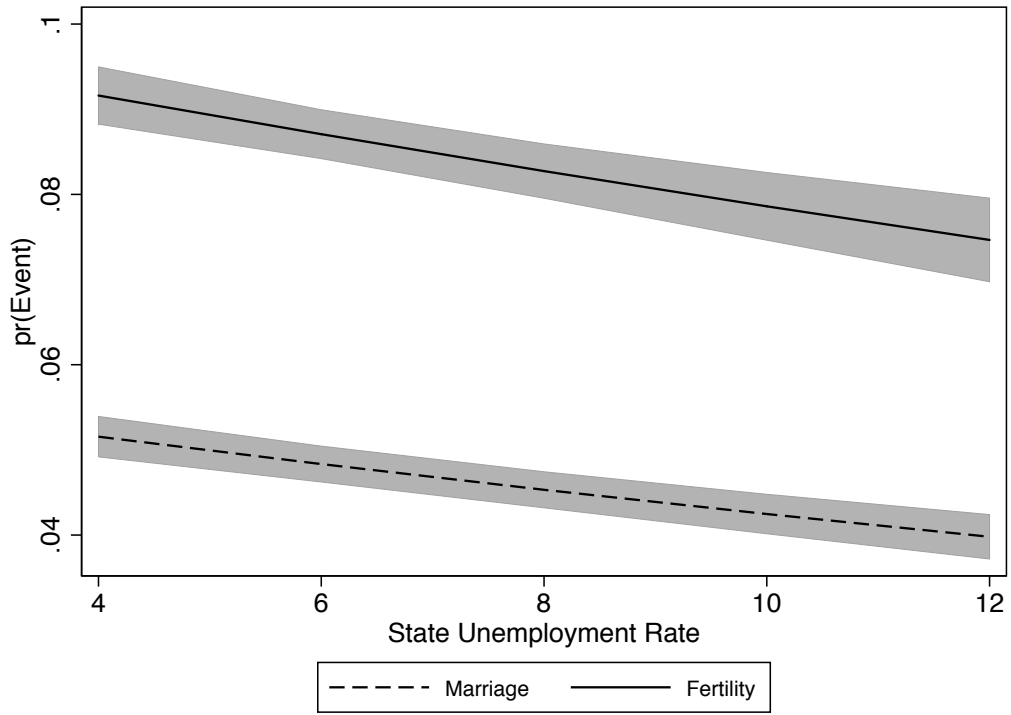


Figure 3. Differences in the Predicted Probability of Marriage and Non-Marital Fertility for Low-SES Women by State-Level Unemployment Rate

