Non-Marital and Teen Fertility and Contraception During the Great Recession

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Abstract

I examine the effects of the Great Recession on non-marital and teen births. Women at risk for these events may have been most vulnerable to the economic harms of the Recession and so most affected in terms of their fertility. However, influential research has found that fertility decisions are often disconnected from economic concerns for disadvantaged women, suggesting null effects of the Recession on non-marital and teen fertility. I constructed a state-level panel of annual non-marital and teen fertility rates merged with state-level economic data. I find that worse macro-economic conditions are associated with lower rates of non-marital and teen fertility. I next analyzed person-month level data from the National Survey of Family Growth (NSFG) on contraceptive practices among unmarried and teenage women. I find that worsening macro-economic conditions at the national level raise the probability of contraceptive use, of consistent contraceptive use, and of the efficacy of the contraceptive method employed. The results suggest that disadvantaged women moderate fertility in response to severe economic shocks, supporting a more nuanced understanding of the relationship between economic factors and fertility in this sub-population.

Keywords: Non-Marital Fertility, Teen Fertility, Contraception, Recession
The economic effects of the Great Recession have been readily apparent in high levels of unemployment and unprecedented levels of mortgage foreclosure. These economic effects have also had important social consequences for American families. Recent research suggests that elevated levels of unemployment and foreclosure led to a substantial reduction, on the order of 5% to 10%, in births in the United States (Schneider, 2015; Currie and Schwandt, 2014; Cherlin et al, 2013; Ananat et al, 2013).

Reductions in fertility around periods of recession are typically thought of as a rational response to increases in economic hardship and perhaps also to increased uncertainty about the future (Sobotka et al, 2011). On those grounds, we might expect the Great Recession to have had its largest effects on relatively disadvantaged women - those who are teens, or unmarried, or with limited educational attainment. However, ethnographic and demographic research on non-marital fertility among low-SES women provides good reason to expect that the Recession would have relatively limited effects on the fertility of such women. This work finds that economic considerations are relatively disconnected from fertility among low-SES unmarried women and this disconnection may manifest in non-use, inconsistent use, or the use of ineffective contraception.

I examine how non-marital and teen fertility responded to the sharp economic shocks of the Great Recession. I first draw on a panel of state-level vital statistics records merged with data on state-level unemployment and foreclosure to estimate how the fertility rates of teen and unmarried women responded to the Recession. There is clearly not a direct relationship between economic conditions and births - an important set of proximate determinants of fertility must necessarily have been the mediating processes. To test the pathways by which the Recession might have affected fertility, I next draw on data from the 2006-2010 Cycle of the National Survey of Family Growth (NSFG) to examine if the Recession affected patterns of contraception use among these same groups of women.

I find that, at the state-level, non-marital and teen fertility declined significantly with rising unemployment and foreclosure during the years of the Great Recession. I also find
that the likelihood of using contraception increased with unemployment and foreclosure over
this same time period for unmarried women. There is some evidence that unmarried women
exposed to worse economic conditions also used contraception more consistently and used
more effective contraceptive methods. However, I find no evidence of a link between national
economic conditions and the use of contraception among teenagers during the Great Reces-
sion. Together, these findings buttress other recent research finding Recessionary reductions
in non-marital and teen fertility. The results suggest that some disadvantaged women moderate
fertility in response to severe economic shocks, supporting a more nuanced understanding
of the relationship between economic factors and fertility in this sub-population.

Fertility in the Great Recession

The Great Recession resulted in substantial economic hardship and uncertainty at the house-
hold level. These effects are most broadly captured in the sharp increases in residential mort-
gage delinquency and foreclosure, the dramatic rise in unemployment, and the pronounced
reductions in consumer confidence. Research has also shown that the Great Recession in-
creased household economic hardship and poverty (Bitler and Hoynes, 2012; Pilkauskas,

Given the substantial investments that many Americans make in their children in the
form of basics like medical care, clothes, food, and shelter as well as other costs such as
childcare, schooling, toys, books, and activities (to name just a few), we might well expect
that at least in the short term, fertility would decline in the face of these economic shocks.
Indeed, this common wisdom is formalized in economic theories of fertility (i.e. Becker,
1960) and borne out in a long line of demographic research in the United States that shows
a negative effect of aggregate measures of unemployment on fertility (i.e. Rindfuss, Morgan,
and Swicegood, 1988; Macunovich, 1996; Schaller, 2016; Currie and Schwandt, 2014). Such
recessionary effects are generally concentrated among younger women and on first births
(Sobotka et al, 2011; Adsera, 2004). While recessions may then primarily serve to delay
fertility (tempo effects), recent research suggests that exposure to poor economic conditions can also have a permanent effect over the life course, reducing number of children ever born (quantum effects) (Currie and Schandt, 2014).

Recent research in the United States finds evidence of significant negative effects of the Great Recession on fertility using a variety of methodological approaches. One set of analyses simply track the time trend in fertility nationally, observing that GFR declined nationally with the onset of the Great Recession (Livingston and Cohn, 2010; Morgan et al, 2011a). A second set of analyses examines the relationship between area-level measures of fertility and area-level economic indicators. Livingston (2011) reports that changes in state economic conditions between 2007 and 2008 were related to declines in fertility between 2008 and 2009 and similarly, Morgan et al (2011a) show that the change in unemployment between 2007 and 2009 was negatively related to the change in fertility between 2007 and 2009. Cherlin et al (2013) extend this series to show a negative relationship between the percentage point change in unemployment between 2007 and 2009 and the percentage point change in GFR between 2007 and 2011. More recently, Schneider (2015) assembles a panel of state-level data on fertility and unemployment and foreclosure for the period 2001 - 2013 and finds that worsening macro-economic conditions are associated with lower general fertility rates and that these effects were largest for younger women.

Variation by Socio-Economic Status
These negative effects of recessionary conditions may not, however, apply to all women and couples equally. The economic hardship perspective on recessions and fertility would suggest that the fertility of women in already disadvantaged sub-groups, such as those with lower levels of educational attainment or at risk of a non-marital or teen birth, might be most affected by the recession. In this scenario, the least advantaged reduce their fertility the

1Notably, recent empirical research does not seem to bear out Butz and Ward’s (1979) theory that while children are expensive, so is any time that women take off from work for pregnancy, birth, and parenthood and so times when the labor market is weak may actually be very good times to have a child.
most in response to poor economic conditions.

Conversely, recent ethnographic work focused on young unmarried mothers in the United States suggests that for many young disadvantaged women, fertility is effectively disconnected from economic resources. Scholars such as Edin and Kefalas (2005) argue that, with few prospects for economic success, these young women see little reason to delay fertility. In these accounts, fertility is not the result of a careful economic calculus, but rather a natural part of the life course essentially removed from economic considerations (Gibson-Davis, 2009). Some prior empirical research supports this idea. Gibson-Davis (2009) finds that in a sample of disadvantaged unmarried parents, improvements in economic standing are predictive of marriage but not of having a birth. Other work has even shown a positive relationship between unfavorable economic conditions and non-marital fertility (Billy and Moore, 1992) and between state-level income inequality and teen fertility (Kearney and Levine, 2014). In essence, this work suggests that for disadvantaged and unmarried and teen women, economic factors may exert a weak influence on fertility. In the context of the economic shocks of the Great Recession, we might then expect to find little relationship between unemployment or foreclosure and the fertility of unmarried, teen, or otherwise disadvantaged women.

This research complements a significant body of demographic work on how class and economic expectations shape how women use contraception. This research suggests that disadvantaged unmarried women and their partners do not so much set out to have children in the face of economic scarcity as “drift into parenthood” (Sawhill, 2014; p.3). Indeed, it is well-established that many non-marital and teen births are unintended (Finer and Henshaw, 2006) and such unintended births are much more common among less educated women than women with a college degree (Musick et al., 2009). The explanation for this mismatch between intentions and fertility is then inconsistent or ineffective use of contraceptive technology (Edin et al, 2007).

There is less consensus on why disadvantaged, unmarried, and teen women are inconsistent in their use of contraception. One explanation notes that although few pregnancies
among low-SES unmarried women are explicitly intended, significant ambivalence exists about pregnancy (Augustine, Nelson, and Edin, 2009; Edin and Kefalas, 2005; Edin et al., 2007; Yoo et al., 2014; Miller, Barber, and Gatney, 2013). In their interviews with unmarried parents, Edin et al (2007) found roughly 65% of pregnancies were neither completely planned nor accidental. Instead, the couples often wanted children, but were unsure if the current circumstances were ideal. This spectrum of ambivalence has also been found in national representative studies (Yoo et al., 2014) and among fathers (Augustine et al., 2009).

**Fertility in the Great Recession: Disadvantage and Proximate Determinants**

Despite these contrasting predictions, relatively little research has investigated if the effects of the Recession vary by women’s socio-economic or marital status. There are though, some notable and useful exceptions. Cherlin et al (2014) examine the time trend in births in the prior 12 months reported in the American Community Survey data and find that women living at less than 100% of the poverty line have the steepest negative gradient in fertility over the years of the Recession, through 2011. Ananat et al (2013) draw on detailed county-level data from North Carolina merged with information on mass-layoffs to examine the effects of the Recession on teen births. While we might expect that teen births would be relatively unresponsive to the Great Recession, or might even increase, Ananat et al (2013) find the opposite, that births to Black teens declined with community-wide job loss in North Carolina. Further, Kearny and Levine (2015) also find that teen births declined during the recession. Finally, Schneider and Hastings (2015) draw on ACS data merged with state-level economic conditions to examine how the Great Recession affected non-marital fertility among low-SES women. They find that unmarried women with a high school degree or less who were exposed to higher rates of foreclosure and unemployment were significantly less likely to have a birth.

These results are somewhat surprising, both because prior theory suggests that fertility
is likely to be disconnected from economic factors for unmarried, disadvantaged, and teen women and because prior empirical research shows that a substantial portion of births to these women are unintended and likely due to inconsistent use of contraception. There are, however, several pathways by which the Great Recession could have affected fertility among these sub-groups of women and not all are inconsistent with this existing theory and empirical work.

One such pathway would be an increase in stress-induced miscarriage. Prior research has found that miscarriage increases in response to maternal stress (Nepomnaschy et al, 2006) and the Great Recession, like prior economic recessions, could reasonably be expected to increase economic stress (e.g. Conger, Reuter, and Elder, 1999). If such a mechanism were at work in the case of the Recession, that could explain the puzzling discrepancy between the apparent decline in births among teens and unmarried women and the existing literature that suggests a weak connection between economic factors and fertility among disadvantaged women. However, I know of no research that has examined this issue in the context of the Great Recession and the magnitude of fertility declines would appear to much larger than would be expected from stress-induced miscarriage.

A possible alternative is that more women elected to terminate their pregnancies during the Great Recession due to economic pressure. Evidence of such behavior would not accord with the idea that fertility is disconnected from economic concerns, but would fit with the finding that unmarried, teen, and low-SES women have trouble adopting consistent and effective patterns of contraceptive use. There is relatively little work on how abortion changed during the recession. In one study, 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. However, nationally, abortions declined markedly during the years of the Great Recession, and reached a low for the period 2002-2011 in 2011 (Pazol et al, 2014). Further, women under the age of 20 and unmarried women accounted for the large majority of all abortions and rates of abortion declined markedly for these two
groups, though the rate of decline among unmarried women was slower between 2007 and 2011 than between 2002 and 2006 (Pazol et al, 2014).

The Great Recession could have also induced more teen and unmarried women to use effective contraception as a means of avoiding births during a period of acute economic constraint. There is somewhat more evidence to support this idea. The strongest evidence to date is reported by Ananat et al (2013). Based on analysis of the Youth Risk Behavior Survey for the period 1995-2009, Ananat et al (2013) find that white and black teens are more likely to report using contraception at last sex following mass layoffs in their state. More broadly, women steadily increased their use of long-acting contraceptives (Finer et al, 2012) and men increased their use of vasectomy (Najari, 2014) over the period 2006 through 2009. Additionally, a 2009 survey found that 30% of female respondents reported using contraception more consistently as a result of the Recession (Gold, 2009) and some reports based on market-research data suggest that the number of condoms and over-the-counter female contraceptives sold increased in the first months of 2009 as compared to the same period in 2008 (Gregory, 2009).

Plan of Analysis

I conduct two related empirical analyses. First, I draw on state-level vital statistics records on births to unmarried women and teen women joined with data from private and governmental sources on unemployment and foreclosure to examine if the Great Recession really did have the effect of reducing births to these two groups of generally disadvantaged women, as found in North Carolina by Ananat et al (2013) and nationally for unmarried women using ACS data by Schneider and Hastings (2015). This analysis advances existing work by considering both teen and non-marital fertility nationally during the period of the Great Recession.

Second, I use individual person-month data from the NSFG to examine if the high rates of unemployment and foreclosure found during the Great Recession changed the use of contraception by unmarried and teen women and, specifically, by unmarried and teen women
of lower socio-economic status. Here, I examine if the probability of contraceptive use, the consistency of contraceptive use, and the type of contraception employed was responsive to economic conditions. While Schneider and Hastings (2015) speculate that the Great Recession likely resulted in increased use of contraceptive technology among un-married women, they do not actually test to see if recessionary economic conditions are associated with contraceptive use. Ananat et al (2013), do show a relationship between economic conditions and contraceptive use among teens, but do not examine contraceptive practices by unmarried women or low-SES unmarried women.

**Data and Methods**

**State-Level Fertility Data**

I create a panel of state-level general fertility rates (GFR) for the period 2002-2013. This data is drawn from the natality vital statistics published by the National Center for Health Statistics (NCHS). I create two key measures of interest. First, I calculate the non-marital GFR as the number of births to unmarried women within a state in a given calendar year divided by the number of unmarried women aged 15-45 living in the state in the same calendar year. The data for this denominator comes from the single-year files of the American Community Survey. Second, I calculate the teen GFR as the number of births to women aged 15-19 within a state in a given calendar year divided by the number of women aged 15-19 living in the state in the same calendar year. The data for this denominator comes from SEER.

I adjust the models for several time-varying measures of state demographic composition (each lagged on year): percent of women age 15-44 in the state that are black, non-hispanic, percent hispanic, percent with less than a high school education, a high school degree, or some college, percent aged 25-34 and percent 35-44, and percent enrolled in school. Each measure is calculated from micro-data form the March supplement to the annual CPS, collapsed with person-weights to the state-year level. These controls are designed to adjust for any non-
linear changes in state demographic profiles that could drive both fertility patterns and labor market conditions.

My approach follows much existing work in aggregating fertility at the state-level (Schaller, 2016; Schneider, 2015; Lovenheim and Mumford, 2013). As Kearney and Levine (2009) note, these state-level vital statistics data are well-measured. Additionally, using state-level aggregates as the outcome allows me to express the effects in terms of the widely used metric of general fertility rates rather than individual likelihoods of having a birth. Finally, from a practical perspective, many of the most-commonly used data sets that would allow for the estimation of the effect of state-level unemployment on individually-level fertility are cohort specific and so less useful for understanding the effects of the Recession (i.e. NLSY, Add Health).

**National Survey of Family Growth**

I complement the state-level fertility data with individual-level data from the 2006-2010 cycle of the National Survey of Family Growth (NSFG). The NSFG is a nationally representative survey of Americans age 15-45 with over-samples of African Americans, Hispanics, and teenagers. It is conducted by the Centers for Disease Control and Prevention’s (CDC) National Center for Health Statistics (NCHS). The multi-stage stratified sample is constructed by first drawing 110 geographic entities called primary sampling units and dividing those into four sub-sets. Each sub-set is then used in turn in each of the four years of fieldwork (Groves et al, 2009). This strategy ensures that interviews that occur later in the interviewing period (2006-2010) are not biased in the direction of hard-to-reach respondents.

Separate surveys are conducted of men and women and, following the convention in the demographic literature on fertility, I use data on women’s reports. The interviews with women were conducted in-person by trained female interviewers and lasted an average of 80 minutes. The survey had a 78% response rate for female interviewees.

This cycle of the NSFG was in the field from June of 2006 through June of 2010, spanning
the years of the Great Recession. It contains interviews with 12,279 women aged 15-45. Though fielded over four years, the NSFG contains only one interview with each respondent. However, because the NSFG collects detailed retrospective data on key variables, it is possible to construct a monthly time-series for each respondent for many of the key measures of interest.

**Contraceptive Use**

The 2006-2010 Cycle of the NSFG collects a detailed monthly calendar of contraceptive method use based on respondents retrospective reports. This calendar is designed to collect information on the use of up to four different contraceptive methods during a given month for up to three years from the January before the interview date. Since interviews were conducted between July of 2006 and June of 2010, contraceptive method data is available from January of 2003 through June of 2010.

This data provides a comprehensive record of the use of contraception at the monthly-level over the period from 2003 through mid-2010. I use this data to construct three key variables for analysis. First, I create a dichotomous measure of any contraceptive use in a given month. Second, I create a measure of consistent contraceptive use which I define as the use of some kind of contraceptive technology in the current month and in each of the prior two months.

Third, I examine the effectiveness of the methods of contraception that respondents employed. Respondents reported using a large variety of contraceptive methods. Scholars have previously estimated the effectiveness of these different types of contraception at preventing pregnancy. Specifically, Trussell et al (2011) provide estimates of the share of women experiencing an unintended pregnancy within the first year of typical use of the method. Table 1 provides a listing of these different methods as well as their associated “failure rates.” I construct a new variable that contains the failure rate corresponding to the contraceptive method used by the respondent. Since respondents can report up to four methods in a given
month, I take the failure rate for the single most effective method used in the month.

TABLE 1 ABOUT HERE

Demographic Controls
To maintain parallelism with the state-level analysis, I stratify the NSFG analyses by marital status and by age. For marital status, I use respondents’ retrospective reports of dates of marriage and divorce/separation to construct a complete marital history and map that to marital status in a given person-month. I then construct a dichotomous measure of married or unmarried in each person month. For age, I use respondents’ month and year of birth to construct a dichotomous measure of being a 15-19 years old.

While the state-level Vital Statistics data cannot be easily stratified by socio-economic status in addition to marital status or age, such data is available in the individual-level NSFG file. I construct a measure of the respondent’s mother’s educational attainment, coding mothers as having less than a high school degree or at least a high school degree. This approach, of using mother’s educational attainment as a proxy for respondents’ social class is also employed by England, McClintock, and Shafer (2011) and Kearney and Levine (2012).

I also create a set of time-invariant background characteristics of respondents. These include race (white, black, hispanic, or other), family structure at age 14 (living with both biological parents or not), foreign born, and the religion in which respondents were raised (none, Catholic, evangelical Protestant, other Protestant, other non-Christian), educational attainment at interview (less than high school, high school graduate, some college, Bachelor’s degree or higher), and school enrollment. Finally, use of the information on the year and month of respondent’s birth permits the construction a time-varying measure of age (included

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2 The Vital Statistics data do contain a measure of mother’s education which could be crossed with marital status to generate a count of non-marital births to less educated women. However, beginning in 2003, the states began to change the way in which education was reported, moving from the 1989 U.S. Standard Certificate of Live Birth to the 2003 U.S. Standard Certificate of Live Birth. However, the states undertook this change at different times making the harmonization across years very difficult.
as age and age-squared) and of whether the respondent was cohabiting.

**Macro-Economic Conditions**

I merge both the state-year-level Vital Statistics data and the individual-level person-month NSFG data with exogenous macro-economic data from government and private-sector sources.

First, I assemble data from the Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics (LAUS) on the unemployment rate. This rate is calculated as the number of people looking for work divided by the number of people in the labor force. The BLS LAUS estimates are model-based and rely on data from the Current Population Survey, the Current Employment Statistics, and the Unemployment Insurance system. I use annual state-level rates of unemployment for my analysis of the state-year level vital statistics data. I use monthly national level unemployment rate data for my analysis of the person-month level NSFG data.

Second, I use quarterly data from the Mortgage Bankers Association (MBA) National Delinquency Survey on the foreclosure start rate. This is a measure of the percentage of residential mortgages starting the foreclosure process during the year. I sum the observed quarters in a given year to create an annual state-level measure of foreclosure starts for my analysis of the state-year level vital statistics data. For the mortgage foreclosure start rate at the national-level on a monthly basis, I 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).

These state and national-level measures of economic conditions likely capture a number of pathways by which poor macro-economic conditions might affect individual behavior. Most directly, poor conditions at serve as a rough proxy for the probability that an individual experiences unemployment or foreclosure. But, state-level conditions also likely capture economic hardship short of unemployment and foreclosure including reduced earnings and economic stress more generally. Even more generally, area-level economic conditions might capture
the strain of recession on personal networks and, perhaps most broadly, feelings of economic uncertainty and insecurity, even among those who have not directly experienced economic hardship (Schneider, Harknett, and McLanahan, 2016; Gassman-Pines, Gibson-Davis, and Ananat, 2015). Recent scholarship on fertility and recession suggests that these feelings of uncertainty may also be important for shaping fertility behaviors (Schneider, 2015; Sobotka et al, 2011). I do not attempt to disentangle the effects of realized economic hardship from feelings of uncertainty in these analyses, but I note that recent work that attempts to do so finds evidence that both hardship and uncertainty affected fertility and other demographic behaviors during the Great Recession (Schneider, 2015; Schneider, Harknett, and McLanahan, 2016). I also do not attempt to map these two different measures, unemployment rate and foreclosure start-rate, onto different pathways of fertility influence. Rather, I treat both as incomplete but reasonable proxies for the events of the Great Recession.

Figure 1 charts the time trend in these two rates between 2003 and the end of 2009. The foreclosure start rate is relatively flat at a low level until 2006 when it begins to climb sharply. Notably, this increase begins well in advance of the official start of the Great Recession (grey shaded area), though the foreclosure start rate does peak right at the end of the official recession. The national unemployment rate falls from 2003 through mid-2007 and then begins an extremely sharp and rapid rise, increasing from about 5% to nearly 10% by the end of 2009. Were this graph to continue, we would see that though the official period of recession ends in mid-2009, the unemployment rate remained at or above 8% through the end of 2012.

FIGURE 1 ABOUT HERE

Analytic Strategy
I first estimate the relationship between state-level economic conditions and state-level non-marital and teen GFR. I construct a state-year level file merging the fertility rates from Vital Statistics, the demographic controls, and the measures of the state economy. I estimate
an Ordinary Least Squares (OLS) regression model of the relationship between economic conditions and fertility. The model includes a one-year lagged measure of state economic conditions as well as lagged measures of the time-varying state-level demographic attributes discussed above. I also include a set of state- and year-fixed effects as well as a state-specific linear time trend. The state fixed effects account for unobserved time-invariant characteristics of the state and avoid problems of omitted variable bias arising from the failure to account for such characteristics, such as religiosity, that might be associated with both fertility and the economy. The year fixed effects account for unobserved period characteristics that are stable across states. The inclusion of state-specific linear time trends controls for state-specific time trends in unobserved variables that might bias the relationship between economic conditions and fertility. I also weight the regressions by the average state population over the period 2002 to 2013. The results are robust to omitting the demographic controls and the coefficients are larger without the state-specific linear time trends.

Next, I estimate the relationship between national-level economic conditions and individual-level use of contraceptive technology. I construct a person-month file from the retrospective questions on contraceptive use in the NSFG. I estimate three sets of regression models, in each, I use the national foreclosure start-rate and the national unemployment rate six-months prior to the reporting month as the key predictors. First, I examine how each measure of economic conditions is related to the use of any contraceptive method in the reporting month. Second, I examine how each measure of economic conditions is related to consistent use (defined as using some kind of contraception in the reporting month and in both of the two months prior) of contraception. Third, I examine the relationship between economic conditions and the specific contraceptive method. For each set of models, I also examine if the findings hold when only examining native-born women and if there is variation in the effect of national economic conditions by co-residential status (cohabiting versus single) and by race/ethnicity.

The first two sets of models are estimated using logistic regression. The third set of mod-
els, of method effectiveness, is estimated with OLS. In all models, I adjust for respondents’ age, age-squared, race/ethnicity, family structure at age 14, religion raised-in, and foreign born status. I also include year fixed effects and adjust the standard errors for repeated observation of respondents. This strategy reduces the risk of omitted variables bias by using area-level economic conditions, rather than individual-level hardship, to proxy for the effects of the Great Recession. This approach also reduces the risk of reverse causality (wherein a woman might reduce labor force involvement in advance of a birth or pregnancy). I define the “at risk” population to be all female respondents who have ever had sex and are not currently pregnant, according to their retrospectively reported pregnancy and conception calendar data. I then estimate the models separately for unmarried women and for teenage women and then again for unmarried women with less-educated mothers and for teen women with less educated mothers.

I also conduct several robustness tests. I examine if the results are sensitive to the choice of lag on the measure of macro-economic conditions. I also estimate a set of person-fixed effects models that exploit within person changes in contraceptive behavior to estimate the effects of economic conditions on contracepting. I also run a set of “placebo” regressions, using future macro-economic conditions to predict past contraceptive use. Here, I expect to find no significant relationship. Finally, I examine if error in respondent’s recall of events for the construction of the retrospective contraceptive calendar’s might affect the results.

**Results**

**Time Trends in Non-Marital and Teen Births**

Figure 1 charts the fertility rates for unmarried women (left panel) and for teen women (right panel) over the years leading up to and following the official dates of the Great Recession (Dec 2007 - June 2009) (grey bar) in six US States: Nevada, Florida, California, North Dakota, Nebraska, and Alaska. The first three (dashed lines) saw the largest absolute increases in
unemployment between 2006 and the peak of unemployment recorded during the recession and post-recession period (an average of 7.8 percentage points). The latter three (solid lines) saw the smallest absolute increases in unemployment (an average of just 1.5 percentage points).

**FIGURE 2 ABOUT HERE**

For non-marital fertility, there appear to be some clear contrasts in the trend between the states with the largest increases in unemployment and the states with the smallest. In Nevada, Florida, and California, non-marital fertility had been rising in the years prior to the Recession and then declined markedly. It is difficult to date the beginning of the decline precisely, but it does appear to begin before the official beginning of the Great Recession. These declines continued through 2011 in all three states and then leveled out in Nevada and Florida while the decline continued through 2013 in California. In contrast, in Nebraska, North Dakota, and Alaska, the patterns appear much less regular.

The time trend is less revealing for teen fertility (right panel). In the three hardest-hit states, teen fertility appears to have begun a sharp decline in 2006 or 2007 with that decline continuing through the Recession and beyond. In the less affected states, teen fertility remained flat through the Recession and then declined in Nebraska and Alaska while remaining basically flat in North Dakota.

**Effects of State Economic Conditions on Non-Marital and Teen Births**

In Table 2, I turn from these descriptive charts of change over time to analysis of the relationship between state-level economic conditions and state-level fertility rates. These models estimate, in six separate regressions, the relationship between the state foreclosure start rate and the unemployment rate in the prior year and marital, non-marital, and teen
fertility rates. All of the models include state and year fixed effects, a state-specific linear time trend, and demographic controls.

TABLE 2 ABOUT HERE

These results show that higher rates of unemployment and foreclosure translated to lower rates of fertility among unmarried women. The coefficient on the state-level foreclosure start rate is negative and significant ($b = -0.38, p < 0.05$) as is the coefficient on unemployment ($b = -0.58, p < 0.05$). Based on these estimates, the non-marital fertility rate would be predicted to decline from approximately 49 per 1,000 when unemployment was 3% to 44 per 1,000 when unemployment was 11%. To size these effects, consider that the non-marital fertility rate increased from 26 per 1,000 in 1970 to a peak of 52 per 1,000 in 2008, an increase of approximately 0.67 births per 1,000 per year. These effects then are comparable in size to about 7.5 years of change in the historical increase in the non-marital fertility rate.

This evidence supports the idea that Recessionary economic shocks served to discourage births among unmarried women. Further, it appears that the effects of the Recession were at least as large on unmarried women as on married women ($b = -0.32$ and $b = -0.38$ for unemployment on marital and non-marital fertility, respectively and of $-0.48$ and $-0.58$ for foreclosure starts on marital and non-marital fertility, respectively).

The results are similar for teen fertility. The mortgage foreclosure start rate ($b = -0.41, p < 0.001$) is significantly negatively related to the teen fertility rate. The unemployment rate is also negatively related to the teen fertility rate ($b = -0.23$), but is not significant at conventional levels ($p < 0.10$).

The non-marital fertility rate includes all births to unmarried women age 15-44. Some of these women are teenagers, making it somewhat difficult to distinguish the two measures analyzed above. I re-estimated the models using the non-teen non-marital fertility rate, that is the number of births to unmarried women age 20-44 in each state-year divided by the number of unmarried women age 20-44 in each state-year. The results are entirely
consistent with those above. The coefficient on the state-level foreclosure start rate remains negative and significant and \( (b = -0.36, p < 0.05) \) and is very similar in magnitude to the models that include non-marital births to women age 15-44. The coefficient on the state-level unemployment rate is also little changed \( (b = -0.55, p < 0.05) \).

These results support the idea that non-marital and teen fertility are pro-cyclical, declining as economic conditions worsened during the Great Recession. However, this result runs contrary to the idea that economic considerations are disconnected from non-marital and teen fertility or that poor economic conditions might even increase such fertility. One possible explanation for the divergence between these results and prior research is that different periods are being studied. I supplement the main results above with a longer panel of state-level data, for the period 1990-2013. I re-estimate the models above, but allow the relationship between state-level unemployment and non-marital and teen fertility to vary over time. I find a significant interaction that suggests that the negative effect of unemployment is much more pronounced in the later part of this period. Figure 3 plots the average marginal effect of unemployment on teen fertility (left panel) and on non-marital fertility (right panel). In short, the relationship is essentially null in the 1990s and then grows increasingly negative through the Great Recession.

FIGURE 3 ABOUT HERE

In sum, it does not appear that fertility and economic considerations are disconnected for these more disadvantaged groups of women. However, these estimates do not reveal the extent to which this relationship between recessionary conditions and birth rates is the results of conscious action. To examine the proximate determinants of these fertility declines, I next turn to analysis of data from the 2006-2010 Cycle of the NSFG.
Contraceptive Use

Table 3 presents the results from a set of models that examine the association between the national foreclosure start rate and the national unemployment rate and the use of contraception by unmarried women and teen women. Panel A of Table 3 presents the results for unmarried women. Models 1 and 2 focus on the use of any contraception, Models 3 and 4 on the consistency of contraceptive use (using contraception for three consecutive months), and Models 5 and 6 on the efficacy of the contraceptive method employed. For each outcome, I present results for all unmarried women and then for unmarried women whose mothers did not graduate from high school.

TABLE 3 ABOUT HERE

Contraceptive Practices Among Unmarried Women

Both the foreclosure start rate and the unemployment rate are positively associated with unmarried women using any contraception (Model 1) and these results are generally strong for unmarried low-SES women. As a rough estimate of the size of these effects, I take the predicted probability that an unmarried women would use any contraception given foreclosure start rates of 0.13 and of 0.45 (corresponding to the 5th and 95th percentiles of the observed values). The model estimates suggest that the probability of use would increase by approximately 6% from 66% to 70%.

Higher rates of foreclosure are also associated with more consistent contraceptive use among unmarried women (Model 3). Again, this relationship appears somewhat stronger for low-SES unmarried women (Model 4). Here, there are no significant relationships between consistency of use and national unemployment rates. Finally, Model 5 shows that higher foreclosure rates and higher unemployment rates are associated with using contraceptive methods that are associated with a lower risk of unintended pregnancy (thus the negative coefficient). We again see a slightly larger coefficient on foreclosure for low-SES unmarried
women, but no significant relationship for unemployment. In all, it appears that worse
economic conditions, but particularly higher rates of foreclosure starts, are are associated
with more contraceptive use, more consistent use, and the use of more effective methods
among unmarried women and among low-SES unmarried women.

These models control for cohabitation among unmarried women, but do not allow the
effects of the economy to vary by co-residential union status. While cohabitation functions
very differently than marriage in the contemporary United States, it is possible that cohabit-
ing women behave differently than women who are not in co-residential unions when it comes
to contraceptive behavior. I tested an interaction between cohabitation and macro-economic
conditions and find no evidence of any significant interactions for the unmarried sub-sample,
approximately 30% of whom were cohabiting in the average person month in the analysis.

The control variables generally have the expected relationships with contraception. Tak-
ing the model of any contraceptive use for unmarried women, women with less than a high
school education are also significantly less likely to use contraceptives than women with
more education with the largest gap between women with a BA or more education. Women
who were enrolled in school at the time of interview were also significantly more likely to
use contraception than women out of school. Foreign born women are less likely to contra-
cept than native born women, and race/ethnic minorities are less likely to contracept than
non-hispanic White women.

Prior research on the Great Recession and fertility suggests that changing patterns of
immigration, which affected the composition of the immigrant population, can account for
some of the apparent recessionary declines in fertility (Cherlin, et al, 2013). Schneider
and Hastings (2015) find negative effects of state economic conditions on non-marital fertili-
ity among low-SES women, even after excluding foreign born women who migrated to the
United States following the Great Recession. I conduct a similar test, excluding foreign born
women from the NSFG analysis sample and re-estimating the models. For the models of
contraception among unmarried women, the results change very little and if anything the
effects are somewhat stronger.

The models above control for race/ethnicity and the main effects of these variables indicate that compared to their non-Hispanic, White counter-parts, non-Hispanic Black, non-Hispanic, others, and Hispanic women are less likely to use contraceptives, to use them consistently, and use less effective methods. It could also be the case that women who are race/ethnic minorities might be differentially responsive to the Great Recession. In prior related research, Ananat et al (2013) find that black teens exhibited the largest reductions in fertility in response to job displacements in North Carolina during the Great Recession, but Schneider and Hastings (2015), find that non-hispanic, Black, non-hispanic White, native-born Hispanics, and foreign-born Hispanic low-SES unmarried women all exhibit a similar negative fertility response to state-level economic conditions.

I assess if the relationships found above between national economic conditions and contraceptive practices hold in four different sub-groups of unmarried women: non-hispanic, White native-born women; non-hispanic, Black native-born women; Hispanic native-born women; and Hispanic foreign-born women. The effects of national economic conditions on contraceptive behavior are evident among native born White and Hispanic women and among foreign-born Hispanic women. Of these three groups, the effects appear largest for native-born Hispanic women. There are no significant relationships between national foreclosure rates and contraceptive behavior for native born unmarried non-hispanic Black women. The national unemployment rate is positively related to any use and to consistent use as well as negatively related to efficacy, but only for white, non-hispanic native born women.

Robustness

I next test the robustness of the key results in Panel A of Table 3. In the main models above, I use a six month lag on macro-economic conditions. I first test several alternative lags. For the first outcome variable, any contraceptive use, I tested lags of 7-1 months prior to the outcome month. The results were substantively similar to the preferred model. For
the second outcome variable, consistent contraceptive use, which uses data from the current and prior two months, I tested lags 8-4 months prior to the outcome variable and again, the results were substantively similar to the preferred model. For the third outcome variable, effectiveness of contraceptive method, I tested lags of 7-3 months (I did not test lags of 1-2 months based on the rationale that obtaining a new method takes time). Here, the results were substantively similar when using lags of 7, 5, and 4 months but were not significant when using lags of 2 or 3 months.

Second, I conduct a set of “placebo tests,” in which I use future economic conditions to predict past contraceptive behavior. Here, I do not expect to find any significant relationships between economic conditions and the key outcomes. I tested using a three month and a six month lead on the national foreclosure start rate to predict each of the three outcomes for unmarried women. In each case, the coefficient is small and far from conventional levels of statistical significance ($p$ ranges from 0.619 to 0.959).

Third, I re-estimate the three key models with individual fixed-effects in addition to the year fixed-effects that I include in the main models. Because my key predictor, the national foreclosure start rate, is exogenous to unobserved individual-level characteristics, the individual fixed effects are less likely to correct problems of omitted variables bias. However, these models focus squarely on individual respondents who change their use of contraception. In contrast, the main models use between individual comparisons. The advantage of the former is that this process of within-individual change may be a bit closer to the behavioral model that we have in mind for recessionary effects. I estimate fixed effects logistic regression models to examine the first two outcomes - any contraceptive use and consistent contraceptive use. In both models the coefficients are larger than in the main models and highly significant. However, the relationship between national foreclosure starts and the effectiveness of the contraceptive method is smaller and not significant in the third individual fixed-effects model.

Fourth, the NSFG data rely on retrospective reporting of contraceptive use with re-
spondents’ being asked to recall practices that took place as long as 48 months prior to the interview. It is possible that this procedure introduces error into the estimates if respondents less accurately recall practices that took place longer ago. In my main estimates, I make use of all available retrospective information on contraceptive practices (as well as on marital status). One way to test the sensitivity of these estimates to recall error is to restrict the analysis sample to those person-month cases that occurred relatively recently prior to the interview month. For instance, we can constrain the analysis sample to only include person months that occurred up to 12 months before the interview. Here, I assess the robustness of the main result to a set of such restrictions, limiting the analysis, in turn, to person-months that occurred 6, 12, 18, and 24 months before the interview. Note, that this test also serves to limit the period under consideration since person-months in 2003, 2004, and 2005 are reported at least six months retrospectively and so partially confounds recall with period.

In the models of any contraceptive use, the estimated coefficient on foreclosure is between 1% and 5% larger with the shorter recall windows, with the exception of 12 months, where it is 25% smaller. The coefficient is significant with the 18 and 24 months windows, but not with the 6 and 12 month windows. For consistency of use, the coefficient on foreclosure is between 25% and 35% larger with the shorter recall windows, with the exception of 18 months where it is only 5% larger. The estimate is significant for the 12, 18, and 24 month recall windows. For efficacy of use, the coefficient is between 10% smaller and 10% larger for the windows between 12 and 24 months, but it is just two-thirds as large for the six month window. The estimate is significant of the 18 and 24 month windows.

Finally, fifth, I use restricted-access geocoded data from the NSFG to re-estimate the main models using state-level economic conditions (and state and year fixed effects) in place of national level economic conditions. Here, I also find consistent evidence of significant positive effects of state-level foreclosure starts and unemployment on contraceptive use and consistency of contraception. Foreclosure and unemployment are also significantly related to the effectiveness of the contraceptive method employed. In general, the effect sizes are
larger, likely reflecting that state-level economic conditions more closely proxy for house-
hold hardship (while still capturing something of the climate of uncertainty), than national
conditions.

**Contraceptive Practices Among Teens**

Panel B of Table 3 presents the results of similar main models but now for teenage women.
Here, the results are much weaker. There are no significant relationships between macro-
economic conditions and teens use of contraception, their consistency of use, and their use of
more effective methods. Restricting the sample to native-born women does not appreciably
change these null effects. However, dis-aggregating by race and nativity shows modest effects
of national foreclosure and unemployment on the contraceptive practices of white native-born
teens who are more likely to use any method, to use the method consistently, and to use
effective methods when conditions are worse.

I also tested alternative recall windows, as above for unmarried women. In general, the
effects are null for both foreclosure and unemployment. The only exception is a 12 month
recall window with the use of national unemployment. There, worse economic conditions
are significantly associated with the use of more effective contraceptive technology, more
consistent use, and the use of any contraception. In general, the results for teenagers are
weaker and less consistent than for unmarried women, though present under some model
specifications.

**Discussion**

The Great Recession’s effects on Americans did not stop at increased joblessness and fore-
closure or lost hours and depressed income. These economic effects reverberated through
households to shape fundamental aspects of the life course. A growing body of research
convincing makes the case that the Great Recession depressed fertility. In this manuscript,
I show that these effects extended to unmarried and teenage women. Most narrowly, this
analysis of the fertility effects of the Great Recession is useful because it is important to assemble an empirical record of how this economic downturn affected Americans’ lives. More broadly, I argue that the events of the Great Recession provide a kind of social laboratory to investigate more general questions of sociological and demographic interest.

I use these events to test the idea that the fertility of unmarried and teen women, and particularly socio-economically disadvantaged women, is fairly disconnected from economic concerns. This prior research would suggest that the economic shocks of the Great Recession might have had few effects on these women’s fertility. However, I find that the Recession had pronounced negative effects on non-marital and teen fertility, a finding in accord with recent prior work by Schneider and Hastings (2014), Ananat et al (2013), and Kearney and Levine (2015). Existing theory further suggested that one reason for the relative disconnect between economic concerns and fertility is the difficulty that many unmarried, teen, and low-SES women face in effectively using contraception. However, I find that at least some members of these sub-groups did increase contraceptive use in response to the Great Recession, with national economic conditions correlated with use of contraception, consistency of use, and efficacy of method.

Notably, I do not find effects of either foreclosure or unemployment on the contraceptive practices of non-Hispanic native-born unmarried black women. This is surprising in part because Black women experienced large percentage point increases in unemployment during the Great Recession. One interpretation is that these results suggest some continued support for the idea that poor economic conditions might not much affect disadvantaged women’s fertility.

However, other recent research finds negative effects of the Recession on the fertility of unmarried Black women (Schneider and Hastings, 2015) and on Black teens (Ananat et al, 2013). One possibility is that, as Ananat et al (2013) suggest, the Recession’s effects on black women’s fertility operated through other proximate determinants such as changes in sexual activity, miscarriage, or abortion.
This research is subject to some important limitations. First, in the state-level analysis, I am unable to specifically examine low-SES unmarried and teen women’s fertility rates. However, the very large share of births to women in these groups is known to be to socio-economically disadvantaged women. Second, in the person-level analyses of the NSFG, I reply on national-level variation in economic conditions and only examine the period through 2010. Future work could usefully exploit state-level variation in economic conditions to identify the effects of the Great Recession on contraceptive use and could employ the 2011-2013 Cycle of the NSFG to extend this work through the period of high unemployment following the official end of the Great Recession. Third, while this work documents the relationship between economic conditions and fertility and shows a plausible proximate determinant of this relationship, it does not examine women’s thinking about the relationship between recessionary conditions and fertility.

Finally, this work does not tell us whether these reductions in teen and non-marital fertility will be temporary or more permanent. Recent research suggests that cohorts of women exposed to higher levels of unemployment may experience permanent reductions in lifetime fertility (Currie and Schwandt, 2014), but much other demographic work finds that effects of recessions are generally temporary. For the cohort of teenagers exposed to the Great Recession, it would seem very likely that their lifetime teen fertility will be depressed if only because most of their teen years played out during the long Great Recession. A somewhat different but also interesting question is whether the low-rates of teen and non-marital fertility caused by the Great Recession will remain or will rise. The recovery from the Great Recession has been quite slow and the economic situation of many less-skilled workers remains quite precarious. These factors suggest that there could indeed be some more lasting and permanent effects of the Great Recession and its aftermath on fertility and perhaps a lasting reduction in non-marital fertility. Further, the Affordable Care Act’s requirement that plans provide contraception at no-cost to the insured may also function to maintain these low rates of non-marital and teen fertility.
In all, this research suggests that need for a more nuanced understanding of the relationship between economic constraints and non-marital and teen fertility. One explanation is the nature of the relationship between economic hardships and non-marital and teen fertility has changed - that a positive or null relationship has become negative in an era of rising inequality, increasingly precarious work, and substantial macro-economic shocks. Perhaps it is the case that in normal economic times, a steady diet of economic deprivation really does become disconnected from fertility decision making, but that extraordinary economic shocks, as seen in the Great Recession, can trigger conscious fertility avoidance behavior.
References


Reed, Joanna, Paula England, Krystale Littlejohn, Brooke Conroy Bass, Monica Caudillo. 2014. “Consistent and Inconsistent Contraception Among Young Women: Insights from Qualitative Interviews.” Family Relations 63(2): 244-258.


Figure 1. National Monthly Foreclosure Start Rate and Unemployment Rate (June 2003-January 2010)
Figure 2. Annual Non-Marital and Teen Fertility Rates for Three States with Large Recessionary Increases in Unemployment and Three States with Small Increases (2002-2013)
Figure 3. Average Marginal Effect of State-level Unemployment over Time (1990-2013).

Notes: Plot is based on models that include state and year fixed-effects, an interaction between year and unemployment, and a set of demographic controls. Standard errors are adjusted for clustering.
Table 1: Contraceptive Methods and Percent of Women Experiencing Unintended Pregnancy within the First Year of Typical Use

<table>
<thead>
<tr>
<th>Contraceptive Method</th>
<th>Percent Pregnant Within 1 year Given Typical Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Method</td>
<td>85%</td>
</tr>
<tr>
<td>Foam</td>
<td>28%</td>
</tr>
<tr>
<td>Jelly or Cream</td>
<td>28%</td>
</tr>
<tr>
<td>Rhythm Method</td>
<td>24%</td>
</tr>
<tr>
<td>Symptothermal Method</td>
<td>24%</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>22%</td>
</tr>
<tr>
<td>Female Condom</td>
<td>21%</td>
</tr>
<tr>
<td>Male Condom</td>
<td>18%</td>
</tr>
<tr>
<td>Sponge</td>
<td>18%</td>
</tr>
<tr>
<td>Diaphram</td>
<td>12%</td>
</tr>
<tr>
<td>Contraceptive Patch</td>
<td>9%</td>
</tr>
<tr>
<td>NuvaRing</td>
<td>9%</td>
</tr>
<tr>
<td>Birth control pill</td>
<td>9%</td>
</tr>
<tr>
<td>Depo-Provera</td>
<td>6%</td>
</tr>
<tr>
<td>Female Sterilization</td>
<td>0.5%</td>
</tr>
<tr>
<td>IUD</td>
<td>0.5%</td>
</tr>
<tr>
<td>Male Sterilization</td>
<td>0.15%</td>
</tr>
<tr>
<td>Hormonal Implant (i.e. Implanon)</td>
<td>0.05%</td>
</tr>
</tbody>
</table>

Notes: Methods are those listed by NSFG 2006-2010 respondents in contraceptive method calendar. Unintended pregnancy rates are taken from Trussell et al (2011). Respondents in the NSFG reporting “emergency contraception” (0.02% of person-years), “Respondent sterile” (0.30% of person years), “Partner sterile” (0.05% of person years), “Lunelle” (0.08% of person years), “Other” (0.06% of person years) are set to missing.
Table 2: State GFR by Sub-Group and State Macro-Economic Conditions (2002-2013)

<table>
<thead>
<tr>
<th></th>
<th>Marital Fertility Rate</th>
<th>Non-Marital Fertility Rate</th>
<th>Teen (15-19) Fertility Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Foreclosure Start Rate</td>
<td>-0.32**</td>
<td>-0.38*</td>
<td>-0.41***</td>
</tr>
<tr>
<td>State Unemployment Rate</td>
<td>-0.48*</td>
<td>-0.57*</td>
<td>-0.23</td>
</tr>
<tr>
<td>Observations</td>
<td>561</td>
<td>561</td>
<td>561</td>
</tr>
</tbody>
</table>

Notes: All models include state and year fixed-effects, a state-specific linear time trend, and a set of demographic controls. Standard errors are adjusted for clustering.
Table 3: Relationship between Contraceptive Use by Unmarried and by Teenage Women and National Macro-Economic Conditions (2003-2010)

<table>
<thead>
<tr>
<th></th>
<th>Use of Contraception</th>
<th>Consistency of Contraception</th>
<th>Effectiveness of Contraception</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>All</td>
<td>Low-SES</td>
<td>All</td>
<td>Low-SES</td>
</tr>
<tr>
<td>National Foreclosure Start Rate</td>
<td>0.15**</td>
<td>0.29*</td>
<td>0.13*</td>
</tr>
<tr>
<td>National Unemployment Rate</td>
<td>0.01*</td>
<td>0.02</td>
<td>0.01*</td>
</tr>
<tr>
<td>Person-Months</td>
<td>239,085</td>
<td>55,668</td>
<td>228,361</td>
</tr>
<tr>
<td></td>
<td>(7)</td>
<td>(8)</td>
<td>(9)</td>
</tr>
<tr>
<td>National Foreclosure Start Rate</td>
<td>0.05</td>
<td>0.33</td>
<td>-0.05</td>
</tr>
<tr>
<td>National Unemployment Rate</td>
<td>0.01</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>Person-Months</td>
<td>41,950</td>
<td>8,102</td>
<td>39,960</td>
</tr>
</tbody>
</table>

Notes: All models include year fixed-effects, age, age-squared, race/ethnicity, family structure at age 14, religion raised in, and being foreign born. Standard errors are adjusted for clustering. Models 1-4 and 7-10 are estimated with logistic regression. Average Marginal Effects are reported in the Table. Models 5-6 and 11-12 are estimated with OLS and coefficients are reported.