Children of the Great Recession: The Impact of the Macroeconomy on Infant Health[1]

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Abstract:

This paper revisits the question of how unemployment rates affect infant health. Its contributions include: analyzing an additional decade of recent data, estimating models for specific decades and recessions, using quarterly rather than annual unemployment rates to more precisely match outcomes to the macroeconomic conditions at the time, and examining a new subgroup (Hispanics). We find that infant health is countercyclical; higher unemployment rates are associated with a lower probability of very low birthweight or premature birth. We investigate mechanisms for this association and find that when unemployment rates rise, fertility falls among two groups of women whose children may be at greater health risk: women over the age of 35 and Hispanic women. Although the women who do give birth during downturns receive slightly less prenatal care, the net effect is an improvement in infant health, which is consistent with the earlier study of Dehejia and Lleras-Muney (2004).

Keywords: recession; infant health; maternal health; fertility; macroeconomy
JEL codes: I12, J13, J11, E32

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Introduction

A large recent literature has explored the impact of the macroeconomy on health; these studies have tended to find that health is counter-cyclical; i.e. that there is "healthy living in hard times" (e.g. Ruhm, 2000, 2003, 2005). Macroeconomic shocks to health early in the life course are of particular interest, because there is an abundance of evidence that early-life health is a critical determinant of adult health and educational attainment (Conti and Heckman, 2012; Almond and Currie, 2011).

This paper examines the impact of the macroeconomy on infant health; specifically, it estimates the impact of the state unemployment rate at the time of conception on birthweight, Apgar score, preterm birth, and congenital abnormalities. We then examine possible mechanisms, such as whether the macroeconomy influences women's fertility decisions (and thus the composition of mothers), mother's health behaviors (as measured by tobacco use and maternal weight gain), and use of health care (prenatal care and Caesarian delivery). This paper updates and builds upon the work of Dehejia and Lleras-Muney (2004), who studied birth certificate data for the U.S. for 1975-1999 (among other data) and found that infant health is countercyclical, a result they attributed to changes in the composition of mothers and improvements in health behaviors.

This paper offers several contributions. First, we analyze the time period 1980-2010, which includes 11 recent years not available at the time of Dehejia and Lleras-Muney (2004); this is advantageous because it provides additional power that increases the precision of our estimates, and also because it includes considerable variation in unemployment rates due to both the 2001 recession and the Great Recession, which lasted from December 2007 until June 2009 and was the longest recession in the U.S. since 1933 (NBER Business Cycle Dating Committee, 2011). It

was also the most severe downturn in the U.S. since World War II; employment fell by 6.3% and output fell by 5.1% (Federal Reserve Bank of Minneapolis, 2011).

Second, we estimate models separately by decade and separately by recession; in particular we compare the relationship between the macroeconomy and infant health during the Great Recession to that during earlier recessions, which allows us to examine how these relationships have changed over time. Third, our models use quarterly (rather than annual) unemployment rates to more precisely match outcomes to the macroeconomic conditions at that time. We also are able to examine an additional outcome (maternal weight gain during pregnancy), which has only been added to birth certificates recently, and to estimate models by mother's ethnicity (Hispanic).

We find that infant health is countercyclical; higher unemployment rates are associated with lower probabilities of premature birth and of very low birthweight. Higher unemployment rates are also associated with decreases in fertility, in particular among two groups of women whose children may be at greater health risk: women over the age of 35 and Hispanic women. Although the women who do give birth during downturns get slightly less prenatal care, the net effect is an improvement in infant health.

Theoretical Framework

In the models of Becker (1965, 1981), parents choose the quantity and quality of their children in order to maximize their joint utility subject to budget and time constraints. One important aspect of child quality is child health, which parents can produce by combining their time with market goods and services (Grossman, 1972). In the current context, doctor visits, prenatal care, maternal smoking, and maternal weight gain can be considered inputs into the production of infant health.

Job loss by either parent will shift in the household budget constraint and thus may change parents' decisions regarding the quantity and quality of children as well as the timing of births. Even in the absence of a direct loss of job or income, worsening labor market conditions may affect parents' pregnancy decisions by increasing uncertainty about future income (Ben-Porath, 1973; Dehejia and Lleras-Muney, 2004; Adsera and Menendez, 2011). Fertility responses to economic downturns will likely be greater when couples perceive income shocks to be permanent rather than transitory, or long-run rather than short-run.

The direction in which fertility will be adjusted will depend on whether the substitution effect or income effect dominates. The substitution effect is that worse labor market conditions imply a lower opportunity cost of time spent pregnant, child-bearing, and child rearing (Ward and Butz, 1980; Schultz, 1985). The income effect is that worse labor market conditions imply lower income, and if children are normal goods then couples will demand fewer children. Two factors may determine whether the substitution effect or income effect dominates: 1) the degree to which a woman's human capital depreciates when she temporarily exits the labor market for childbirth; and 2) the liquidity of the household and capital market conditions for borrowing.

Among women whose human capital does not depreciate quickly (generally low-skill women), those who are not credit constrained are likely to choose childbirth when their own wages are low. In other words, these families are able to withstand temporary income shocks and hence are less likely to postpone childbirth during economic downswings. Alternatively, women with non-depreciating human capital who are credit constrained are likely to respond to the income effect and postpone childbirth to a time when household income is expected to be higher. Finally, women whose human capital depreciates quickly, likely highly skilled women, face both the labor market uncertainty associated with recessions and a potential wage penalty for

temporarily exiting the labor market for childbirth; for these women, childbirth during economic slumps is likely not optimal. Some women may be reluctant to exit the labor market for childbirth during periods of high unemployment, and this would be exacerbated if their jobs rewarded work experience; these women would opt to accumulate human capital and postpone childbirth with the expectation of higher wages in the future (Heckman and Willis, 1976).

Another avenue by which macroeconomic conditions can affect fertility is through couples' marriage decisions. Job loss or the threat of job/income loss may dissuade couples from marrying (Hellerstein and Morrill, 2011; Morgan et al., 2011). The postponement of marriage may in turn lead to the postponement of childbearing (Galbraith and Thomas, 1945; Silver, 1965), which may manifest as a lower likelihood of first births in response to higher unemployment (Neels, 2010).

In addition to fertility, health and health behaviors are also driven by these income and substitution effects. The income effect suggests that individuals will buy less of all normal goods. This may increase health, as when consumers reduce their smoking, drug use, and alcohol consumption, or may decrease health, as when consumers cancel gym memberships or switch from expensive healthier foods to cheaper, less healthy foods. The substitution effect suggests that individuals may take advantage of the lower opportunity cost of time to substitute towards time-intensive health investments such as exercising, seeing physicians, and preparing meals from scratch. Empirical evidence suggests that health is countercyclical; high unemployment is associated with lower adult mortality and better health behaviors, including reduced smoking and obesity and improved physical activity and diet (Ruhm, 2000; 2003; Ruhm and Black, 2002).

Data and Methods

Our primary data are the 1980-2010 Natality Detail Files (NDF), which are a compilation of birth certificates for the universe of children born in the U.S. (approximately 4 million each year). We begin our analysis in 1980 because ethnicity data needed for this analysis are not available for previous years. The NDF provide a wide variety of information on infant health. We classify a birth as low birthweight if the infant weighed under 2500 grams, and as very low birthweight if it weighed under 1500 grams (Kowlessar et al., 2013). Births with fewer than 37 weeks gestation are classified as preterm (Kowlessar et al., 2013). Those with Apgar scores under 5 are classified as low. We also create an indicator variable for whether the infant had any of the congenital abnormalities that are noted on birth certificates for all years: anencephaly, spina bifida, omphalocele, cleft lip or palate, or Down's Syndrome.

The NDF also include information on mothers' demographic characteristics, such as age, race, birth parity, and marital status. When we estimate models separately by race, we use the mother's self-reported race because the practice of inferring an infant's race based on the parents' reported races was phased out after the 1989 revision of the birth certificate. In addition, the NDF includes measures of several pregnancy-related health behaviors: timing of first prenatal care (PNC) visit, number of PNC visits, maternal weight gain (the IOM (1990) defined excessive maternal weight gain as 40 pounds or more), tobacco use, and delivery method of the birth. We do not include maternal alcohol use during pregnancy in this analysis because collection of this information was phased out during the 2003 revision of the birth certificate due to concerns related to validity. Following Dehejia and Lleras-Muney (2004), we limit our sample to births to women 18 years or older, because the fertility decisions of younger teenagers are less likely to be influenced by labor market conditions. The data are aggregated into cells

defined by state of residence of the mother,[2] year-quarter of conception,[3] and mother's race/ethnicity (non-Hispanic white, non-Hispanic black, and Hispanic; other races are excluded from our study).

Some states choose not to report (or collect) data on some variables in certain years; in addition, the data collected changed when U.S. birth certificates were revised in 1979, 1989, and 2003. Mother's ethnicity (i.e. Hispanic status) was formally included as an item on birth certificates in 1989; however, NCHS had earlier (in 1979) recommended that states collect ethnicity information. Ten states (Arizona, Arkansas, California, Hawaii, Indiana, New Mexico, New York, Tennessee, Texas, and Utah) complied with the recommendation and NCHS began tabulating pregnancy outcomes by mother's race/ethnicity beginning in 1980. By 1989 all but three states (New Hampshire, Oklahoma, and Louisiana) reported ethnicity, and the remaining states did so by 1992. Similar variation in reporting by states affects other variables as well. For example, the number of states not reporting Apgar scores fell from 11 in 1980 to 4 in 1985 to 2 in 2000 to zero in 2010. In 1989, data on prenatal weight gain was not collected by 4 states and data on tobacco use was not collected by 7 states; by 2000 only California was not collecting this information. We utilize all the observations available for a certain specification; if a variable is not available for certain states in certain years, we do not include those states in calculating the cell means for that variable for the affected quarters. Consequently, sample sizes vary by outcome.

We calculate fertility rate as the number of births divided by the number of reproductive-age women (15-44 years). To compute the numerator, we sum the number of births by race/ethnicity, state, and conception year-quarter. We estimate the denominator using Census

[2] We obtained the confidential use version of the NDF from the National Center for Health Statistics (NCHS), because state or finer geographic identifiers are not available in the public use files for years prior to 2005.
[3] The reported year and month of last menstrual period is used to determine the year and quarter of conception.

counts and intercensal estimates of the number of females by race/ethnicity, state, and year obtained from the U.S. Census Bureau.[4] Sample sizes vary in the cell-level fertility regressions and are often smaller for non-Hispanic black and Hispanic samples because ethnicity is not reported in all states and quarters.

Our primary measure of the macroeconomy is the state unemployment rate. This is the most common measure used in the literature on the macroeconomy and health (see, e.g., the review in Ruhm, 2006) and the literature on the macroeconomy and fertility specifically (e.g., Adsera and Menendez, 2011; Hondroyiannis, 2010; Adsera, 2005; Dehejia and Lleras-Muney, 2004; Perry, 2003; Macunovich, 1996). We use data on monthly state unemployment rates from the Bureau of Labor Statistics and calculate quarterly state unemployment rates by averaging the monthly unemployment rate in each quarter. We match these unemployment data to the aggregated cell data by state of mother's residence and year-quarter of conception. In doing so, we assume that the mother resided in the state of birth during the pregnancy. As a robustness check, we also estimate models with employment-to-population ratio (EP ratio) in the state and quarter of conception instead of the unemployment rate. We obtain the EP ratio by state and month from the Bureau of Labor Statistics, Local Area Unemployment Statistics (BLS-LAUS). We do this because the unemployment rate does not capture the extent to which workers may be discouraged and exit the labor force entirely when the macroeconomy is in decline. A final robustness check uses unemployment rate in the state and quarter of birth instead of that in the state and quarter of conception to test if results are sensitive to unemployment rates at different points in the pregnancy.

[4] Population counts by gender, race/ethnicity, age, state, and year are not available, so we impute the number of 15-44 year old females in the cell. Specifically, we use Census counts and intercensal estimates of the number of 15-44 year old females and the total number of females by state and year. From this we estimate the fraction of the state female population between 15 and 44 years old, which we multiply by the population data on the number of females by race/ethnicity, state, and year.

When we examine the relationship between the macroeconomy and infant health, the composition of mothers giving birth, and health investments in pregnancies, we follow Dehejia and Lleras Muney (2004) and estimate the following reduced-form models:

$$Y_{st} = \alpha + \beta U_{st} + \delta_s + \tau_t + (\delta_s * t) + \epsilon_{st} \qquad (1)$$

In this equation, *s* is an index for the state of mother's residence and *t* represents the year-quarter of conception. Y_{st} represents the outcomes of infant health (birthweight, Apgar score, preterm birth, congenital malformations), demographic characteristics (education, age, marital status, race/ethnicity), pregnancy-related health and health care behaviors (prenatal care, excessive weight gain, tobacco use, method of delivery – c-section, vaginal birth, VBAC), and fertility rate of mothers who reside in state *s* and conceived an infant in year-quarter *t*. *U* is our regressor of interest – the unemployment rate in state *s* at time *t*, which is the conception quarter. δ_s is a vector of state fixed effects, and τ_t represents conception year-quarter fixed effects. $(\delta_s * t)$ is a full set of state-specific time trends, and ϵ is the idiosyncratic error term. Thus, the model controls for time-invariant unobserved heterogeneity at the state level, year effects nationwide, and linear trends within states.

We estimate equation (1) for four samples: the full pooled sample, non-Hispanic white mothers, non-Hispanic black mothers, and Hispanic mothers. Observations (the aggregated data cells) are weighted by the number of births in each cell. We calculate robust standard errors clustered at the state level to account for heteroskedasticity.

Empirical Results

Summary Statistics

Table 1 presents summary statistics for the data at the level of state and quarter, with observations weighted by the number of births in that state during that quarter. During the

period covered by our data (1980-2010), the state unemployment rate averaged 6.0%, with a standard deviation of 1.8. Across all states and quarters, 7.3% of births were low birthweight (<2500 grams), 1.3% were very low birthweight (<1500 g), 1.3% were born with low Apgar scores (<=5), 11.2% were preterm births (born before 37 weeks gestation), and 0.2% had a congenital abnormality.

The average fertility rate per 1,000 women of childbearing age (15-44 years) across states and quarters was 15.2 overall, 13.2 among non-Hispanic white mothers, 17.7 among non-Hispanic blacks, and 25.3 among Hispanics. Of all of the births in the sample, 75.6% were to non-Hispanic white mothers, 13.2% were to non-Hispanic black mothers, and 11.6% were to Hispanic mothers.

Impact of Unemployment Rate on Infant Health

Table 2 provides results from regressions of various measures of infant health on the quarterly state unemployment rate, state fixed effects, fixed effects for the year-quarter of conception, and state time trends. For the sake of clarity and brevity, only the coefficients on unemployment rate are listed.

When the model is estimated using all years (1980-2010) pooled and all race/ethnic groups pooled, we find that a one-percentage-point increase in the unemployment rate is associated with small but statistically significant improvements in infant health; specifically, it is associated with a 0.01percentage point reduction in the probability of very low birthweight (<1500 g), and a 0.07 percentage point reduction in the probability of the birth being premature. The signs of the point estimates suggest that a higher unemployment rate is also associated with a lower probability of low birthweight (< 2500 g) and a lower probability of congenital defects, but none of these are statistically significant.

When the model is estimated separately by the mother's race and ethnicity, we find the same patterns for children born to non-Hispanic white mothers (which is not surprising, given that they are the majority of the sample). In addition, we find for non-Hispanic whites that a one percentage point increase in the unemployment rate is associated with a 0.03 percentage point reduction in the probability of low birthweight (<2500 g). Children born to non-Hispanic black mothers also have a significantly lower probability of being very low birthweight during periods of higher unemployment. Results for children of Hispanic mothers are different; a higher unemployment rate is associated with a higher probability of being low birthweight and a lower probability of having a low Apgar score.

To examine changing patterns over time, we estimate the model separately by decade. However, splitting the sample into thirds sacrifices statistical power, and we find few statistically significant results. Two exceptions are that a higher unemployment rate was associated with a lower probability of very low birthweight births among children of Non-Hispanic black mothers in the 1980s and 2000s (with a point estimate in the 1990s very similar to that for the 2000s) and with a lower probability of a low Apgar score among children born to Hispanic women in the 1980s and 2000s.

As another way of examining changing patterns over time, we estimate the model separately for each of the past five recessions. In the pooled sample, it is only during the Great Recession, not during the four previous recessions, that unemployment rate is associated with a lower probability of very low birthweight. We find the counter-cyclical pattern of very low birthweight for the overall sample as well as for children born to non-Hispanic white mothers and non-Hispanic black mothers.

Results for children born to Hispanic mothers tend to follow a different pattern than those for children born to non-Hispanic white or non-Hispanic black mothers. In particular, the positive association of unemployment rate with low birthweight is found among Hispanics not just for the entire time period but also for the 1981 recession and Great Recession; for whites and blacks this relationship is always the opposite sign when statistically significant. Also only among Hispanics is there a negative correlation between the unemployment rate and low Apgar scores (in the entire period as well as in the 1980s and 2000s); for whites and blacks this is almost always not statistically significant, although among whites it was positive and significant in the 1980s.

Impact of Unemployment on Fertility Rates

There are many reasons why the health of infants might change during macroeconomic downturns. In the following sections we examine the role of several possible mechanisms. First, we test whether fertility rates vary with the macroeconomy. Table 3 lists results from a regression of the state fertility rate (expressed as births per 1,000 women between 15 and 44 years old) on the quarterly unemployment rate at time of conception, state fixed effects, fixed effects for the year-quarter of conception, and state-time trends. We find that a one percentage-point increase in the unemployment rate is associated with a reduction of 0.18 births per thousand women of childbearing age; this represents a reduction of 1.2%. Estimated separately by race and ethnicity, this reduction in births is equal to 0.16 (1.2%) for whites, 0.13 (0.7%) for blacks, and 0.52 (2.1%) for Hispanics. Thus, the fertility of Hispanics, which has not been examined separately in prior work, seems to be particularly procyclical. As a result of these changes, when the unemployment rate rises one percentage point, the percentage of all babies that are non-Hispanic black rises 0.09% and the percentage that are Hispanic falls 0.25%.

When we estimate models models separately by decade, the results for the 1980s and 2000s are quite similar to those for the pooled period, while those for the 1990s are generally of smaller magnitude and not statistically significant.

When we estimate models separately by recession, we find by far the strongest results during the Great Recession. Although the 1981 recession also had substantial point estimates (in several cases even larger than those during the Great Recession), they tend not to be statistically significant. Part of this difference may be due to statistical power – we have more observations during the Great Recession because it lasted longer.

Impact of Unemployment on Composition of Mothers

We continue our analysis of how the macroeconomy affects the composition of mothers by turning from race and ethnicity in Table 3 to education, age, and marital status in Table 4. When we estimate models for all years pooled, we find that a one percentage point increase in the unemployment rate is associated with a 0.18 percentage point decrease in the probability that a child's mother was a college graduate and a 0.15 percentage point increase in the probability that a child's mother had some college attendance. There is no significant impact on the probability that the mother was a high school dropout or had exactly a high school degree. Overall, mothers giving birth during periods of high unemployment are less likely to be college graduates than those giving birth during low unemployment.

There is also a shift in the age composition of mothers. A one percentage point rise in the unemployment rate is associated with a 0.14 percentage point reduction in the probability that a child's mother was older than 35 years, and a 0.14 percentage point increase in the probability that she was between 25 and 35 years old.

Finally, we find that a one percentage point increase in the unemployment rate is associated with a 0.09 percentage point decrease in the probability that the mother is having her first child. We find no significant change in the percentage of births to married women.

Results by decade and recession show considerable variation. In the most recent decade (2000-2010), a higher unemployment rate is associated with a lower proportion of mothers being high school dropouts and a higher proportion having a college degree. It is also associated with a decrease in the proportion of mothers between 18 and 24 years of age and increases in the proportion between 25 and 35 years old and among those 35 and older. In the Great Recession, a higher unemployment rate was associated with a decrease in the proportion of mothers who were high school dropouts and who were married. The patterns for the most recent decade differ from the average pattern over the entire period; specifically, in the 2000s a higher unemployment rate was associated with a higher proportion of mothers who were college graduates and a higher proportion of mothers who were older than 35.

Impact of Unemployment on Maternal Health Behaviors and Health Care Choices

We also examine how maternal health behaviors and health care choices change during macroeconomic downturns. Table 5 shows that there is no detectable change in maternal smoking or weight gain during pregnancy. There are some changes with respect to health care, though. A one percentage point increase in the unemployment rate is associated with a small decrease in the number of prenatal visits (0.02, compared to a mean of 11.4) and a small reduction (0.3 percentage points) in the probability of having any prenatal care in the first trimester. A higher unemployment rate is also associated with a 0.3 percentage point higher probability of Caesarian delivery. This may appear somewhat unexpected as Caesarian deliveries involve high costs; one might expect mothers to choose this method of childbirth less

often during a recession. On the other hand, Caesarian deliveries may indicate complications due to inadequate prenatal care, thus might be expected to rise during a recession.

When we estimate models by race, we find the same patterns for non-Hispanic whites as for the overall sample, which is not surprising given that they constitute more than two-thirds of the sample. Among non-Hispanic black mothers, a one percentage point rise in unemployment is associated with a 0.3 percentage point (or 2.75%) rise in the probability of smoking during pregnancy. Although unemployment is not significantly associated with prenatal care among blacks, it is associated with a higher probability of Caesarian delivery. The unemployment rate is not correlated with health behaviors or health care choices among Hispanics.

Robustness Checks

We conducted two robustness checks concerning our key explanatory variable (state quarterly unemployment rate). As the first check, we replaced the state quarterly unemployment rate with the state employment-to-population ratio. The purpose of this is to better control for discouraged workers; they are excluded from the denominator in the unemployment rate but are counted in the employment-to-population ratio. As the second robustness check, we use the state quarterly unemployment rate at the time of birth instead of at the time of conception. Both measure macroeconomic conditions very early in the life course, and there is no theoretical reason to prefer one over the other.

The findings and conclusions are extremely robust in both of these checks. For the infant health measures, unemployment rate at the time of conception and unemployment rate at the time of birth are both negatively correlated, and employment-to-population ratio is positively correlated, with very low birthweight for the overall sample as well as for children born to non-Hispanic white and non-Hispanic black mothers. One difference is that unemployment rate at

the time of birth is also negatively correlated with low birth weight for the overall sample as well as children born to non-Hispanic white mothers and Hispanic mothers.

The findings for preterm births are also robust. Preterm births are negatively correlated with both the unemployment rate at the time of conception and the unemployment rate at the time of birth; and they are positively correlated with the employment-to-population ratio—for the overall sample as well as for non-Hispanic whites. One difference is that preterm births are also negatively correlated with unemployment rate at the time of birth, while they are positively correlated with employment-to-population ratio for non-Hispanic blacks.

Other results that are robust across all three measures of the macroeconomy are: the fertility of whites is procyclical; the percentage of babies born that are non-Hispanic black rises with the unemployment rate; the percentage of babies born that are Hispanic falls with the unemployment rate; the percentage of babies born to college graduates falls with the unemployment rate; the percentage of babies born to women over age 35 falls with the unemployment rate; use of prenatal care falls with unemployment rate for the overall sample as well as for non-Hispanic whites (in our two robustness checks, this relationship also holds for non-Hispanic blacks); and Caesarian deliveries rise with the unemployment rate for the entire sample as well as for non-Hispanic whites and non-Hispanic blacks separately (in our two robustness checks, this relationship also holds for Hispanics). Tables of these results are available upon request. Overall, the results are extremely robust to the use of alternate measures of the macroeconomy.

Discussion

This paper revisits the relationship between the macroeconomy and infant health in the United States using 11 more recent years of data than Dehejia and Lleras Muney (2004), thus

including the Great Recession. We find that increases in the unemployment rate have many effects, some of which promote infant health and some of which reduce it. Effects that lead to better infant health include a relative reduction in births by women over age 35 (whose babies face risks due to advanced maternal age) and Hispanic women (who are lower income and less educated on average). Effects that lead to worse infant health include a relative reduction in births by college graduates and reductions in prenatal care. The net effect, however, is that higher unemployment is associated with a lower probability that babies are very low birthweight or preterm.

We estimate models separately for each of the past five recessions and find that the relationships between unemployment rate and very low birth weight births—and fertility rates overall—were stronger during the Great Recession than during earlier downturns.

This paper is the first to examine these relationships for Hispanics and non-Hispanics, and we find several interesting differences. Only for Hispanics is the unemployment rate associated with a higher probability of low birthweight and a lower probability of a low Apgar score. The fertility of Hispanic mothers is more sensitive to the unemployment rate than that of non-Hispanic whites or non-Hispanic blacks; as a result, a rise of one percent in the unemployment rate is associated with a 0.25 percentage point (0.7%) decline in the percentage of babies in the U.S. that are born to Hispanic mothers.

This paper contributes to the relatively small literature on the relationship between the macroeconomy, infant health, and fertility (Eiriksdottir et al., 2013; Margerison-Zilko et al., 2011; Dehejia and Lleras-Muney, 2004; Joyce and Mocan, 1993; Joyce, 1989). The closest comparison for our results are those of Dehejia and Lleras-Muney (2004), who estimated similar models using birth certificate data for the U.S. for 1975-1999. On the whole, the results are quite

similar for infant health and composition of mothers; we find stronger evidence of procyclical fertility. Focusing on their models that, like ours, control for state-specific time trends, and that examine the same outcomes, both papers find for the pooled sample of all babies that a higher unemployment rate is associated with a lower probability of very low birthweight and with no significant effect on the probability of having a low Apgar score or a congenital defect (see their Table IIIa, col. 2, 3, and 7). However, they also find that it is associated with a lower probability of low birthweight; we find a negative point estimate, but it is not statistically significant. We find stronger evidence that fertility is procyclical; Dehejia and Lleras-Muney (2004) find a negative correlation between unemployment rate and birth rates, but it is not statistically significant (see their Table II, col. 4-6). With respect to compositional changes, we find the same pattern of signs on the point estimates regarding education, but different coefficients are statistically significant; we find that a higher unemployment rate is associated with a lower probability that a mother is a college graduate and a higher probability that she has some college education, whereas Dehejia and Lleras-Muney (2004) find a lower probability that a mother is a high school dropout and a higher probability that she has a high school degree (see their Table IIIb, col 1-4). Both papers find evidence that mothers are less likely to be under age 25 or over age 35, and more likely to be between 25 and 35 years of age, although which of those effects is statistically significant varies (see their Table IIIb, col. 5-7). Both papers find no detectable correlation between unemployment rates and the probability that a mother is married.

With respect to maternal health behaviors, both papers find no detectable correlation between unemployment rates and maternal smoking, but the papers find differing results with respect to prenatal care. Dehejia and Lleras-Muney (2004) find that the number of prenatal visits increases with the unemployment rate (Table IIIc, col. 8), whereas we find that it decreases. On the whole,

however, our results based on an additional 11 years of more recent data are quite consistent with those of Dehejia and Lleras-Muney (2004).

Another useful comparison is Eirıksdottir et al. (2013). They study data before and after the economic collapse in Iceland and find that the percentage of low-birthweight births rose from 2.5% to 3.0% after the collapse. We find that during the Great Recession in the U.S., a one percentage point increase in the unemployment rate was associated with a 0.03 percentage point decline in the probability of a low birthweight birth (which was not statistically significant) and a statistically significant 0.03 percentage point decrease in the probability of a very low birthweight birth. Another difference is that we find a decrease in the risk of preterm birth, whereas they find a small increase that is not statistically significant. One potential explanation for these differences is that the collapse in Iceland was more severe and traumatic than the Great Recession in the U.S., and thus may have had additional negative effects via maternal stress.

Our finding that births are pro-cyclical (that they fall during periods of high unemployment) is consistent with what has been found for earlier periods (e.g., Adsera and Menendez, 2011; Hondroyiannis, 2010; Adsera, 2005; Dehejia and Lleras-Muney, 2004; Perry, 2003; Macunovich, 1996).

This paper also contributes to the recent literature on the impacts of the Great Recession and how it differed from previous recessions (e.g. Cawley, Moriya, and Simon, 2014; Farber, 2011; Hurd and Rohwedder, 2010). In particular, we find that the impacts of unemployment rate on infant health and fertility were stronger during the Great Recession than in previous recessions. There are several possible reasons for this; the Great Recession was characterized by an unusually large reduction in house prices and a reduction in mortgage lending. The demand for children and the timing of births are potentially affected by housing considerations such as

ownership and living area (e.g. whether there is a nursery or bedroom for the child). The substantial drop in house prices during the Great Recession may have represented, to homeowners, a negative shock to wealth that reduced their demand for children. Although the drop in house prices helped make homeownership more affordable for young couples, the dramatic reduction in mortgage lending may have made it more difficult on the whole for such couples to buy homes, which may have led to a postponement of fertility. The Great Recession also differed from previous recessions in its depth, duration, and its disproportionate impact on male-dominated sectors such as finance, banking, construction, and manufacturing, which led to it being nicknamed the "man-cession" (Elsby et al., 2010). Another possibility is that from the beginning the Great Recession may have been perceived to be longer-lasting, and thus women postponed or permanently reduced their fertility to a greater extent. Future research should investigate these and other possible explanations for the particularly strong association between unemployment rate and infant health and fertility rates during the Great Recession.

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Table 1. Descriptive Statistics for Aggregate Data, Natality Detail Files 1980-2010

	Overall		Non-Hispanic White Mothers		Non-Hispanic Black Mothers		Hispanic Mothers	
	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
State unemployment rate	6.0	1.8	5.9	1.9	6.0	1.9	6.2	1.8
Employment-to-population ratio	62.3	3.7	62.4	3.9	61.6	3.6	62.2	2.9
Fertility Rate	15.2	2.2	13.2	2.0	17.7	3.1	25.3	5.0
Sample percent			69.1	16.0	21.3	11.3	35.9	17.4
Sample percent (unweighted)			75.6	17.9	13.2	13.6	11.6	13.4
Child characteristics								
Fraction born below 2500 grams (low birthweight)	0.073	0.015	0.062	0.010	0.130	0.013	0.063	0.010
Fraction born below 1500 grams (very low birthweight)	0.013	0.005	0.010	0.002	0.029	0.005	0.011	0.002
Fraction with Apgar <= 5	0.013	0.033	0.008	0.004	0.019	0.012	0.010	0.008
Fraction born before 37 wks gestation (preterm birth)	0.112	0.023	0.097	0.017	0.176	0.018	0.113	0.013
Fraction with any congenital abnormalities	0.002	0.005	0.002	0.007	0.001	0.002	0.002	0.002
Mother characteristics								
Fraction who are HS dropouts	0.190	0.066	0.108	0.039	0.207	0.049	0.454	0.092
Fraction HS graduates	0.347	0.063	0.338	0.075	0.427	0.048	0.312	0.044
Fraction with some college	0.233	0.037	0.253	0.041	0.251	0.047	0.154	0.040
Fraction with college or more	0.230	0.066	0.301	0.090	0.115	0.042	0.080	0.035
Fraction 18-25 years	0.354	0.064	0.304	0.078	0.484	0.067	0.419	0.046
Fraction between 25 and 35 years	0.556	0.042	0.597	0.048	0.447	0.045	0.503	0.030
Fraction greater than 35 years	0.090	0.033	0.099	0.042	0.070	0.027	0.078	0.019
Fraction of first-time mothers	0.385	0.023	0.408	0.024	0.342	0.033	0.338	0.032
Fraction married	0.693	0.080	0.808	0.064	0.343	0.076	0.582	0.101
Number of prenatal care visits	11.4	0.7	11.8	0.6	10.5	1.0	10.6	1.0
Fraction with prenatal care in first trimester	0.809	0.061	0.861	0.046	0.705	0.077	0.714	0.091
Fraction who smoked any time during pregnancy	0.129	0.054	0.157	0.050	0.109	0.055	0.038	0.027
Fraction with weight gain > 40 lbs	0.187	0.032	0.198	0.036	0.179	0.035	0.148	0.029
Fraction with Caesarian delivery	0.254	0.063	0.255	0.053	0.272	0.060	0.255	0.057
Sample size	6,287		6,277		5,989		5,965	

Note:

1. 1980-2010 Natality Detail Files restricted to births to mothers 18 years or older and mothers who are non-Hispanic white, non-Hispanic black, or His
2. Data aggregated to race/ethnicity, state, year and quarter of conception level
3. Observations weighted by number of births
4. Fertility rate = number of births in state, race/ethnicity, year and quarter/female population (15-44 years) in state, race/ethnicity, and year
5. Any congenital abnormalities refers to 5 congenital defects available on the birth certificates for all years: anencephaly, spina bifida, omphalocele, cleft lip/palate, Down's syndrome

Table 2: Effect of Unemployment Rate on Infant Health Outcomes, by Decades, Recession Years, and Mother's Race/Ethnicity
Regression coefficient, associated standard error in parentheses and sample size reported

	Overall					Non-Hispanic White					Non-Hispanic Black					Hispanic				
	Birthweight < 2500 grams	Birthweight < 1500 grams	Apgar score <= 5	Gestation < 37 wks	Any congenital malformation	Birthweight < 2500 grams	Birthweight < 1500 grams	Apgar score <= 5	Gestation < 37 wks	Any congenital malformation	Birthweight < 2500 grams	Birthweight < 1500 grams	Apgar score <= 5	Gestation < 37 wks	Any congenital malformation	Birthweight < 2500 grams	Birthweight < 1500 grams	Apgar score <= 5	Gestation < 37 wks	Any congenital malformation
Sample mean	0.073	0.013	0.013	0.112	0.002	0.062	0.010	0.008	0.097	0.002	0.130	0.029	0.019	0.176	0.001	0.063	0.011	0.010	0.113	0.002
All years: 1980-2010																				
Quarterly UE rate	-0.000265	-0.000109**	0.000092	-0.000709**	-0.000025	-0.000257**	-0.000092***	0.000067	-0.000841***	-0.000054	-0.000537	-0.000320***	0.000725	-0.000743	0.000027	0.000108**	0.000021	-0.000618**	0.000116	0.000051**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	6,284	6,284	6,269	6,283	4,633	6,268	6,268	6,251	6,267	4,618	5,955	5,955	5,903	5,953	4,563	5,926	5,926	5,864	5,924	4,553
By decades																				
1980-1989																				
Quarterly UE rate	-0.000558*	-0.000121	0.000050	-0.000414	-	-0.000086	-0.000011	0.000161**	-0.000011	-	-0.001525***	-0.000348*	-0.000246	-0.001025	-	-0.000624	-0.000194	-0.000296*	-0.000339	-
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)		(0.001)	(0.000)	(0.000)	(0.001)		(0.000)	(0.000)	(0.000)	(0.001)	
	2,032	2,032	2,029	2,031		2,028	2,028	2,025	2,027		1,722	1,722	1,720	1,720		1,703	1,703	1,699	1,700	
1990-1999																				
Quarterly UE rate	-0.000044	-0.000062	-0.001611*	-0.000428	-0.000158	-0.000187	-0.000101	-0.001287	-0.000472	-0.000265*	0.000187	-0.000159	0.001581	-0.000282	0.000058	0.000181	0.000094	-0.000686	-0.000601**	0.000045
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
	2,040	2,040	2,030	2,040	2,026	2,040	2,040	2,027	2,040	2,023	2,039	2,039	1,991	2,039	1,984	2,040	2,040	1,981	2,040	1,979
2000-2010																				
Quarterly UE rate	0.000029	-0.000011	-0.000015	-0.000134	0.000004	-0.000011	0.000018	0.000108	-0.000231	0.000005	0.000152	-0.000169*	-0.000196	-0.000193	0.000022	-0.000142	-0.000013	-0.000477***	-0.000023	-0.000007
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	2,212	2,212	2,210	2,212	2,199	2,200	2,200	2,199	2,200	2,187	2,194	2,194	2,192	2,194	2,179	2,183	2,183	2,184	2,184	2,172
By recession years																				
1980, Quarters 1-3																				
Quarterly UE rate	0.000914	0.000414	0.000746	0.001999	-	0.001217	0.000449	0.000523	0.001642	-	-0.004305**	-0.000278	0.000455	0.002463	-	0.001037	0.000170	0.002331	0.003174	-
	(0.001)	(0.000)	(0.000)	(0.002)		(0.001)	(0.001)	(0.000)	(0.001)		(0.002)	(0.001)	(0.002)	(0.006)		(0.004)	(0.001)	(0.003)	(0.008)	
	153	153	152	152		153	153	152	152		115	115	115	115		110	110	110	107	
1981, Q3 - 1982, Q4																				
Quarterly UE rate	-0.000777	-0.000401	0.000285	-0.000630	-	-0.001549	-0.000506	0.000285	-0.001273	-	0.000918	-0.001395*	0.000487	-0.002116	-	0.003785*	0.002480***	0.000207	0.008087***	-
	(0.001)	(0.000)	(0.000)	(0.001)		(0.001)	(0.000)	(0.000)	(0.001)		(0.002)	(0.001)	(0.001)	(0.003)		(0.002)	(0.001)	(0.001)	(0.003)	
	305	305	304	305		305	305	303	304		241	241	240	241		229	229	229	229	
1990, Q3 - 1991, Q1																				
Quarterly UE rate	0.001232	0.000160	-0.002726	0.000908	0.000053	0.002362	0.000117	-0.002707	-0.000455	-0.000143	-0.009536	-0.000554	0.000552	0.005078	0.001637	0.005028	0.000942	-0.029781	0.004144	-0.000762
	(0.003)	(0.002)	(0.005)	(0.004)	(0.000)	(0.003)	(0.001)	(0.013)	(0.004)	(0.001)	(0.008)	(0.004)	(0.005)	(0.012)	(0.001)	(0.007)	(0.002)	(0.033)	(0.009)	(0.001)
	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153
2001, Quarters 1-4																				
Quarterly UE rate	0.000785	0.000319	-0.000368	0.000820	0.000158	0.000655	0.000039	-0.002133	0.000096	0.000109	0.001748	0.001999	0.007505	0.001524	0.000437	-0.001189	-0.000336	-0.000506	0.001570	0.000031
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)	(0.000)	(0.004)	(0.002)	(0.008)	(0.003)	(0.000)	(0.002)	(0.001)	(0.002)	(0.003)	(0.000)
	204	204	204	204	200	204	204	204	204	200	204	204	204	204	200	204	204	204	204	200
2007, Q4 - 2009, Q2																				
Quarterly UE rate	-0.000278	-0.000325***	-0.000157	-0.000120	-0.000025	-0.000028	-0.000206**	-0.000149	-0.000125	-0.000017	-0.002258***	-0.000981***	-0.000665	-0.000298	0.000073	0.001456*	0.000116	0.000548	-0.000505	-0.000181
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357

Notes:
1. 1980-2010 Natality Detail Files restricted to mothers 18 years or older, who are non-Hispanic white, non-Hispanic black, or Hispanic, and aggregated to race/ethnicity, state, year, and quarter of conception level
2. Each regression coefficient and its associated, robust standard error (clustered at state level) is weighted by number of births the outcome represents and obtained from a separate regression
3. Model includes state fixed effects, conception year-quarter fixed effects, and state-year trends
4. Consistently measured congenital malformation data available after 1989
5. *(**)(***) indicates statistical significance at 0.1(0.05)(0.01) level, respectively

Table 3. Effect of Unemployment Rate on Fertility Rate and Racial/Ethnic Composition of Births, by Decades and Recession Years

Regression coefficient, associated standard error in parentheses and sample size reported

	Overall Fertility Rate	White Fertility Rate	Black Fertility Rate	Hispanic Fertility Rate	Percent Black babies	Percent Hispanic Babies
Sample %	100	75.6	13.2	11.6		
Sample mean	15.2	13.2	17.7	25.3	21.3	35.9
All years: 1980-2010						
Quarterly UE rate	-0.1757***	-0.1573***	-0.1271*	-0.5230***	0.0884**	-0.2495***
	(0.046)	(0.038)	(0.065)	(0.186)	(0.035)	(0.070)
	6,287	6,277	5,989	5,965	5,989	5,965
By decades						
1980-1989						
Quarterly UE rate	-0.1544**	-0.1119	-0.2299**	-0.4150***	-0.1307	-0.5354**
	(0.058)	(0.070)	(0.110)	(0.123)	(0.085)	(0.221)
	2,035	2,035	1,756	1,741	1,756	1,741
1990-1999						
Quarterly UE rate	-0.0130	-0.0563**	0.0435	0.0340	0.1664**	0.3179***
	(0.022)	(0.024)	(0.082)	(0.056)	(0.066)	(0.111)
	2,040	2,040	2,039	2,040	2,039	2,040
2000-2010						
Quarterly UE rate	-0.2527***	-0.1242***	-0.2094***	-0.6427***	0.0809	-0.4531***
	(0.028)	(0.021)	(0.045)	(0.074)	(0.053)	(0.058)
	2,212	2,202	2,194	2,184	2,194	2,184
By recession years						
1980, Quarters 1-3						
Quarterly UE rate	0.1602	0.0435	0.5919	0.7059	0.3527	0.1861
	(0.218)	(0.171)	(0.599)	(0.504)	(0.303)	(0.234)
	153	153	121	112	121	112
1981, Q3 - 1982, Q4						
Quarterly UE rate	-0.2811	-0.2448*	-0.5868	0.0217	-0.0935	0.3588
	(0.169)	(0.131)	(0.424)	(0.387)	(0.153)	(0.328)
	305	305	247	235	247	235
1990, Q3 - 1991, Q1						
Quarterly UE rate	0.0093	-0.2423	-0.8114	1.1466	-0.3572	0.8237
	(1.148)	(0.410)	(1.186)	(3.202)	(1.267)	(2.026)
	153	153	153	153	153	153
2001, Quarters 1-4						
Quarterly UE rate	0.0514	-0.0671	0.3732	-0.8982*	0.1994	-0.4918*
	(0.144)	(0.122)	(0.363)	(0.499)	(0.254)	(0.287)
	204	204	204	204	204	204
2007, Q4 - 2009, Q2						
Quarterly UE rate	-0.2076***	-0.1565***	-0.1941***	-0.9431***	0.0343	-0.2792
	(0.062)	(0.054)	(0.033)	(0.301)	(0.032)	(0.177)
	357	357	357	357	357	357

Notes:

1. 1980-2010 Natality Detail Files restricted to mothers 18 years or older, who are non-Hispanic white, non-Hispanic black, or Hispanic, and aggregated to race/ethnicity, state, year, and quarter of conception level

2. White and Black refer to non-Hispanic White and non-Hispanic Black samples, respectively

3. Fertility rate = number of births in state, race/ethnicity, year and quarter/female population (15-44 years) in state, race/ethnicity, and year

2. Each regression coefficient and its associated, robust standard error (clustered at state level) is weighted by number of births the outcome represents and obtained from a separate regression

5. Model includes state fixed effects, conception year-quarter fixed effects, and state-year trends

6. *(**)(***) indicates statistical significance at 0.1(0.05)(0.01) level, respectively

Table 4. Effect of Unemployment Rate on Composition of Mothers, by Decades and Recession Years

Regression coefficient and associated standard error in parentheses

		Mother's Education				Mother's Age			Family Composition	
	Sample size	HS dropout	HS graduate	Some college attendance	College graduate or more	18-24 years	25 and 35 years	Greater than 35 years	First-time mothers	Married
Sample mean		0.190	0.347	0.233	0.230	0.354	0.556	0.090	0.385	0.693
All years: 1980-2010	6,284									
Quarterly UE rate		-0.000636	0.000997	0.001477***	-0.001838***	-0.000015	0.001429***	-0.001414***	-0.000937**	0.000193
		(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
By decades										
1980-1989	2,032									
Quarterly UE rate		-0.001591**	0.000208	0.000787*	0.000595*	-0.002275***	0.002420***	-0.000145	-0.001525***	0.002438**
		(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
1990-1999	2,040									
Quarterly UE rate		0.002243	0.001353	-0.001443**	-0.002154**	0.000477	-0.000029	-0.000448	-0.002264***	-0.001895
		(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
2000-2010	2,212									
Quarterly UE rate		-0.004578**	0.001200	0.000872	0.002507***	-0.002591***	0.002216***	0.000376***	0.000192	0.001345
		(0.002)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
By recession years										
1980, Quarters 1-3	153									
Quarterly UE rate		0.001280	-0.002122	-0.000761	0.001604	-0.003217	0.002433	0.000785	-0.002046**	-0.001819
		(0.002)	(0.002)	(0.001)	(0.001)	(0.003)	(0.003)	(0.001)	(0.001)	(0.002)
1981, Q3 - 1982, Q4	305									
Quarterly UE rate		-0.001125	0.002343	-0.000059	-0.001158	0.000289	-0.000302	0.000013	-0.000112	0.000268
		(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
1990, Q3 - 1991, Q1	153									
Quarterly UE rate		0.002394	-0.010246	-0.000474	0.008326*	-0.010174*	0.009551	0.000623	-0.002615	-0.000373
		(0.009)	(0.006)	(0.006)	(0.004)	(0.005)	(0.006)	(0.003)	(0.008)	(0.007)
2001, Quarters 1-4	204									
Quarterly UE rate		-0.002978*	0.005145***	-0.003150**	0.000983	-0.001611	0.000621	0.000989	0.000811	-0.002316
		(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.003)
2007, Q4 - 2009, Q2	357									
Quarterly UE rate		-0.001709**	0.000387	0.000214	0.001108	-0.001128	0.000631	0.000497	0.000352	-0.002395***
		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)

Notes:

1. 1980-2010 Natality Detail Files restricted to mothers 18 years or older, who are non-Hispanic white, non-Hispanic black, or Hispanic, and aggregated to race/ethnicity, state, year, and quarter of conception level
2. Each regression coefficient and its associated, robust standard error (clustered at state level) is weighted by number of births the outcome represents and obtained from a separate regression
3. Model includes state fixed effects, conception year-quarter fixed effects, and state-year trends
4. *(**)(***) indicates statistical significance at 0.1(0.05)(0.01) level, respectively

Table 5. Effect of Unemployment Rate on Mother's Health Behaviors and Healthcare Choices, by Decades, Recession Years, and Mother's Race/Ethnicity
Regression coefficient, associated standard error in parentheses and sample size reported

	Overall					Non-Hispanic White					Non-Hispanic Black					Hispanic				
	Number of prenatal care visits	Prenatal care in first trimester	Tobacco use	Prenatal weight gain > 40 lbs	Caesarian delivery	Number of prenatal care visits	Prenatal care in first trimester	Tobacco use	Prenatal weight gain > 40 lbs	Caesarian delivery	Number of prenatal care visits	Prenatal care in first trimester	Tobacco use	Prenatal weight gain > 40 lbs	Caesarian delivery	Number of prenatal care visits	Prenatal care in first trimester	Tobacco use	Prenatal weight gain > 40 lbs	Caesarian delivery
Sample mean	11.4	0.809	0.129	0.187	0.254	11.8	0.861	0.157	0.198	0.255	10.5	0.705	0.109	0.179	0.272	10.6	0.714	0.038	0.148	0.255
All years: 1980-2010																				
Quarterly UE rate	-0.018856*	-0.002915**	0.001238	-0.000998	0.002649**	-0.027307***	-0.004120***	0.001041	-0.000774	0.003092***	-0.017836	-0.003481	0.003028***	-0.001886	0.002186**	-0.018299	-0.000207	-0.000097	0.000359	0.001469
	(0.010)	(0.001)	(0.001)	(0.001)	(0.001)	(0.010)	(0.001)	(0.001)	(0.001)	(0.001)	(0.015)	(0.002)	(0.001)	(0.001)	(0.001)	(0.021)	(0.002)	(0.001)	(0.001)	(0.002)
	6,283	6,283	4,648	4,657	4,660	6,265	6,265	4,636	4,647	4,648	5,953	5,953	4,587	4,630	4,609	5,924	5,924	4,596	4,624	4,613
By decades																				
1980-1989																				
Quarterly UE rate	0.024126***	0.001534**	-	-	-	0.014220**	0.000561	-	-	-	0.013983	0.000811	-	-	-	0.027292	0.002999	-	-	-
	(0.008)	(0.001)				(0.005)	(0.000)				(0.017)	(0.002)				(0.022)	(0.002)			
	2,031	2,031				2,025	2,025				1,720	1,720				1,700	1,700			
1990-1999																				
Quarterly UE rate	0.018117	0.001151	0.000162	0.001045	-0.001091*	0.004156	-0.000511	0.001019	0.000543	-0.001262**	0.014795	0.000570	0.002481	-0.000637	-0.001061	0.055589***	0.005666***	-0.005343***	0.002744*	-0.000689
	(0.016)	(0.001)	(0.001)	(0.001)	(0.001)	(0.016)	(0.001)	(0.001)	(0.001)	(0.001)	(0.033)	(0.003)	(0.002)	(0.001)	(0.001)	(0.010)	(0.001)	(0.001)	(0.002)	(0.001)
	2,040	2,040	2,039	2,040	2,040	2,040	2,040	2,039	2,040	2,040	2,039	2,039	2,012	2,039	2,039	2,040	2,040	2,026	2,040	2,040
2000-2010																				
Quarterly UE rate	0.023708	0.005530**	0.000660	-0.001655*	-0.000247	0.019282	0.004265**	0.000182	-0.001777*	0.000003	0.013007	0.006075*	0.000889	-0.001513	0.000576	0.025988	0.006109*	0.000046	-0.002336*	-0.001597
	(0.022)	(0.002)	(0.001)	(0.001)	(0.001)	(0.019)	(0.002)	(0.001)	(0.001)	(0.001)	(0.028)	(0.003)	(0.001)	(0.001)	(0.002)	(0.035)	(0.003)	(0.001)	(0.001)	(0.001)
	2,212	2,212	2,201	2,209	2,212	2,200	2,200	2,189	2,199	2,200	2,194	2,194	2,180	2,189	2,170	2,184	2,184	2,172	2,182	2,172
By recession years																				
1980, Quarters 1-3																				
Quarterly UE rate	0.000980	0.002279	-	-	-	-0.003092	0.000996	-	-	-	0.056700	0.002438	-	-	-	0.043501	0.022153**	-	-	-
	(0.015)	(0.003)				(0.012)	(0.002)				(0.054)	(0.006)				(0.062)	(0.010)			
	152	152				152	152				115	115				109	109			
1981, Q3 - 1982, Q4																				
Quarterly UE rate	-0.001668	-0.000359	-	-	-	0.001245	-0.002289	-	-	-	0.013628	0.008388	-	-	-	-0.004083	0.007293	-	-	-
	(0.020)	(0.002)				(0.023)	(0.002)				(0.084)	(0.007)				(0.078)	(0.012)			
	305	305				303	303				241	241				227	227			
1990, Q3 - 1991, Q1																				
Quarterly UE rate	0.043579	0.001879	0.010912	-0.005006	0.001775	0.014299	0.001514	0.002661	0.016575	0.003632	0.119925	0.009392	0.051138	-0.073780	0.000562	0.113033	0.000834	-0.001758	-0.179845**	-0.002933
	(0.067)	(0.006)	(0.018)	(0.009)	(0.006)	(0.063)	(0.006)	(0.016)	(0.026)	(0.005)	(0.142)	(0.021)	(0.061)	(0.130)	(0.014)	(0.154)	(0.009)	(0.037)	(0.081)	(0.009)
	153	153	153	153	153	153	153	153	153	153	153	153	151	153	153	153	153	152	153	153
2001, Quarters 1-4																				
Quarterly UE rate	0.009637	-0.001989	0.001303	0.003932	0.001926	-0.010744	-0.001238	0.000671	0.003275	0.000313	0.004067	-0.002401	0.000103	-0.009181	0.003617	0.051647	-0.005337	0.002604	-0.001725	0.005567
	(0.035)	(0.002)	(0.002)	(0.004)	(0.002)	(0.034)	(0.001)	(0.002)	(0.004)	(0.002)	(0.047)	(0.005)	(0.003)	(0.013)	(0.004)	(0.046)	(0.005)	(0.002)	(0.011)	(0.004)
	204	204	201	204	204	204	204	201	204	204	204	204	200	204	204	204	204	200	204	204
2007, Q4 - 2009, Q2																				
Quarterly UE rate	-0.011396	0.001306	0.002802	0.000159	0.000575*	-0.004721	0.001699	0.002661	-0.000068	0.000080	-0.025958	0.001150	0.001706	-0.000704	0.001232	-0.033882	0.000355	0.003610	0.001133	0.000477
	(0.015)	(0.002)	(0.003)	(0.001)	(0.000)	(0.013)	(0.001)	(0.004)	(0.001)	(0.000)	(0.027)	(0.002)	(0.002)	(0.001)	(0.001)	(0.034)	(0.004)	(0.004)	(0.001)	(0.001)
	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357

Notes:
1. 1980-2010 Natality Detail Files restricted to mothers 18 years or older, who are non-Hispanic white, non-Hispanic black, or Hispanic, and aggregated to race/ethnicity, state, year, and quarter of conception level
2. Each regression coefficient and its associated, robust standard error (clustered at state level) is weighted by number of births the outcome represents and obtained from a separate regression
3. Model includes state fixed effects, conception year-quarter fixed effects, and state-year trends
4. Tobacco use, prenatal weight gain, and method of delivery not available before 1988
5. *(**)(***) indicates statistical significance at 0.1(0.05)(0.01) level, respectively