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Booms, Busts, and Babies' Health*

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ABSTRACT

This paper documents a counter-cyclical pattern in the health of children, and examines whether this pattern is due to selection among women choosing to give birth or to behavioral changes. We study the relationship between the unemployment rate at the time of a baby's conception and parental characteristics, parental behaviors, and babies' health. Using national data from the Natality Files from 1975 onward, we find that babies conceived in times of high unemployment have a reduced incidence of low and very low birth weight, fewer congenital malformations, and a reduced rate of post-neonatal mortality. These health improvements are attributable both to selection (changes in the type of mothers that conceive during recessions) and to changes in behavior during recessions. Black mothers tend to be higher socio-economic status (as measured by education and marital status) in times of high unemployment, whereas white mothers are less educated. Health behaviors also appear to improve among all pregnant women, although we cannot reject the hypothesis that all health improvements among black women are due to selection.

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1. Introduction

In this paper we study the relationship between the unemployment rate at the time of a baby's conception and health outcomes at birth, and we explore whether this relationship is due to the effect of the unemployment rate on fertility decisions or on the health-related behavior of pregnant women. Economic models of fertility suggest that women who choose to have children in recessions may differ from women who choose to postpone fertility. To the extent that these parental characteristics are related to children's health, differential fertility may result in differences in the health of children over the business cycle. At the same time, evidence suggests that individuals' health may improve during recessions, because the overall effect of recessions is to increase health-related activities (and to decrease risky behaviors). Therefore changes in parental behavior over the business cycle could also affect the health of infants, even in the absence of compositional change.

Several empirical findings from the existing literature motivate our work. An extensive literature in demographics and economics has documented a pro-cyclical pattern in fertility, i.e., that the number of children born decreases in recessions (Yule 1906, Galbraith and Thomas 1941, Thomas 1941, Becker 1960, Silver 1965, and Ben-Porath 1973, to name but a few), which suggests the possibility of increased selectivity. At the same time, Ruhm (2000, 2002, and 2003) and Deaton and Paxson (2001) have shown that health-related behaviors and adult mortality are counter-cyclical. (See also Snyder and Evans, 2002.) In this paper we link these two strands of the literature to babies' health outcomes at birth.

We use U.S. birth certificate data from 1975 onward, and match average infant health outcomes and parental characteristics and behaviors with the unemployment rate in the mother's state of residence during the year of conception. We find that babies conceived in times of high unemployment have a reduced incidence of low and very low birth weight, a reduced rate of neo-natal and post-neonatal mortality, and fewer congenital malformations. Interestingly these results also appear to hold across countries.

We explore the extent to which health improvements are attributable both to selection (differences in the type of mothers that conceive during recessions) and to changes in behavior by examining average mother characteristics and behaviors as reported in the Natality Files. To confirm our findings we look at several additional data sets. We use confidential California birth certificate data that link mothers over time and that allow to us estimate mother fixed effects models. We also use data from the Behavioral Risk Factor Surveillance System (BRFSS) to examine the characteristics of women who become pregnant over the business cycle. Using these data we can also look at how business cycles affect the health behavior of women of fertile ages and of pregnant women. Our evidence suggests that infant health improves because mothers' health related behaviors (such as smoking and drinking) improve over the business cycle. But we also find evidence of compositional effects which differ sharply by race: black mothers tend to be higher socio-economic status (as measured by education and marital status) in times of high unemployment, whereas white mothers are less educated.

Our results are important for several reasons. We show that temporary changes in labor market conditions affect parental behaviors and child health outcomes at birth; these in turn are known to be correlated with subsequent health and economic outcomes

in childhood and adulthood (see the discussion in Almond, et al., 2003). Our results suggest that the opportunity cost of women's time may be an important determinant of health behavior during pregnancy, and consequently suggest a possible mechanism for improving child health outcomes. Our paper also contributes to the large literature on fertility. In particular, our evidence that the fertility response to temporary shocks in income differs substantially by socio-economic status and by race is consistent with life cycle models in which imperfect capital markets and skill-depreciation during pregnancy play a role in the timing of fertility decisions.

The paper is organized as follows. In Section 2 we provide a theoretical framework to motivate our empirical work. We pay particular attention to differences in permanent versus temporary changes in wages, and to how these changes may differ across socio-economic groups depending on their skill level and their access to credit markets. In Section 3 we describe the empirical approach and the data. Section 4 presents the main results from the Natality Files. Section 5 presents corroborative evidence from other data sources. Section 6 concludes.

2. Theoretical Framework

Becker (1960, 1965) provides a framework within which to analyze the relationship between cyclical fluctuations in employment and fertility and health-related behaviors. Within the Becker framework we think of children as normal goods, and think of changes in the unemployment rate as affecting the wages (or employment status) of women and their family members. These effects depend on whether individuals perceive changes in the unemployment rate as permanent or transitory. Women can adjust both the quantity

and quality dimensions of fertility. Though our subsequent discussion refers to the former, it is worth noting that in principle these predictions apply to the quality-adjusted demand for children and that predictions regarding quantity are ambiguous once quality is incorporated into the analysis. We maintain the standard assumption that women are primarily responsible for raising children in the household. The discussion in this section draws substantially on Hotz, et al. (1997).

2.1 The Effect of Changes in the Unemployment Rate on Fertility

Permanent Changes

The effect of a decrease in a woman's wage (holding other household income constant) can be separated into income and substitution effects. Because children are relatively time intensive, a decrease in wages lowers the relative cost of children and therefore increases the demand for children. (See Becker 1965 and also Ben-Porath 1973, Ward and Butz 1980, and Heckman and Walker 1990.) This is the substitution effect. On the other hand a decline in wages also lowers income, decreasing the demand for children. This is the income effect. The net prediction is ambiguous. Perry (2003) argues that the income effect should be stronger for high wage earners and the substitution effect should be stronger for low wage earners. Therefore when wages fall, total fertility should decrease for high wage earners and increase for low wage earners. She provides evidence for this pattern in U.S. data.

A decline in the wages of a woman's family members lowers total family income without affecting the value of her time. This will unambiguously reduce the demand for

children, although the responsiveness of the demand may differ across groups, in particular across income levels.

Transitory Changes

The main difference between transitory and permanent changes is that transitory changes in wages have no effect on lifetime income and, hence, total fertility. However they will affect the timing of fertility.[1] The effect of transitory changes in labor market conditions is complicated by life-cycle fertility considerations. Over the life cycle, couples will time fertility to maximize lifetime income. There are two key factors that affect the timing of births. The first is the extent to which mothers' skills depreciate during temporary absences from the labor force during pregnancy and childbirth (Happel, et al., 1984), and the second is whether capital markets are perfect or imperfect.

If capital markets are perfect, women's fertility decisions will not depend on the path of wages of other members of the household. Furthermore, if skills do not depreciate, women will substitute fertility into periods in which their own-wage is low. If however skills deteriorate then it is no longer clear that low wage periods are optimal, since there is an additional loss of income due to skill depreciation.

If capital markets are imperfect, absent other considerations (in particular, if skills do not depreciate), couples will postpone fertility to periods when the husband's income is high (typically when unemployment is low), since households use the timing of births to smooth consumption; again, if skills deteriorate, it is no longer clear that low unemployment periods are optimal.

[1] However even if changes in wages are temporary, households might respond as though these changes were permanent (in which case the predictions above apply): wealth could be low relative to income (e.g. Ben-Porath 1973) or households may also be myopic or uncertain about the permanent or transitory nature of the observed changes in labor market conditions.

We hypothesize that low skill women are less likely to have human capital that deteriorates rapidly. Therefore when unemployment rates are high we expect them to increase fertility if they are not credit constrained, and to postpone fertility if they are.

2.2 The Effect on the Consumption of Health-Related Goods[2]

A decrease in own-wage would again have income and substitution effects with respect to the consumption of health-related goods. Health-related activities are time-intensive, and as such we would expect individuals who face a decline in wages to substitute into these activities. Health-related activities that benefit babies include mothers' own health-related activities, such as exercise (see Ruhm 2000 for evidence on adult health) and prenatal care. Decreases in income (resulting from either lower own-wages or lower wages of family members) would lead to a lower consumption of all (normal) goods, including health-related goods such as health club memberships and nutritious diets, but also could reduce the consumption of health-damaging goods such as cigarettes and alcohol. The work by Ruhm (2002, 2003) suggests that on average individuals are more likely to cut down on unhealthy behaviors during recessions, generating a counter-cyclical pattern in health.

2.3 Empirical predictions and framework

As we discuss in the next section, our empirical work examines the effect of transitory changes in unemployment. The model makes the following predictions: (a) substitution effects will lead low-skill women who are not credit constrained to increase fertility when

[2] The effects of changes in the unemployment rate are qualitatively similar for both temporary and permanent changes so we analyze them jointly here.

unemployment is transitorily high; (b) low-skill women who are credit constrained will tend to postpone fertility when unemployment is high; (c) in terms of behaviors, we expect all mothers to increase time-intensive health behaviors, such as exercise and use of prenatal care, most of which appear to be health-improving.

3. Econometric Specification and Data Description

3.1 Specification

Several issues arise in translating the theoretical framework from Section 2 into an empirical specification. First, the theory relates to short-term decreases in the wages of individuals and their family members, whereas our empirical work uses aggregate unemployment. This is a consequence of using the Natality Files, and has both advantages and disadvantages. Among the advantages, as a widely publicized measure of the business cycle, the unemployment rate should capture not only individual job-loss but also the effect of economic uncertainty more generally. The unemployment rate is also less likely to be endogenous with respect to fertility decisions than individual or family employment. Among the disadvantages, we cannot distinguish between the effects of own employment and spousal (or household) unemployment (Butz and Ward 1979 and Heckman and Walker 1990).[3] Furthermore, not all groups are equally affected by changes in the unemployment rate. Hoynes (1999) finds that "lower education levels, nonwhites, and low skill women experience greater cyclical fluctuation than high skill men." Therefore some caution is needed in interpreting our results.

[3] We also have examined the effect of race- and gender-specific unemployment rates computed from the CPS; results available upon request.

Second, we do not directly observe skills or credit constraints in the data, but we do observe demographic characteristics that are good predictors of these characteristics, namely race, education and marital status. Low (high) education women are likely to correspond to low (high) skill women in the discussion above. Blacks are more likely to be credit constrained than whites (Jappelli 1990).

We consider the following reduced-form specification:

$$Y_{st} = a + b*(\text{unemployment rate})_{st} + r_s + q_t + g_s(r_s \cdot t) + e_{st}, \quad (1)$$

where Y_{st} refers to outcomes (such as mothers' characteristics, babies' health, or use of prenatal care) for children conceived at time t, $(\text{unemployment rate})_{st}$ refers to the state and year specific rate of unemployment, and r_s and q_t refer to state and year fixed effects. State-specific trends are represented by $r_s \cdot t$, where t is a year trend. We match outcomes at time t with unemployment rates at the time of conception. We use the number of births as weights,[4] and present robust standard errors, which correct for heteroskedasticity (including clustering at the state level).

We consider two specifications. In the first, we include state and year fixed effects, but ignore state-specific trends ($g_s = 0$). This specification identifies the effects of changes in the state-level unemployment rate within states over time. It therefore ignores permanent differences between states and national fluctuations (which are absorbed by state and time dummies). In principle, there is no reason to ignore national fluctuations

[4] Although all states were reporting in the Natality Files by 1975, some states were only reporting 50 percent of births. It was not until 1985 that all states reported 100 percent of births. See Appendix A for more details. We weight our regressions using the number of births in each state to account for this

but these are very likely to be correlated with other national trends, such as female labor force participation. We also present estimates that allow for a state-specific trend. These estimates are more likely to be driven by changes in the unemployment rate rather than other omitted factors, but are also more likely to be sensitive to measurement error.

Can the effect of unemployment in this specification be considered causal? Endogeneity is not the primary concern (in the sense that mothers' fertility decisions do not have an immediate and direct effect on the statewide unemployment rate at the time of conception), but could arise if women leave their jobs in anticipation of future pregnancy. Another concern is that the unemployment rate might capture the effect of a coincident shock or omitted variable. We address both concerns by presenting results using the unemployment rate one year prior to conception as an instrument. We also include additional state-year controls, such as the level of state transfers, WIC benefits, etc.[5]

3.2 Data

Unemployment data

We exploit variation across states and within states over time in unemployment rates. Our primary measure of unemployment is the state-by-year unemployment rate published by the Bureau of Labor Statistics. Measurement error in the unemployment rate is an important concern. Both the number of individuals unemployed and the labor force are

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differential sample size and also because there are very few black births in some states. Our results are not particularly sensitive to using weights.

[5] These controls address concerns of omitted variable bias, but they may be simultaneously determined with our outcomes, such as the average age and education of mothers or the average health of babies. Thus we do not include them in our main specifications.

subject to measurement error. Thus we also consider an alternative measure of employment, the employment-to-population ratio (Appendix D).

The Natality Files

We use the Vital Statistics Natality records from 1975 to 1999, covering every birth in the U.S. Birth certificates contain information on parents' characteristics including age, marital status, and education; mother's behavior during pregnancy (such as prenatal care information, and information about smoking and drinking); and child health outcomes including birth weight, congenital malformations and the 5-minute Apgar score.[6] The sample includes all births to mothers ages 18 and older.[7] We aggregate these data into cells defined by state of residence of the mother, year of conception, and race and gender of the baby.

A few data-quality issues are worth mentioning. We use the date of the last menstrual period to determine the date of conception. Some states did not report this information in the early years of the panel. We therefore drop these observations. Mother's education, congenital malformations, and the 5-minute Apgar score are missing in some states for some years. Some (but not all) states report smoking and drinking after 1989. It is also worth noting that smoking and drinking are known to be under-reported

[6] The Apgar score is a 10-point scale that is used to assess the health of newborns based on five criteria (appearance, pulse, grimace, activity, and respiration) that are rated between 0 and 2. A low Apgar score has been found to be a good predictor of subsequent infant mortality. See Almond, Chay, and Lee (2002).

[7] We eliminate teen mothers from our analysis because this group's fertility decisions are potentially complicated by other factors. Parents may be involved in fertility decisions of their teenage children. For example Hao, et al., (2003) suggest that "parents have, under certain conditions, the incentive to penalize teenage (and typically out-of-wedlock) childbearing of older daughters, in order to get the younger daughters to avoid teenage childbearing." Also, the labor market participation of this group is limited, therefore further complicating predictions of the effect of temporary changes in the unemployment rate. There is also a debate about the extent to which teenagers make rational decisions (see Levine 2001).

by pregnant mothers on the birth certificate.[8] A key variable, marital status, is imputed or missing for some states and years. Marital status was inferred by some states by comparing the last names of the mother, the father, and the infant. We kept data only for those states and years for which marital status was reported directly in the birth certificate. Appendix A documents variable availability for each state and year. Our regressions do not hold the sample constant: we use all of the observations available for any given specification.

Descriptive statistics are presented in Table 1. In the overall sample, over 50 percent of mothers are between the ages of 25 and 35, and 20 percent are high school dropouts. The prevalence of low birth weight is on the order of 7 percent for the full sample. However black infants are on average in worse health compared to white infants: about twice as many black infants that are born with low birth weight or very low birth weight, and low Apgar scores and infant mortality rates are more than double among black infants. There are several striking differences between black and white mothers as well. Only 39 percent of black mothers are married, compared to 85 percent of white mothers. The distribution of education also differs substantially by race: the proportion of white mothers with college or more education is 22 percent as opposed to 8 percent for blacks.

We also use restricted-access birth certificate data from California for the years 1990-2000, which contain enough information to identify mothers who have had more

[8] For smoking see Prazzini, et al. (1996). For drinking see results of the 2001 study conducted by the CDC as reported in: http://www.stopgettingsick.com/Conditions/condition_template.cfm/3040/314/46.

than one birth.[9] The California birth certificate data is identical in structure to the national birth certificate data, except for the additional information it contains that allows us to convert it into a panel of mothers. There is some information that the state of California does not collect, such as drinking and smoking, and that is therefore not available in the California panel. (See Appendix A for details.)

Other data

We use infant mortality data provided by the Centers for Disease Control (CDC). We calculate birth rates using counts from the Natality Files and population estimates provided by the Bureau of the Census (online). Mortality and birth rates are reported in Table 1. They show large differences by race: both neonatal and post-neonatal mortality are more than twice as high for blacks. Blacks' birth rate is also higher than whites'. Data on state demographics and government transfers are described in Besley and Case (2003). WIC benefits were obtained from the U.S. Department of Agriculture. We also use data from the Behavioral Risk Factor Surveillance System and from the World Bank Development Indicators. These data are described in Section 5.

4. Main Results

4.1 Introductory Results: Birth Rates

Table 2 examines the effect of unemployment on birth rates. Without state-specific trends, the effect of unemployment is positive for the overall sample and for whites, and negative for blacks. With state-specific trends, in columns (4) to (6), the effect is negative for all three samples. None of these coefficients is significant, but it is

[9] Because of confidentiality requirements, we do not have direct access to this data. We report the results of specifications that were run for us by Roland Fryer and Steven Levitt, to whom we are very grateful for

noteworthy that the effect is smaller in magnitude for whites than blacks: a one percentage point change in the unemployment rate results in a 0.7 percent decline in the birth rate for whites, but a 1.6 percent decline for blacks. We examine this more directly in columns (7) and (8). We show that the proportion of black babies born declines as unemployment increases. The magnitude of the effect ranges from 1.2 to 0.4 percent, and both effects are significant at the one percent level.

The fact that fertility is more responsive to changes in unemployment for blacks than whites suggests that unemployment leads to greater selectivity in fertility decisions among blacks. We explore this issue, along with the behavioral effects of unemployment, in the next section.[10]

4.2 Mother Characteristics, Child Health, and Prenatal Care

Tables 3a through 3c present our main results. For mother characteristics, childbirth outcomes, prenatal care, and smoking and drinking behavior during pregnancy, we match outcomes to unemployment in the year of conception of the child. Mortality outcomes are matched to unemployment in the year prior to mortality. We present all results with and without state-specific trends.

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their assistance. See Fryer and Levitt (2003) for additional details regarding this data.

[10] The effect of the unemployment rate on another dimension of selectivity, namely abortion, is inconclusive. Using two data sets, the Alan Guttmacher Institute data and the Centers for Disease Control data (the former is regarded as more accurate, but is not broken down by race), we find some evidence for a positive relationship, but the results are not robust. For example, we find that abortions per live birth increase with unemployment. When we examine abortions per woman however, we find a negative effect of unemployment using the Guttmacher data and the CDC data for whites, but find a positive effect for blacks using the CDC data, significant at the ten percent level. This issue is unresolved in the literature. These results are presented in Dehejia and Lleras-Muney (2003), Table 3. See Blank, George, and London (1996) and Levine (2002) for the effects of unemployment on abortion. See Gruber, Levine, and Staiger (1997), Angrist and Evans (1999), Donohue and Levitt (2000), and Pop-Eleches (2002) for the role and implications of abortion in selective fertility decisions.

In Table 3a, we examine the effect of unemployment on the birth outcomes of infants. In the overall sample we find that increased unemployment results in significant decreases in the incidence of low and very low birth weight, and in infant mortality. The effects are significant at the one percent level for low birth weight and imply a 1.4 to 2.6 percent reduction in low birth weight for each percentage point increase in unemployment. For very low birth weight the results are smaller in magnitude. For overall infant mortality and post-neonatal mortality, the results are significant and negative.

In the lower panels of Table 3a (and in subsequent tables) we split our results by race. There are two reasons for this. First, it is well known in the epidemiology literature that there are significant health differences between blacks and whites; indeed, this is documented in Table 1 for infant mortality. Second, our discussion in Section 2 suggests that credit constraints and the level of human capital (both of which are correlated with race) could effect how women respond to changes in unemployment. When we split by race we also find reduced low and very low birth weight and infant mortality for both races, but the effects are consistently more significant and larger for blacks (both in levels and relative to the mean). Furthermore, for blacks we find a statistically significant and large (3.6 to 4.8 percent) reduction in the incidence of congenital defects. The effect of a one percentage point change in the unemployment rate on other outcomes is small, in general less than one percent, except for black post-neonatal mortality (1.23 percent).

In Table 3b, we examine the effect of unemployment on the average characteristics of mothers. In the overall sample (columns 1 to 4) there is a significant reduction in high school dropouts and mothers with some college, and an increase in

mothers with just a high school education. However, these effects differ by race. Among whites there is a significant reduction in the proportion of mothers with some college or college plus. Instead for blacks we find a significant reduction in high school dropout mothers and a significant increase in more educated mothers. Though the magnitudes of these effects are small, most are statistically significant at the one percent level.[11]

In columns (5) to (9) we look at other parental characteristics. The proportion of mothers who are prime-aged with respect to fertility (between 25 and 35) increases for all samples and the proportion of young mothers (less than 25) decreases; however the proportion of mothers age 35 and older increases for blacks but decreases for whites. The average level of education among fathers is also increasing for all samples. There are no significant changes in the proportion of mothers who are married. Overall, these results suggest that the main difference between blacks and whites are driven by education, rather than by other factors a priori equally important in fertility decisions, such as marriage. We explore these differences again in the next section.

Table 3c examines changes in average behavioral outcomes. It is important to note that since these are aggregate results they could be driven either by compositional changes (selection into fertility) or by individual-level behavioral changes. Columns (1) to (3) document significant improvements in prenatal care use among all mothers: the average number of prenatal care visits increases, the proportion of mothers with inadequate prenatal care decreases, and the proportion of mothers who use prenatal care in the first trimester increases. For blacks the effects are significant at the one percent level, and for whites the effects are significant for the first two outcomes. For both

[11] It is interesting to note that Neal (2002) also finds sharp differences in the pattern of fertility and labor participation between white and black women.

samples the magnitudes of the effects are large: a one percentage point increase in unemployment leads to 5 percent increase in prenatal care visits among whites and a 3 percent increase among blacks. There is also a large decline in the number of mothers with fewer then 5 prenatal care visits (about 30 percent for whites and 10 percent for blacks).

Unlike prenatal care, we find a sharp difference between blacks and whites in smoking and drinking behavior. The proportion of white mothers who smoke and drink during pregnancy significantly increases for whites, but decreases for blacks.

For all outcomes we test whether there are significant differences between whites and blacks, in particular whether the unemployment-race interaction is significantly different from zero in a model that is fully interacted with race. The p-values are reported at the bottom of the tables. For all but three outcomes, we find significant differences at the 10 percent level, and for most outcomes the difference is significant at the 1 percent level.[12]

We subject our results to a range of robustness checks (presented in Appendix D). We address concerns of measurement error in the unemployment rate by using the employment-to-population ratio. We also add additional state- and time-varying covariates (such as the level of state transfers), and attempt to instrument for the unemployment rate using lagged unemployment. Finally we try linking births to monthly, rather than yearly, unemployment-rate data. Our results are robust to these alternative specifications.

[12] We also test whether the race interactions are jointly significantly different from zero. For all outcomes the p-value of this test is less than 0.0001.

It is notable that, with the exception of smoking and drinking (for which the sample size is small), the results for both specifications (with and without state-specific trends) are very similar both in terms of magnitude and statistical significance. Given the demands placed on the data by allowing for state-specific trends, particularly for smaller samples, in subsequent specifications we focus on the results with state and year fixed effects. (Further results that include state-specific trends are reported in Appendix E.)

Overall our results suggest a significant improvement in child health for all sub-samples but also suggest that socio-economic status (SES) of mothers (as measured by education) is worsening among whites and improving among blacks. Interestingly, we do not observe any significant differences in selection for other observable demographic characteristics. For behavior we find that for blacks all measures of behavior improve, whereas for whites prenatal care improves, but smoking and drinking during pregnancy increase. To the extent that the SES of black mothers is improving (in terms of education), we cannot distinguish whether improved health is driven by an improved sample of mothers or improved behavior. Instead for whites, to the extent that mothers are less educated, this table suggests that the improvements in health outcomes are due to changes in individual behavior rather than a change in the sample. We corroborate these speculations in Section 5 when we examine individual data with mother fixed effects (California birth certificate data) and examine the choice to become pregnant during recessions using the BRFSS data.

4.3 Results for Sub-Samples

In this section, we present our main results for a range of splits of the sample. This serves as a further robustness check, and provides additional insight into the results from Table 3.

We first split the sample by race and education. We drop those below age 25, who may not yet have completed college.[13] To the extent that mothers' skills are measured by education and are the main source of selectivity in birth decisions, within education categories we expect to see (and indeed find) a more homogeneous set of outcomes between blacks and whites. In particular for both blacks and whites we find that low-education mothers drive improvements in birth weight. Among college-plus mothers there is an increase in the incidence of low birth weight and a significant increase in the proportion of babies with a low Apgar score. Likewise, improvements in prenatal care are more uniform among mothers with high school or less education for blacks and whites. Among college-plus mothers, the proportion of mothers with fewer than five prenatal care visits increases for both blacks and whites (albeit insignificantly for the former) and the prevalence of congenital defects increases significantly.

There are still, however, some notable differences between blacks and whites. For all education categories, smoking and drinking behavior are different. For the middle education categories, the patterns of the coefficients for prenatal care and congenital malformations suggest that blacks with high school or some college more resemble dropouts, whereas whites in these categories more resemble college-plus mothers.

[13] Our results are not particularly sensitive to this sample restriction.

Another interesting feature of Table 4 is that, among black high school dropouts and graduates, the share of married women increases significantly. This motivates our next sample split: by race, education, and marital status in Tables 5a and 5b. It is important to note that marital status is not correctly reported in the birth certificate in many years and states (see Appendix A), and therefore our sample is significantly smaller when splitting by marital status. Among high school dropouts and high school graduate blacks, we note that the most significant health (infant mortality, congenital defects) and prenatal-care improvements are among single women. This suggests that, at least for these groups, the selection of single women out of fertility is driving health improvements. Among high school dropout and high school graduate whites, and among both whites and blacks with higher levels of education, the contrast between married and single mothers is less sharp.

4.4 Discussion

Taken together the results from Tables 3, 4 and 5 provide evidence of improvements in babies' health as unemployment increases. The tables also suggest that changes in the composition of mothers giving birth play a significant role in this pattern. Among blacks there is a significant reduction in the proportion of low-education mothers, and this group drives some of the health improvements we observe for blacks. These mothers – who are more likely to have unhealthy babies – opt out of fertility, leading to improvements in the average health of babies for this group. For whites we instead find an increase in the proportion of low-education mothers. This suggests that the substitution effect is stronger

among low-education mothers than high-education mothers, leading to a reduction in the average level of education among whites.

Once we break the sample by education groups, we find that results are much more homogenous across the races (with the exception of smoking and drinking). They suggest that less-educated women see large improvements in health and behavior, whereas health and behavior appear, if anything, to worsen as education increases for both races. These results also suggest that not all improvements in health for blacks are driven by selection since we see improvements among low-skill blacks in both behavior and health—although of course there may still be selection based on unobservables. We attempt to find further evidence for these patterns in the next section using additional data.

In terms of the theoretical framework outlined in Section 2, the fact that there is an increase in the proportion of low-education white mothers in times of high unemployment is consistent with the view that these are women whose skills do not depreciate during time away from the labor market and who consequently substitute into fertility when unemployment is high. This interpretation, however, requires either that these women are not credit constrained or that the substitution effect dominates any credit constraints. The decrease in the proportion of low-education black mothers, and more generally the sharply different pattern compared to whites, is consistent with the view that blacks, and in particular low-education blacks, are more likely to be credit constrained than whites or more educated blacks.

5. Extensions

5.1 Evidence from California's Linked Birth Certificate Records: Behavior versus Selection

In this section we examine whether the counter-cyclical health improvements that we note in Section 4 are due to behavioral changes or purely to selection. We use a panel of mothers from restricted-access data from California's Birth Certificate records from 1990 to 2000, and link county of residence with county-level unemployment rates in the year of conception. We compare cross-sectional estimates of the effect of unemployment – which in principle include both selection and behavioral effects – with estimates that include mother fixed effects, which measure the effect of changes in the unemployment rate within mothers over time (i.e., behavioral effects). If we find a significant effect of unemployment on children's health in the latter specification, it will suggest that part of the health benefits associated with recessions are due to changes in individual behavior.

Table 6, Panel A, presents cross-sectional estimates in which the sample is restricted to mothers who are observed at least twice in the California birth certificate data.[14] For whites we find an increase in the incidence of low birth weight, and a significant increase in the number of prenatal care visits. For blacks we find (insignificant) reductions in low birth weight, and a significant increase in the use of prenatal care. For both groups the magnitudes of the results are smaller than the national sample, and are generally not highly significant.[15] Thus, any conclusions drawn from these results must be taken with caution.

[14] Appendix F presents results comparing the full sample of mothers to mothers with two or more births.
[15] There are several possible reasons for this difference. The effects of unemployment could be smaller for California mothers relative to the national average. For example, there could be fewer credit constraints in California relative to other states. The effects of changes in county-level unemployment could be different

In Panel B we control for selection by adding mother fixed effects to the specification. Comparing results from Panels A and B, we find that for whites the negative effect of unemployment on birth outcomes becomes much smaller, and improvements in prenatal care use become larger. Instead among blacks we find that the magnitude of the effect of unemployment on health outcomes and prenatal care use decrease in the fixed-effects specification relative to the cross-sectional estimates. These results are consistent with the view that among white mothers negative selection offsets some of the behavioral improvements in times of high unemployment. Instead for blacks, selection is positive in times of high unemployment, and when this is accounted for the pure behavioral improvements in health are smaller. However we must be cautious not to over-interpret these results. Because all coefficients are insignificant when fixed effects are included, we cannot rule out that behavioral improvements could also play a role in the health improvements of black babies.

5.2 Evidence From Individual Behavioral Data

To provide further evidence on the type of women who are pregnant when unemployment is high, and to further explore their health behavior during recessions, we use individual data from the Behavioral Risk Factor Surveillance System (BRFSS) from 1985 to 2002. The BRFSS is a series of cross-sections, each of which is a representative sample of the non-institutionalized population of the U.S. It contains information about pregnancy status at the time of the survey as well as other demographic characteristics

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from the effects of changes in state-level unemployment. For example, changes at the state level could be better predictors of changes in permanent income. There is possibly more measurement error in these local unemployment rates. Finally, the California data cover a later period; indeed, the magnitudes are comparable to the national results if we restrict the sample to 1990 and later.

including state of residence and race. We restrict our sample to black and white, pregnant and non-pregnant, women ages 18 to 45. Individuals are asked questions both about their health and their health-related behavior. Not all health-related questions were asked every year in every state; therefore the number of observations varies with the outcome of interest. Summary statistics for this data are in Appendix B. About 4 percent of women ages 18 to 45 report being pregnant at the time of the interview. About 25 percent smoked in the last month, an average of about 16 cigarettes per day. Half of the sample reported drinking in the last month, an average of 13 drinks per month.

In Table 7, we examine the effect of unemployment and its interactions with education, marital status, and age on the probability of pregnancy at the time of the interview. The regressions also include state and year dummies, as well as state-specific trends, and we use the survey weights. The results are surprisingly consistent with our findings from the Natality Files. We find a positive and significant relationship between the unemployment rate and the probability of pregnancy for whites, whereas the effect is negative (and insignificant) for blacks. But more importantly the effect of the unemployment rate differs significantly by education group across the races: more educated whites are less likely to be pregnant when the unemployment rate increases, whereas the opposite is true for blacks (although the interactions are only significant for whites). On the other hand although married women and young women are less likely to become pregnant in recessions, the response is qualitatively similar for both races. So the main characteristic that affects selection into fertility differentially across the races appears to be education.

In Table 8 we examine how unemployment affects a range of health-related behaviors for all fertile-aged women and for pregnant women. These results therefore can shed light on both the cyclical behavior of pregnant women and on selection. In columns (1) and (2), we look at the effect of unemployment on smoking. Although not significant, there is a decrease in the prevalence of smokers among fertile-aged and pregnant women when the unemployment rate increases, and this decrease is much larger among pregnant black mothers than pregnant white mothers (the magnitudes differ by an order of 10). Similarly, the number of cigarettes smoked declines in the full sample of women, and smoking decreases among pregnant blacks whereas it increases among pregnant whites (in columns 3 and 4). Columns (5) through (8) present results for drinking: even though drinking increases with the unemployment rate for most groups (Ruhm 2000 also finds this result), the effect is negative among pregnant black mothers and positive among pregnant white mothers. The number of drinks decreases for all pregnant women, even though non-pregnant women appear to drink more in recessions.

Overall these results, though not highly statistically significant, mirror our findings from the Natality Files for pregnant women and they also support selection in the hypothesized direction: reduced smoking and drinking among blacks is congruent with low-SES black women postponing fertility when unemployment is high; increased smoking and drinking among whites is congruent with an increase in fertility for low-SES mothers.

5.3 Results Using Cross-Country Data

We conclude by examining whether similar results exist across countries. We use country-level panel data from the World Bank World Development Indicators (available online). It contains information on infant mortality rates, birth rates, and unemployment rates from 1980 to 1999. We keep countries with at least two years of data, which leaves us with 96 countries. Summary statistics for the data are reported in Appendix C for the full sample and by level of development.[16] The number of years for which data are available varies substantially by country; on average we have about 14 years per country, although developed countries have a much more complete series than developing countries. As expected, infant mortality and birth rates are much higher in developing countries. In particular infant mortality is about 4 times higher (28 per 1,000 compared to 8 per 1,000).

In Table 9a we examine the relationship between unemployment and the birth rates and infant mortality rates across all countries, including country and year dummies. In columns (1) and (2), we find a negative and statistically significant relationship between lagged unemployment – which corresponds most closely to unemployment at the time of conception – and the birth and mortality rates. In column (3) we show that even controlling for birthrates, which might capture country-specific, time-varying improvements in health and living standards, the unemployment effect remains significant. Interestingly, note that the coefficient on birth rates is positive and significant. Taken at face value, this correlation is consistent with the evidence presented for blacks in the United States, namely that when more babies are born, they tend to be

less healthy on average. Finally, in column (4) we show that the adult death rate is not significantly associated with unemployment, thereby plausibly ruling out general improvements in healthcare as a confounding factor in the previous columns. In Table 9b, we split the sample into developed and developing countries; the results are qualitatively similar across both samples and remain significant.[17]

There are several important limitations of these cross-country results, and addressing these concerns, we feel, is beyond the scope of the present paper. Nonetheless, we note that the results are consistent with our findings from the United States.

6. Conclusion

In this paper we have examined whether the business cycle induces a cycle in the health of children and the characteristics of their mothers. Using the Natality files, we find evidence for these effects. We find that when unemployment is high, neonatal and post-neonatal mortality decline, and all mothers tend to increase their use of prenatal care. Along the dimension of selection we find that less-educated single black mothers are less likely to have babies during recessions, raising the average health of black babies, and that less-educated white mothers are more likely to have babies during recessions, leading to reduced average health among whites.

We also find evidence of decreases in risky behavior, such as drinking and smoking, among blacks, but increases in these activities among whites. Because of the

[16] Developed countries are defined as Western European countries, Iceland, Canada, the U.S., Japan, Australia, and New Zealand. All other countries were categorized as developing. The full list of countries can be found in the note to Appendix Table B.

[17] There are several reasons for proceeding this way. The theory and empirical evidence presented so far have suggested the effect of unemployment is likely to differ by income level. The quality of the data differs sharply between rich and poor countries. Finally, in developing countries the unemployment rate may not be well measured.

aggregate nature of these results, our effects on behavioral outcomes capture both selection and individual-level behavioral changes. In particular, among blacks, since the average mothers' education increases, both selection and behavior lead to improved behavior-related outcomes. In contrast, among whites negative selection would offset behavioral improvements. Our fixed-effects results from a panel of California mothers suggest for blacks that selection drives our results (and that behavioral effects are relatively small) and for whites since there is negative selection that behavioral effects are larger than the joint behavior-plus-selection effect. We also show that our results are robust to a wide range of specifications and controls, and finally we provide evidence suggesting that these relationships seem to hold for cross-country data.

What are the implications of our findings? First, our results provide evidence consistent with the inter-temporal fertility models discussed in Section 2. In particular, the pattern of substitution into fertility by low-skill women suggests that skill-depreciation plays an important role in fertility decisions, and the pattern of black-white differences is consistent with the view that blacks, particular low-skill blacks, are likely to be credit constrained. Second, our findings with respect to behavioral changes induced by unemployment also raise interesting issues. Given that women's health behavior improves with higher unemployment rates and that incomes are lower, it would seem that the opportunity cost of time is an important consideration in these behavioral changes. If, as many have suggested, improving birth outcomes should be a policy objective, then our results suggest that policies attenuating the effect of taking time off from work to attend prenatal care, and to attend to health more generally, are particularly important.

A number of issues remain open. One interesting question in light of our findings in this paper is whether inter-state migration might contribute to our results (for example if more educated mothers are more likely to migrate from high to low unemployment states). Provisional findings using the 2000 Census suggest that migration does not explain away our results, but this is an interesting and important issue worthy of further study. Another important extension is to examine whether the selection and behavioral effects we have documented affect longer-term outcomes. These are avenues for future research.

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Table 1: Summary Statistics for Aggregate Natality Data

Sample	All		White		Black	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Unemployment rate (state and year)	6.61	1.97	6.58	1.97	6.69	1.96
Birth rate	0.063	0.014	0.061	0.013	0.076	0.015
Percent of black babies	0.144	0.153				
White mom=1	0.84	0.36				
% born below 2500 grams	0.068	0.035	0.058	0.020	0.13	0.041
% born below 1500 grams	0.013	0.011	0.010	0.006	0.028	0.017
% with Apgar score 5 and below	0.010	0.012	0.008	0.009	0.018	0.017
Infant mortality per 1,000 live births	978	423	826	190	1850	955
Neonatal mortality per 1,000 live births	639	286	533	146	1150	681
Post-neonatal mortality per 1,000 live births	340	152	293	81	699	622
Any congenital defects=1	0.013	0.010	0.012	0.009	0.014	0.015
% mothers with less than high school	0.19	0.39	0.17	0.38	0.24	0.43
% mothers with high school	0.41	0.49	0.40	0.49	0.46	0.50
% mothers with some college	0.22	0.41	0.22	0.41	0.21	0.41
% mothers with college or more	0.19	0.39	0.21	0.41	0.088	0.28
% mothers less than age 25	0.39	0.49	0.37	0.48	0.52	0.50
% mothers between age 25 and 35	0.52	0.50	0.54	0.50	0.42	0.49
% mothers greater than 35	0.087	0.28	0.090	0.29	0.069	0.25
Father's education	12.8	1.77	12.9	1.85	12.2	1.18
% moms married	0.77	0.42	0.85	0.36	0.39	0.49
Number of prenatal care visits	10.9	3.79	11.07	3.82	9.88	3.45
% with fewer than 5 prenatal	0.11	0.20	0.10	0.20	0.17	0.15
% had prenatal care in first trimester	0.80	0.14	0.82	0.06	0.66	0.09
Smoked any time during pregnancy[(a)]	0.14	0.053	0.148	0.066	0.115	0.070
Drank any time during pregnancy[(a)]	0.014	0.014	0.013	0.015	0.019	0.017

Notes: Data aggregated by state, year of conception, and gender and race of the baby. The number of observations in each cell are used as weights. Child mortality data are by state and year for 1979-1998. Infant morality rates are computed as the number of infant that die within a year of birth as a fraction of live births *1000, and likewise for neo-natal mortality (the number of infant that die within 28 days) and post-neonatal mortality (number of infant that die between 28 days and a year of birth).

(a) These variables are only calculated from 1989-1999 since the information only started being collected by states in 1989. More generally, not all variables are available for every year and state. Please see Appendix A for details.

Table 2: Effect of Unemployment on Birthrate and Percent Black

Dependent variable	(1) Overall birthrate	(2) White birthrate	(3) Black birthrate	(4) Overall birthrate	(5) White birthrate	(6) Black birthrate	(7) % black babies	(8) % black babies
unemployment rate	0.000096	0.00019	-0.00047	-0.00022	-0.00019	-0.00047	-0.0018***	-0.00059***
	(0.00034)	(0.00038)	(0.00039)	(0.00023)	(0.00025)	(0.00032)	(0.00038)	(0.00028)
% effect	*0.0015*	*0.013571*	*-0.02474*	*-0.034*	*-0.00792*	*-0.01621*	*-0.0125*	*-0.0041*
State fixed effects	x	x	x	x	x	x	x	x
Year fixed effects	x	x	x	x	x	x	x	x
State-specific trend				x	x	x		x
Observations	2506	1253	1253	2506	1253	1253	1253	1253
R-squared	0.51	0.58	0.55	0.74	0.77	0.79	1.00	1.00

Notes: Birthrate data are by state, year, and race. Birthrate=number of births divided by population by state and year. Percent black babies is the ratio of black births to total births by state and year. Births are matched to unemployment rates by state and year of conception. All regressions are weighted using the number of births in the state, year, and race as weights. Robust standard errors are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 3a: Effect of Unemployment on Children's health outcomes

Dependent variable	(1) % born below 2500 grams	(2) % born below 1500 grams	(3) % with Apgar score 5 and below	(4) Infant mortality rate	(5) Neo-natal mortality rate	(6) Post neonatal mortality rate	Congenital defects
All mothers							
unemployment rate with state and year fe	-0.00034***	-0.00006*	-0.00003	-6.549***	-2.825	-3.726***	0.00009
	(0.000064)	(0.000033)	(0.000045)	(2.336)	(1.829)	(0.933)	(0.00013)
% effect of 1% D in u-rate	*-0.50%*	*-0.46%*	*-0.30%*	*-0.67%*	*-0.44%*	*-1.10%*	*0.69%*
unemployment rate with state and year fe, and state trends	-0.00018***	-0.00007*	-0.000024	-4.940*	-1.825	-3.117***	0.00011
	(0.000063)	(0.00003)	(0.00005)	(2.657)	(2.039)	(1.134)	(0.00015)
% effect of 1% D in u-rate	*-0.26%*	*-0.54%*	*-0.24%*	*-0.51%*	*-0.29%*	*-0.92%*	*0.85%*
White mothers							
unemployment rate with state and year fe	-0.00020***	-0.00004	0.00004	-4.612***	-1.804	-2.810***	0.00015
	(0.00006)	(0.00003)	(0.00003)	(1.588)	(1.199)	(0.827)	(0.00012)
% effect of 1% D in u-rate	*-0.34%*	*-0.40%*	*0.50%*	*-0.56%*	*-0.34%*	*-0.96%*	*1.25%*
unemployment rate with state and year fe, and state trends	-0.00005	-0.00005	0.00004	-2.546	-0.647	-1.902**	0.00020
	(0.00006)	(0.00003)	(0.00003)	(1.678)	(1.246)	(0.962)	(0.00015)
% effect of 1% D in u-rate	*-0.09%*	*-0.50%*	*0.50%*	*-0.31%*	*-0.12%*	*-0.65%*	*1.67%*
Black mothers							
unemployment rate with state and year fe	-0.00089***	-0.00020***	-0.00015	-17.168***	-8.382*	-8.785***	-0.00067***
	(0.00016)	(0.00006)	(0.00019)	(5.073)	(4.390)	(2.301)	(0.00022)
% effect of 1% D in u-rate	*-0.68%*	*-0.71%*	*-0.83%*	*-0.93%*	*-0.73%*	*-1.26%*	*-4.79%*
unemployment rate with state and year fe, and state trends	-0.00078***	-0.00020***	-0.00016	-15.658**	-7.061	-8.596***	-0.00051**
	(0.00016)	(0.00006)	(0.00029)	(6.107)	(5.061)	(2.517)	(0.00025)
% effect of 1% D in u-rate	*-0.60%*	*-0.71%*	*-0.89%*	*-0.85%*	*-0.61%*	*-1.23%*	*-3.64%*
P-value on black-white difference	*0.0000*	*0.0083*	*0.35*	*0.0449*	*0.2448*	*0.0428*	*0.0001*

Notes: Data from the Natality Files are aggregated to the state, year, and race level, for states and years as listed in Appendix A. Child mortality data are by state and year for 1979-1998. Infant morality rates are computed as the number of infant that die within a year of birth as a fraction of live births *1000, and likewise for neo-natal mortality (the number of infant that die within 28 days) and post-neonatal mortality (number of infant that die between 28 days and a year of birth). All regressions include state and year fixed effects. The unemployment rate is calculated at the state-year level and matched to the Natality Files (birth weight, Apgar score) by the year of conception of the baby and to mortality data by the year prior to child mortality. They are weighted by the number of births in the state. Robust standard errors in parentheses. For the difference between black and white, the p-value tests whether the unemployment-race coefficient is significantly different from zero in a model that is fully interacted with race. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 3b: Effect of Unemployment on Mother Characteristics and behaviors by Race, 1976-1998

Dependent variable	(1) % moms less high school	(2) % moms with high school	(3) % moms some college	(4) % moms college or more	Mother's age less than 25	(5) Mother's age between 25 and 35	Mother's age greater than 35	(6) Average father's education	(7) % married
All mothers									
u-rate with state and year fe	-0.00116***	0.00222***	-0.00094***	-0.00011	-0.00097***	0.00115***	-0.00018	0.01535***	0.00008
	(0.00042)	(0.00031)	(0.00030)	(0.00029)	(0.00025)	(0.00020)	(0.00018)	(0.00467)	(0.00030)
	-0.61%	*0.54%*	*-0.43%*	*-0.06%*	*-0.25%*	*0.22%*	*-0.21%*	*0.12%*	*0.01%*
u-rate with state and year fe, and state trends	-0.00091**	0.00080***	0.00020	-0.00009	-0.00220***	0.00187***	-0.00018	0.01172***	-0.00011
	(0.00037)	(0.00019)	(0.00027)	(0.00021)	(0.00017)	(0.00013)	(0.00018)	(0.00380)	(0.00018)
% effect	*-0.48%*	*0.20%*	*0.09%*	*-0.05%*	*-0.56%*	*0.36%*	*-0.21%*	*0.09%*	*-0.01%*
White mothers									
u-rate with state and year fe	-0.00064	0.00235***	-0.00109***	-0.00061**	-0.00032	0.00082***	-0.00049**	0.01383**	0.00032
	(0.00045)	(0.00032)	(0.00039)	(0.00030)	(0.00028)	(0.00024)	(0.00019)	(0.00589)	(0.00028)
	-0.38%	*0.59%*	*-0.50%*	*-0.29%*	*-0.09%*	*0.15%*	*-0.54%*	*0.11%*	*0.04%*
u-rate with state and year fe, and state trends	-0.00058	0.00090***	0.00011	-0.00044**	-0.00197***	0.00175***	-0.00049**	0.01061**	0.00020
	(0.00039)	(0.00018)	(0.00035)	(0.00017)	(0.00018)	(0.00013)	(0.00019)	(0.00465)	(0.00015)
% effect	*-0.34%*	*0.23%*	*0.05%*	*-0.21%*	*-0.53%*	*0.32%*	*-0.54%*	*0.08%*	*0.02%*
Black mothers									
u-rate with state and year fe	-0.00338***	0.00142***	0.00089***	0.00106***	-0.00411***	0.00279***	0.00133***	0.03185***	-0.00012
	(0.00049)	(0.00051)	(0.00034)	(0.00028)	(0.00048)	(0.00035)	(0.00021)	(0.00706)	(0.00080)
	-1.41%	*0.31%*	*0.42%*	*1.20%*	*-1.11%*	*0.52%*	*1.93%*	*0.26%*	*-0.03%*
u-rate with state and year fe, and state trends	-0.00229***	0.00052	0.00107***	0.00070***	-0.00318***	0.00215***	0.00133***	0.02627***	-0.00040
	(0.00038)	(0.00040)	(0.00024)	(0.00015)	(0.00029)	(0.00029)	(0.00021)	(0.00517)	(0.00035)
% effect	*-0.95%*	*0.11%*	*0.51%*	*0.80%*	*-0.86%*	*0.40%*	*1.93%*	*0.22%*	*-0.10%*
P-value on black-white difference	*0.0000*	*0.1266*	*0.00001*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0501*	*0.6090*

Notes: Data from the Natality Files are aggregated to the state, year, and race level, for states and years as listed in Appendix A. The unemployment rate is calculated at the state-year level and matched to the Natality Files by the year of conception of the baby. Regressions include state and year fixed effects. They are weighted by the number of births in the state. Robust standard errors in parentheses. For the difference between black and white, the p-value tests whether the unemployment-race coefficient is significantly different from zero in a model that is fully interacted with race.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3c: Effect of Unemployment on Behaviors by Race, 1976-1998

Dependent variable	(8) Average no. of prenatal care visits	(9) % < than 5 prenatal care visits	(10) % prenatal care in first trimester	(11) Smoked during pregnancy	Drank during pregnancy
All mothers					
u-rate with state and year fe	0.52965***	-0.02964***	0.00162***	0.00308**	0.00100
	(0.14646)	(0.00545)	(0.00042)	(0.00142)	(0.00124)
	4.86%	*-26.95%*	*0.20%*	*2.20%*	*7.14%*
u-rate with state and year fe, and state trends	0.67067***	-0.02699***	0.00050	0.00002	-0.00022
	(0.24755)	(0.00759)	(0.00041)	(0.00077)	(0.00073)
% effect	*6.15%*	*-24.54%*	*0.06%*	*0.01%*	*-1.57%*
White mothers					
u-rate with state and year fe	0.58250***	-0.02948***	0.00078**	0.00350**	0.00111
	(0.17629)	(0.00555)	(0.00037)	(0.00147)	(0.00129)
	5.26%	*-29.48%*	*0.10%*	*2.36%*	*8.54%*
u-rate with state and year fe, and state trends	0.77210***	-0.03020***	-0.00020	-0.00016	-0.00023
	(0.26660)	(0.00801)	(0.00037)	(0.00080)	(0.00075)
% effect	*6.97%*	*-30.20%*	*-0.02%*	*-0.11%*	*-1.77%*
Black mothers					
u-rate with state and year fe	0.30706***	-0.01848***	0.00529***	-0.00031	-0.00117***
	(0.08887)	(0.00355)	(0.00096)	(0.00094)	(0.00036)
	3.11%	*-10.87%*	*0.80%*	*-0.27%*	*-6.16%*
u-rate with state and year fe, and state trends	0.35638***	-0.01309***	0.00421***	0.00072	-0.00054
	(0.13624)	(0.00409)	(0.00075)	(0.00071)	(0.00039)
% effect	*3.61%*	*-7.70%*	*0.64%*	*0.63%*	*-2.84%*
P-value on black-white difference	*0.1630*	*0.0952*	*0.0000*	*0.0288*	*0.0894*

Notes: Data from the Natality Files are aggregated to the state, year, and race level, for states and years as listed in Appendix A. The unemployment rate is calculated at the state-year level and matched to the Natality Files by the year of conception of the baby. Regressions include state and year fixed effects. They are weighted by the number of births in the state. Robust standard errors in parentheses. For the difference between black and white, the p-value tests whether the unemployment-race coefficient is significantly different from zero in a model that is fully interacted with race.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Effect of Unemployment by Race and Education, 1976-1998

Dependent variable	(1) % born below 2500 grams	(2) % born below 1500 grams	(3) % with Apgar score 5 and below	(4) Mother's age greater than 35	(5) Average father's education	(6) % married	(7) Average no. of prenatal care visits	(8) % < than 5 prenatal care visits	(9) % prenatal care in first trimester	(10) Smoked during pregnancy	(11) Drank during pregnancy	Congenital defects
High school drop-out												
White												
unemployment	-0.00061***	-0.00011	0.00008	-0.00182***	0.03114***	-0.00059	0.07580	-0.00447***	0.00819***	0.00241*	0.00027	-0.00021
rate	(0.00020)	(0.00007)	(0.00010)	(0.00033)	(0.00767)	(0.00071)	(0.05644)	(0.00068)	(0.00092)	(0.00142)	(0.00106)	(0.00021)
% effect	*-0.81%*	*-0.89%*	*0.76%*	*-1.25%*	*0.32%*	*-0.08%*	*0.75%*	*-3.52%*	*1.22%*	*1.77%*	*2.20%*	*-1.53%*
Black												
unemployment	-0.00054	-0.00034*	-0.00059	-0.00049	0.07153***	0.00491***	0.12856**	-0.00834***	0.00959***	-0.00123	-0.00155***	-0.00092**
rate	(0.00056)	(0.00018)	(0.00077)	(0.00052)	(0.01503)	(0.00131)	(0.05071)	(0.00148)	(0.00169)	(0.00107)	(0.00043)	(0.00046)
% effect	*-0.33%*	*-1.03%*	*-2.67%*	*-0.31%*	*0.67%*	*1.29%*	*1.46%*	*-3.68%*	*1.68%*	*-1.03%*	*-7.56%*	*-5.28%*
P-value on difference	*0.7699*	*0.1424*	*0.4811*	*0.3629*	*0.0163*	*0.3511*	*0.6524*	*0.1212*	*0.4048*	*0.1054*	*0.1420*	*0.1717*
High school graduate												
White												
unemployment	-0.00014	-0.00004	-0.00001	-0.00072***	0.00243*	-0.00013	-0.00914	0.00039	0.00262***	0.00268**	0.00074	0.00001
rate	(0.00010)	(0.00006)	(0.00005)	(0.00021)	(0.00133)	(0.00024)	(0.05066)	(0.00041)	(0.00041)	(0.00127)	(0.00104)	(0.00015)
% effect	*-0.23%*	*-0.39%*	*-0.12%*	*-0.64%*	*0.02%*	*-0.01%*	*-0.08%*	*0.87%*	*0.31%*	*1.77%*	*5.38%*	*0.07%*
Black												
unemployment	-0.00112***	-0.00016	-0.00009	0.00031	0.01484**	0.00281***	0.01321	-0.00333***	0.00523***	-0.00102	-0.00127***	-0.00021
rate	(0.00031)	(0.00013)	(0.00025)	(0.00032)	(0.00595)	(0.00077)	(0.05742)	(0.00105)	(0.00110)	(0.00101)	(0.00040)	(0.00026)
% effect	*-0.84%*	*-0.53%*	*-0.47%*	*0.24%*	*0.12%*	*0.56%*	*0.13%*	*-2.42%*	*0.75%*	*-0.88%*	*-6.46%*	*-1.47%*
P-value on difference	*0.0005*	*0.2267*	*0.7265*	*0.0001*	*0.0280*	*0.2613*	*0.7350*	*0.0126*	*0.0123*	*0.0448*	*0.0814*	*0.1120*
Some College												
White												
unemployment	-0.00004	0.00003	0.00008*	0.00119***	0.00206	-0.00027	-0.00077	0.00072**	0.00198***	0.00304**	0.00099	0.00029**
rate	(0.00010)	(0.00006)	(0.00004)	(0.00024)	(0.00126)	(0.00019)	(0.02861)	(0.00030)	(0.00030)	(0.00148)	(0.00131)	(0.00014)
% effect	*-0.08%*	*0.33%*	*1.16%*	*0.92%*	*0.01%*	*-0.03%*	*-0.01%*	*2.40%*	*0.22%*	*2.04%*	*7.13%*	*2.24%*
Black												
unemployment	-0.00085***	-0.00024	-0.00008	0.00099***	0.01813***	0.00044	0.03464	-0.00176**	0.00407***	0.00019	-0.00072*	-0.00002
rate	(0.00031)	(0.00016)	(0.00015)	(0.00034)	(0.00638)	(0.00081)	(0.03324)	(0.00089)	(0.00086)	(0.00091)	(0.00038)	(0.00024)
% effect	*-0.73%*	*-0.84%*	*-0.48%*	*0.75%*	*0.14%*	*0.07%*	*0.31%*	*-1.98%*	*0.51%*	*0.16%*	*-3.76%*	*-0.15%*
P-value on difference	*0.0249*	*0.0724*	*0.1165*	*0.8809*	*0.0610*	*0.0469*	*0.4567*	*0.0194*	*0.1659*	*0.1014*	*0.1938*	*0.1776*
College or more												
White												
unemployment	0.00011	0.00004	0.00005	0.00150***	0.00334***	0.00006	-0.00905	0.00084***	0.00137***	0.00396**	0.00150	0.00046***
rate	(0.00009)	(0.00004)	(0.00004)	(0.00034)	(0.00128)	(0.00008)	(0.02658)	(0.00030)	(0.00025)	(0.00160)	(0.00145)	(0.00015)
% effect	*0.24%*	*0.47%*	*0.83%*	*0.79%*	*0.02%*	*0.01%*	*-0.07%*	*3.65%*	*0.15%*	*2.73%*	*10.93%*	*3.84%*
Black												
unemployment	0.00068**	0.00012	0.00042**	0.00125**	0.01643***	0.00074	0.00816	0.00075	0.00137**	-0.00020	-0.00077**	0.00024
rate	(0.00032)	(0.00018)	(0.00018)	(0.00052)	(0.00437)	(0.00061)	(0.03183)	(0.00082)	(0.00067)	(0.00096)	(0.00039)	(0.00023)
% effect	*0.68%*	*0.47%*	*2.87%*	*0.65%*	*0.11%*	*0.09%*	*0.07%*	*1.30%*	*0.16%*	*-0.18%*	*-4.24%*	*1.94%*
P-value on difference	*0.3981*	*0.4348*	*0.0199*	*0.9035*	*0.0047*	*0.1374*	*0.5295*	*0.6171*	*0.8687*	*0.0251*	*0.1277*	*0.3473*

Notes: Data from the Natality Files are aggregated to the state, year, and race level, for states and years as listed in Appendix A. Regressions exclude individuals below age 25. The unemployment rate is calculated at the state-year level and matched to the Natality Files by the year of conception of the baby. Regressions include state and year fixed effects. They are weighted by the number of births in the state. Robust standard errors in parentheses. For the difference between black and white, the p-value is for the unemployment-race interaction.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5a: Effect of Unemployment on Mother Characteristics and Behaviors by Race, Education, and Marital Status, 1976-1998

Dependent variable	(1) % born below 2500 grams	(2) % born below 1500 grams	(3) % with Apgar score 5 and below	(4) Mother's age greater than 35	(5) Average father's education	(7) Average no. of prenatal care visits	(8) % < than 5 prenatal care visits	(9) % prenatal care in first trimester	(10) Smoked during pregnancy	(11) Drank during pregnancy	(12) Congenital defects
Black single											
High school dropout											
unemployment rate	-0.00130***	-0.00055***	-0.00073	0.00007	0.03833	0.07463***	-0.00423***	0.00689***	-0.00145	-0.00141***	-0.00133**
	(0.00037)	(0.00015)	(0.00085)	(0.00028)	(0.02409)	(0.01514)	(0.00125)	(0.00151)	(0.00105)	(0.00045)	(0.00059)
% effect	*-0.84%*	*-1.88%*	*-3.65%*	*0.20%*	*0.34%*	*0.87%*	*-1.88%*	*1.26%*	*-1.22%*	*-6.91%*	*-8.40%*
High school graduate											
unemployment rate	-0.00103***	-0.00025*	0.00001	0.00098***	0.00207	0.04640***	-0.00111	0.00592***	-0.00158	-0.00145***	-0.00084**
	(0.00026)	(0.00013)	(0.00020)	(0.00017)	(0.01141)	(0.01532)	(0.00101)	(0.00155)	(0.00103)	(0.00044)	(0.00043)
% effect	*-0.76%*	*-0.86%*	*0.05%*	*2.89%*	*0.02%*	*0.48%*	*-0.72%*	*0.97%*	*-1.35%*	*-7.19%*	*-5.70%*
P-value on difference	*0.5552*	*0.1427*	*0.3982*	*0.0056*	*0.1725*	*0.1882*	*0.0517*	*0.6537*	*0.9305*	*0.9572*	*0.5071*
Black married											
High school dropout											
unemployment rate	0.00014	0.00007	0.00049	0.00190***	0.04429***	0.06168***	-0.00256**	0.00551***	-0.00098	-0.00094*	-0.00044
	(0.00056)	(0.00023)	(0.00037)	(0.00066)	(0.00979)	(0.01332)	(0.00101)	(0.00131)	(0.00096)	(0.00050)	(0.00061)
% effect	*0.11%*	*0.28%*	*2.56%*	*1.68%*	*0.41%*	*0.67%*	*-1.51%*	*0.90%*	*-0.88%*	*-4.78%*	*-2.52%*
High school graduate											
unemployment rate	-0.00038	0.00002	0.00011	0.00126***	0.00398**	0.01460	0.00029	0.00370***	-0.00052	-0.00070*	0.00023
	(0.00027)	(0.00014)	(0.00025)	(0.00030)	(0.00178)	(0.01042)	(0.00071)	(0.00106)	(0.00085)	(0.00041)	(0.00031)
% effect	*-0.35%*	*0.08%*	*0.63%*	*1.58%*	*0.03%*	*0.14%*	*0.31%*	*0.50%*	*-0.47%*	*-3.62%*	*1.66%*
P-value on difference	*0.4007*	*0.8899*	*0.3984*	*0.3760*	*0.0000*	*0.0053*	*0.0221*	*0.2821*	*0.7203*	*0.7142*	*0.3167*
White single											
High school dropout											
unemployment rate	-0.00080***	-0.00004	-0.00000	0.00046***	-0.02389**	0.04670***	-0.00073	0.00418***	0.00485***	0.00185	-0.00018
	(0.00026)	(0.00010)	(0.00014)	(0.00015)	(0.00945)	(0.01193)	(0.00080)	(0.00131)	(0.00166)	(0.00148)	(0.00043)
% effect	*-0.87%*	*-0.27%*	*0.00%*	*1.40%*	*-0.23%*	*0.48%*	*-0.52%*	*0.69%*	*3.18%*	*14.00%*	*-1.15%*
High school graduate											
unemployment rate	-0.00051**	-0.00002	0.00021*	0.00126***	-0.01270**	0.03592***	0.00079	0.00162*	0.00480***	0.00182	0.00010
	(0.00022)	(0.00010)	(0.00011)	(0.00017)	(0.00617)	(0.00925)	(0.00060)	(0.00093)	(0.00159)	(0.00135)	(0.00033)
% effect	*-0.63%*	*-0.14%*	*1.99%*	*3.07%*	*-0.11%*	*0.34%*	*0.86%*	*0.24%*	*3.07%*	*13.59%*	*0.63%*
P-value on difference	*0.3830*	*0.8818*	*0.2230*	*0.0005*	*0.3218*	*0.4751*	*0.1282*	*0.1116*	*0.9843*	*0.9903*	*0.5981*
White married											
High school dropout											
unemployment rate	-0.00056***	-0.00005	0.00008	0.00040**	0.01575***	0.06897***	-0.00149**	0.00686***	0.00244**	0.00025	-0.00041*
	(0.00017)	(0.00006)	(0.00009)	(0.00018)	(0.00462)	(0.00914)	(0.00061)	(0.00094)	(0.00115)	(0.00086)	(0.00022)
% effect	*-0.76%*	*-0.45%*	*0.80%*	*0.71%*	*0.15%*	*0.67%*	*-1.40%*	*1.00%*	*1.60%*	*2.06%*	*-2.98%*
High school graduate											
unemployment rate	-0.00008	-0.00002	0.00002	0.00084***	0.00071	0.03549***	0.00114***	0.00210***	0.00347**	0.00141	0.00006
	(0.00008)	(0.00003)	(0.00005)	(0.00024)	(0.00120)	(0.00546)	(0.00041)	(0.00045)	(0.00148)	(0.00126)	(0.00018)
% effect	*-0.15%*	*-0.22%*	*0.25%*	*1.33%*	*0.01%*	*0.31%*	*3.07%*	*0.25%*	*2.18%*	*9.92%*	*0.47%*
P-value on difference	*0.0117*	*0.6494*	*0.5563*	*0.1427*	*0.0016*	*0.0017*	*0.0003*	*0.0000*	*0.5832*	*0.4468*	*0.0981*

Notes: Data from the Natality Files are aggregated to the state, year, and race level, for states and years as listed in Appendix A. Regressions exclude individuals below age 25. The unemployment rate is calculated at the state-year level and matched to the Natality Files by the year of conception of the baby. Regressions include state and year fixed effects. They are weighted by the number of births in the state. Robust standard errors in parentheses. For the difference between black and white, the p-value is for the unemployment-race interaction.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5b: Effect of Unemployment on Mother Characteristics and Behaviors by Race, Education, and Marital status, 1976-1998

Dependent variable	(1) % born below 2500 grams	(2) % born below 1500 grams	(3) % with Apgar score 5 and below	(4) Mother's age greater than 35	(5) Average father's education	(7) Average no. of prenatal care visits	(8) % < than 5 prenatal care visits	(9) % prenatal care in first trimester	(10) Smoked during pregnancy	(11) Drank during pregnancy	(12) Congenital defects
Black single											
Some college											
unemployment rate	-0.00123***	-0.00063***	-0.00195	0.00084***	0.02826	0.03270**	0.00054	0.00300**	-0.00110	-0.00114**	0.00004
	(0.00046)	(0.00022)	(0.00147)	(0.00028)	(0.02791)	(0.01316)	(0.00085)	(0.00137)	(0.00101)	(0.00046)	(0.00039)
% effect	*-0.96%*	*-2.12%*	*-10.22%*	*1.66%*	*0.22%*	*0.31%*	*0.48%*	*0.44%*	*-0.94%*	*-5.74%*	*0.29%*
College plus											
unemployment rate	0.00014	0.00041	0.00043	0.00236**	0.01379	-0.01617	0.00346***	0.00159	-0.00171	-0.00128**	-0.00017
	(0.00095)	(0.00050)	(0.00046)	(0.00095)	(0.02590)	(0.01885)	(0.00117)	(0.00175)	(0.00113)	(0.00051)	(0.00052)
% effect	*0.11%*	*1.25%*	*2.38%*	*1.96%*	*0.10%*	*-0.14%*	*4.05%*	*0.20%*	*-1.51%*	*-6.68%*	*-1.25%*
P-value on difference	*0.1978*	*0.0580*	*0.1225*	*0.1209*	*0.7083*	*0.0343*	*0.0441*	*0.5377*	*0.6883*	*0.8453*	*0.7351*
Black married											
Some college											
unemployment rate	-0.00134***	-0.00036*	-0.00023	0.00115***	0.01095***	0.00804	0.00154***	0.00182**	-0.00037	-0.00063	0.00021
	(0.00039)	(0.00019)	(0.00020)	(0.00034)	(0.00290)	(0.00984)	(0.00058)	(0.00089)	(0.00092)	(0.00046)	(0.00030)
% effect	*-1.34%*	*-1.49%*	*-1.49%*	*1.23%*	*0.08%*	*0.07%*	*2.59%*	*0.22%*	*-0.33%*	*-3.27%*	*1.62%*
College plus											
unemployment rate	0.00029	-0.00018	0.00044**	0.00215***	0.00998**	-0.02937**	0.00243***	0.00045	-0.00060	-0.00083*	0.00076**
	(0.00043)	(0.00023)	(0.00022)	(0.00065)	(0.00390)	(0.01176)	(0.00065)	(0.00074)	(0.00101)	(0.00046)	(0.00030)
% effect	*0.31%*	*-0.76%*	*3.04%*	*1.26%*	*0.07%*	*-0.24%*	*5.93%*	*0.05%*	*-0.55%*	*-4.45%*	*6.30%*
P-value on difference	*0.0053*	*0.5469*	*0.0259*	*0.1725*	*0.8447*	*0.0147*	*0.3029*	*0.2362*	*0.8717*	*0.7539*	*0.1921*
White single											
Some college											
unemployment rate	-0.00079**	0.00010	0.00006	0.00117***	-0.01070	0.01714*	0.00081	0.00003	0.00557***	0.00253	0.00040
	(0.00036)	(0.00017)	(0.00017)	(0.00035)	(0.00997)	(0.01037)	(0.00060)	(0.00097)	(0.00177)	(0.00165)	(0.00039)
% effect	*-1.08%*	*0.74%*	*0.62%*	*1.73%*	*-0.08%*	*0.15%*	*1.05%*	*0.00%*	*3.63%*	*18.57%*	*2.66%*
College plus											
unemployment rate	0.00026	-0.00008	0.00041	-0.00310**	0.02058	0.00438	0.00194**	0.00023	0.00571***	0.00270	0.00068
	(0.00071)	(0.00035)	(0.00033)	(0.00135)	(0.01657)	(0.01350)	(0.00078)	(0.00133)	(0.00175)	(0.00169)	(0.00052)
% effect	*0.36%*	*-0.55%*	*4.30%*	*-1.58%*	*0.14%*	*0.04%*	*3.01%*	*0.03%*	*3.86%*	*19.10%*	*4.67%*
P-value on difference	*0.1869*	*0.6357*	*0.3457*	*0.0358*	*0.1039*	*0.4452*	*0.2435*	*0.9114*	*0.9559*	*0.9428*	*0.6627*
White married											
Some college											
unemployment rate	-0.00016	-0.00003	0.00007	0.00210***	0.00299**	0.02657***	0.00126***	0.00157***	0.00437**	0.00215	0.00035*
	(0.00010)	(0.00004)	(0.00005)	(0.00031)	(0.00144)	(0.00590)	(0.00033)	(0.00032)	(0.00182)	(0.00169)	(0.00021)
% effect	*-0.33%*	*-0.36%*	*1.01%*	*2.28%*	*0.02%*	*0.22%*	*5.07%*	*0.17%*	*2.80%*	*14.69%*	*2.72%*
College plus											
unemployment rate	0.00004	0.00002	0.00005	0.00167***	0.00302**	0.01279**	0.00141***	0.00097***	0.00547***	0.00273	0.00076***
	(0.00010)	(0.00004)	(0.00005)	(0.00036)	(0.00149)	(0.00623)	(0.00032)	(0.00029)	(0.00189)	(0.00180)	(0.00020)
% effect	*0.09%*	*0.25%*	*0.81%*	*1.00%*	*0.02%*	*0.10%*	*7.27%*	*0.10%*	*3.58%*	*19.08%*	*6.38%*
P-value on difference	*0.1567*	*0.3502*	*0.7617*	*0.3685*	*0.9877*	*0.1085*	*0.7351*	*0.1641*	*0.6726*	*0.8136*	*0.1599*

Notes: Data from the Natality Files are aggregated to the state, year, and race level, for states and years as listed in Appendix A. Regressions exclude individuals below age 25. The unemployment rate is calculated at the state-year level and matched to the Natality Files by the year of conception of the baby. Regressions include state and year fixed effects. They are weighted by the number of births in the state. Robust standard errors in parentheses. For the difference between black and white, the p-value is for the unemployment-race interaction.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Effect of Unemployment in California, 1990-2000. Mothers with at least 2 Births

Dependent variable	(1) born below 2500 grams	(2) born below 1500 grams	(3) Average no. of prenatal care visits	(4) < than 5 prenatal care visits	(5) prenatal care in first trimester
Panel A: cross section					
White mothers (N=840,656)					
unemployment rate	0.0011*	-5.33e-07	0.0286***	0.00022	0.0013
	(0.00058)	(0.00024)	(0.0096)	(0.00039)	(0.00084)
Add county specific trend					
unemployment rate	0.002***	1.6e-04	0.034***	-7.7e-04	0.001
	(7.2e-04)	(2.9e-04)	(0.012)	(5.1e-04)	(0.001)
Black mothers (N=155,207)					
unemployment rate	-0.0034	-0.0015	0.0532*	-0.0016	0.0036
	(0.0022)	(0.0011)	(0.0296)	(0.0017)	(0.0028)
Add county specific trend					
unemployment rate	-0.004	-0.002**	0.033	-0.005***	0.006
	(0.003)	(0.001)	(0.038)	(0.002)	(0.004)
Panel B: Mother Fixed Effects					
White mothers					
unemployment rate	0.00054	-0.00033	0.0328***	-0.00016	0.0016
	(0.00063)	(0.00027)	(0.0114)	(0.00051)	(0.0010)
Add county specific trend[(a)]					
unemployment rate	0.001	-1.9e-04	0.022	-0.002***	0.002**
	(8.3e-04)	(3.5e-04)	(0.015)	(6.7e-04)	(0.001)
Black mothers					
unemployment rate	-0.00022	0.00047	0.0112	-5.64e-06	0.0024
	(0.0025)	(0.0013)	(0.0355)	(0.0022)	(0.0035)
Add county specific trend					
unemployment rate	4.5e-04	8.1e-04	-0.009	-0.003	0.003
	(0.003)	(0.002)	(0.043)	(0.003)	(0.004)

Notes: Robust standard errors are in parentheses. Individual level data from the California Birth Certificate Files from 1990 to 2000. The unemployment rate is calculated at the county-year level and matched by year of conception of the baby. Regressions include county and year fixed effects, and state-specific trends where specified.

(a) These results with both mother fixed effects and county specific trends are based on a 80% random sample of mothers with multiple births because of computational constraints. This is true only for the sample of white moms.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Selection in Pregnancy, BRFSS Data

Dependent variable: pregnant at time of interview	White	White	Black	Black
Unemployment rate	0.00350**	0.01148***	-0.00088	-0.00256
	(0.00169)	(0.00374)	(0.00550)	(0.00979)
Unemployment rate*high school		-0.00383		0.00189
		(0.00314)		(0.00668)
Unemployment rate*some college		-0.00571*		0.00053
		(0.00315)		(0.00642)
Unemployment rate*college or more		-0.00743**		0.00328
		(0.00315)		(0.00693)
Unemployment rate*married		-0.01201***		-0.00363
		(0.00131)		(0.00419)
Unemployment rate*(age 25 to 35)		0.00535***		0.00326
		(0.00193)		(0.00557)
Unemployment rate*(ages>35)		0.00552***		0.00140
		(0.00175)		(0.00546)
Married=1		0.10613***		0.04232
		(0.00804)		(0.02630)
Age between 25 and 35		-0.04266***		-0.06422*
		(0.01183)		(0.03590)
Age 35 and above		-0.09693***		-0.09031**
		(0.01091)		(0.03542)
high school graduate=1		0.05869***		0.00861
		(0.01920)		(0.03032)
some college=1		0.06726***		0.00312
		(0.01926)		(0.02777)
College or more=1		0.09038***		0.00000
		(0.01935)		(0.00000)
Constant		-0.09952***		0.09429
		(0.02806)		(0.06374)
State, year dummies	yes	yes	yes	yes
State-specific trend	yes	yes	yes	yes
Observations	448876	448073	61753	61539
R-squared	0.00	0.02	0.01	0.03

Notes: The excluded education category is high school dropout, the excluded age category is 18-25. Regressions use survey weights, and include state and year fixed effects, and state-specific trends. Robust standard errors are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8: Smoking and Drinking Behavior by Race and Education, BRFSS Data

Dependent variable	(1) Smokes currently	(2) Smokes currently	(3) average number of cigarettes per day	(4) average number of cigarettes per day	(5) =1 if drank in last month	(6) =1 if drank in last month	(7) number of drinks in last month	(8) number of drinks in last month
	women age 15 to 45	pregnant women	women age 15 to 45	pregnant women	women age 15 to 45	Pregnant women	women age 15 to 45	pregnant women
full sample:								
unemployment rate	0.00345	0.00235	-0.01667	0.28278	0.00579	0.00050	0.93713	-2.19055**
	(0.00320)	(0.01325)	(0.15944)	(0.79820)	(0.00422)	(0.01450)	(0.67284)	(1.01183)
white sample:								
unemployment rate	0.00401	0.00509	-0.01405	0.04191	0.00584	0.01596	1.05925	-2.35448**
	(0.00343)	(0.01411)	(0.17098)	(0.89723)	(0.00450)	(0.01491)	(0.72662)	(1.16862)
black sample:								
unemployment rate	0.00096	-0.03964	0.11121	-0.54311	0.00408	-0.07921*	-0.52888	-2.75099*
	(0.00846)	(0.02993)	(0.39180)	(1.28825)	(0.01164)	(0.04090)	(1.06893)	(1.61830)
State, year dummies	yes	yes	yes	yes	yes	Yes	yes	yes
State-specific trend	yes	yes	yes	yes	yes	Yes	yes	yes
Observations	510503	21535	78080	1903	356836	15175	262534	6437
R-squared	0.01	0.02	0.04	0.20	0.05	0.05	0.01	0.15

Notes: Regressions use survey weights, and include state and year fixed effects and state-specific trends. Robust standard errors are in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 9a: The effect of unemployment on infant health outcomes. Country level panel 1980-1999, including all countries

Dependent variable	(2) Birth rate (per 1,000 people)	(4) Infant mortality rate (per 1,000 live births)	(6) Infant mortality rate (per 1,000 live births)	(8) Death rate (per 1,000 people)
A-No weights				
Lagged unemployment	-0.070***	-0.160***	-0.097***	-0.009
Mean 8.41, s.d. 5.78	(0.018)	(0.040)	(0.037)	(0.007)
Birth rate, crude (per 1,000 people)			0.892*** (0.072)	
Observations	875	875	875	875
R squared	0.97	0.97	0.98	0.97
B-Population used as weights				
Lagged unemployment	-0.074***	-0.233***	-0.131**	-0.018
	(0.023)	(0.060)	(0.051)	(0.011)
Birth rate, crude (per 1,000 people)			1.380*** (0.080)	
Observations	875	875	875	875
R squared	0.98	0.98	0.99	0.95

Notes: Robust standard errors are in parentheses. Regressions include country and year fixed effects.
Data: World Development Indicators (WDI) collected by the World Bank, available online at: http://www.worldbank.org.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 9b: The effect of unemployment on infant health outcomes. Country level panel 1980-1999, by level of development

Dependent variable	(2) Birth rate (per 1,000 people)	(4) Infant mortality rate (per 1,000 live births)	(6) Infant mortality rate (per 1,000 live births)	(8) Death rate (per 1,000 people)
Developed countries[a]				
Lagged unemployment	-0.130***	-0.098***	-0.087***	-0.003
	(0.021)	(0.024)	(0.025)	(0.012)
Birth rate, crude (per 1,000 people)			0.085	
			(0.059)	
Observations	401	401	401	401
R squared	0.94	0.93	0.93	0.94
Developing countries[b]				
Lagged unemployment	-0.058*	-0.331***	-0.211**	-0.013
	(0.033)	(0.112)	(0.090)	(0.019)
Birth rate, crude (per 1,000 people)			2.070***	
			(0.141)	
Observations	474	474	474	474
R squared	0.98	0.97	0.98	0.95

Notes: (a) Developed countries include Australia, Austria, Belgium, Canada, Denmark, France, Finland, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States; (b) Developing countries include Albania, Algeria, Argentina, Azerbaijan, Bahamas, Bangladesh, Barbados, Belarus, Belize, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Estonia, Fiji, Guam, Honduras, Hong Kong, Hungary, Israel, Jamaica, Kazakhstan, Korea, Rep.Latvia, Lithuania, Macao, Macedonia, Malaysia, Malta, Mexico, Moldova, Morocco, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Puerto Rico, Romania, Russian Federation, Seychelles, Singapore, Slovak Republic, Slovenia, South Africa, Sri Lanka, St. Lucia, Suriname, Tajikistan, Thailand, Trinidad and Tobago, Turkey, Uganda, Ukraine, Uruguay, Uzbekistan, Venezuela, Virgin Islands, West Bank and Gaza, Zambia, and Zimbabwe. Robust standard errors are in parentheses. Regressions include country and year fixed effects and are weighted using population as weights. Data: World Development Indicators (WDI) collected by the World Bank, available online at: http://www.worldbank.org. * significant at 10%; ** significant at 5%; *** significant at 1%

Appendix A: Natality Files

State	*Year started 100% reporting*	*Educational attainment of parents*	*Date last normal menstrual period began*	*Prenatal care information*	*Legitimacy status. Marital status*	*5-minute Apgar score*	*Drinking while pregnant*	*Smoking while pregnant*
Alabama	1976	1976-	1976-	1976-	1975-	1978-	1989-	1989-
Alaska	1977	1975-	1975-	1978-	1975-	1978-	1989-	1989-
Arizona	1985	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Arkansas	1980	1978-	1978-	1978-	1975-	1978-	1989-	1989-
California	1985	1978, 1989-	1975-	1975-	1989-	only 1978	Never	Never
Colorado	1973	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Connecticut	1979	1975-	1982-	1975-	1989-	1982-	1989-	1989-
Delaware	1985	1975-	1975-	1975-	1975-	1989-	1989-	1989-
DC	1985	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Florida	1972	1975-	1975-	1975-	1975-	1979-	1989-	1989-
Georgia	1985	1975-	1975-	1975-	1980-	1980-	1989-	1989-
Hawaii	1979	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Idaho	1977	1978-	1978-	1978-	1978-	1978-	1989-	1989-
Illinois	1974	1975-	1975-	1975-	1975-	1979-	1989-	1989-
Indiana	1978	1975-	1975-	1975-	1975-	1978-	1989-	1999-
Iowa	1974	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Kansas	1974	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Kentucky	1976	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Louisiana	1975	1975-	1975-	1975-	1975-	1982-	1990-	1990-
Maine	1972	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Maryland	1975	1975-	1975-	1975-	1989-	1979-	1989-	1989-
Massachusetts	1977	1975-	1976-	1976-	1978-	1978-	1989-	1989-
Michigan	1973	1975-	1975-	1975-	1975-1977, 1989-	1978-	1989-	1989-
Minnesota	1976	1975-	1975-	1975-	1975-	1982-	1989-	1989-
Mississippi	1979	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Missouri	1972	1975-	1975-	1975-	1975-	1978-	1989-	1989-

Appendix A continued

State	*Year started 100% reporting*	*Educational attainment of parents**	*Date last normal menstrual period began*	*Prenatal care information*	*Legitimacy status--Marital status*	*5-minute Apgar score*	*Drinking while pregnant*	*Smoking while pregnant*
Montana	1974	1975-	1975-	1975-	1988-	1978-	1989-	1989-
Nebraska	1974	1975-	1975-	1975-	1975-	1978-	1990-	1990-
Nevada	1976	1975-	1975-	1975-	1989-	1978-	1989-	1989-
New Hampshire	1972	1975-	1975-	1975-	1975-	1978-	1989-	1989-
New Jersey	1979	1975-	1975-	1975-	1975-	1978-	1989-	1989-
New Mexico	1985	1980-	1985-	1980-	1980-	1980-	1989-	1989-
New York	1973	1975-	1975-	1975-	1989-	1978-	1995-	1995-
North Carolina	1975	1975-	1975-	1975-	1975-	1978-	1989-	1989-
North Dakota	1985	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Ohio	1977	1975-	1975-	1975-	1989-	1978-	1989-	1989-
Oklahoma	1975	1975-	1975-	1975-	1975-	1991-	1991-	1991-
Oregon	1974	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Pennsylvania	1979	1976-	1978-	1978-	1975-	1978-	1989-	1989-
Rhode Island	1972	1975-	1975-	1975-	1975-	1978-	1989-	1989-
South Carolina	1974	1975-	1975-	1975-	1975-	1978-	1989-	1989-
South Dakota	1980	1975-	1975-	1975-	1975-	1978-	Never	Never
Tennessee	1975	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Texas	1976	1989-	1980-	1975-	1975-1976, 1989-	Never	1989-	1989-
Utah	1978	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Vermont	1972	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Virginia	1975	1975-	1978-	1978-	1975-	1978-	1989-	1989-
Washington	1978	1992-	1975-	1975-	1975-	1980-	1989-	1989-
West Virginia	1976	1975-	1975-	1975-	1975-	1978-	1989-	1989-
Wisconsin	1975	1975-	1978-	1975-	1975-	1978-	1989-	1989-
Wyoming	1979	1975-	1975-	1975-	1975-	1978-	1989-	1989-

Appendix A continued: Further notes on Natality Files

Marital status

By 1979 39 states were reporting marital status. From 1975 to 1977, states asked whether birth was legitimate. Starting in 1978 marital status was asked directly on the birth certificate in most states, except for 12 states. Georgia, Idaho, Massachusetts, Maryland, Montana, New Mexico and Ohio started asking marital status in later years (see table above). There are 5 states that report marital status but did not ask the question on the birth certificate directly. Rather they infer it using different procedures. California started inferring marital status in 1989 by comparing parents and children's surnames. Direct marital status question was asked only starting in 1997. Connecticut has inferred marital status since 1989. Michigan reported illegitimacy from 1975-1977, did not report marital status until 1989, and starting inferring, marital status in 1989. It is known that the number of births to unmarried women was underreported by as much as 25% from 1989-93. In Nevada, marital status is asked only through electronic registration but not on paper copies. In 1995 and 1996 data were misreported due to computer processing errors. New York started inferring marital status in 1989 and still does, although method of inference changed in 1997. Texas reported illegitimacy in 1975-76, started inferring marital status in 1989, and started asking marital status directly starting in 1994. Births to unmarried women are known to have been underreported in the 1989-1993 period.

Father's education

Fathers' education was reported only by some states in some years as reported in the table above. Also, starting in 1991, it was reported only in categories rather than in single years as was the case prior to 1991.

Congenital Malformations

Were reported in the Natality Files from 1981 through 1989, and then again from 1994 through 1999. New Mexico never reported this item. We coded only whether there were any congenital malformations. In later years only, there is more information on the type of congenital malformation.

Appendix B: Summary Statistics for BRFSS data

Sample	All		White		Black	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
All women ages 18-45						
Pregnant	0.042	0.20	0.042	0.20	0.040	0.20
Smokes currently	0.26	0.44	0.27	0.44	0.21	0.41
Number if cigarettes	16.6	9.34	17.1	9.36	12.3	8.02
Drink in the last month	0.60	0.49	0.62	0.49	0.50	0.50
Number of drinks	10.6	53.5	10.9	53.7	8.52	51.6
Number of servings of fruits and vegetables per day	3.83	2.16	3.85	2.13	3.65	2.33
Had regular doctor check up less than one year ago	0.58	0.49	0.57	0.50	0.67	0.47
Number of days physical health was not good in the last month	2.47	5.93	2.48	5.93	2.38	5.93
Number of days mental health was not good in the last month	4.09	7.71	4.10	7.68	4.02	7.94
N	516903		453283		63620	
Pregnant women only						
Smokes currently	0.14	0.35	0.14	0.35	0.12	0.33
Number if cigarettes	13.9	8.65	14.2	8.62	10.9	8.34
Drink in the last month	0.28	0.45	0.28	0.45	0.30	0.46
Number of drinks	3.30	11.4	3.23	11.3	3.85	11.5
Number of servings of fruits and vegetables per day	4.38	2.34	4.41	2.27	4.19	2.80
Had regular doctor check up less than one year ago	0.68	0.46	0.68	0.47	0.74	0.44
Number of days physical health was not good in the last month	2.54	6.17	2.53	6.11	2.68	6.62
Number of days mental health was not good in the last month	2.88	6.50	2.78	6.30	3.70	7.80
N	21818		19257		2561	

Appendix C: Country level data—World Bank Development Indicators

Variable	Obs	Mean	Std. Dev.	Min	Max
All countries					
Year	971	1990.52	5.60	1980	1999
Birth rate, crude (per 1,000 people)	971	17.44	7.86	7.5	50.2
Death rate, crude (per 1,000 people)	971	8.51	2.62	3.1	19.8
Infant mortality (per 1,000 live births)	971	18.01	19.17	2.4	119
Total population	971	3.76e+07	1.21e+08	65780	1.23e+09
Unemployment rate(% of total labor force)	971	8.43	5.71	0.1	42.2
Number of years in panel	971	14.13	5.93	2	20
Developed =1(*)	971	0.44	0.50	0	1
Developed countries					
Year	424	1989.65	5.70	1980	1999
Birth rate, crude (per 1,000 people)	424	12.84	2.19	9	21
Death rate, crude (per 1,000 people)	424	9.31	1.50	6	12.3
Infant mortality (per 1,000 live births)	424	7.69	2.93	2.4	24.3
Total population	424	3.49e+07	5.66e+07	228000	2.79e+08
Unemployment rate (% of total labor force)	424	7.47	4.43	0.2	23.9
Number of years in panel	424	18.88	2.18	9	20
Developing countries					
Year	547	1991.20	5.43	1980	1999
Birth rate, crude (per 1,000 people)	547	21.00	8.77	7.5	50.2
Death rate, crude (per 1,000 people)	547	7.90	3.09	3.1	19.8
Infant mortality (per 1,000 live births)	547	26.01	22.34	3.1	119
Total population	547	3.97e+07	1.53e+08	65780	1.23e+09
Unemployment rate (% of total labor force)	547	9.18	6.43	0.1	42.2
Number of years in panel	547	10.45	5.26	2	20

(*) developed countries include Australia, Austria, Belgium, Canada, Denmark, France, Finland, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States. Developing countries include Albania, Algeria, Argentina, Azerbaijan, Bahamas, Bangladesh, Barbados, Belarus, Belize, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Estonia, Fiji, Guam, Honduras, Hong Kong, Hungary, Israel, Jamaica, Kazakhstan, Korea, Rep.Latvia, Lithuania, Macao, Macedonia, Malaysia, Malta, Mexico, Moldova, Morocco, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Puerto Rico, Romania, Russian Federation, Seychelles, Singapore, Slovak Republic, Slovenia, South Africa, Sri Lanka, St. Lucia, Suriname, Tajikistan, Thailand, Trinidad and Tobago, Turkey, Uganda, Ukraine, Uruguay, Uzbekistan, Venezuela, Virgin Islands, West Bank and Gaza, Zambia, Zimbabwe.

Appendix D: Specification Checks

(1) % born below 2500 grams	(2) % born below 1500 grams	(3) % with Apgar score 5 and below	(4) % moms less high school	(5) % moms with high school	(6) % moms less high school plus	(7) % moms college or more	(8) Mother's age less than 25	(9) Mother's age between 25 and 35	(10) Mother's age between 25 and 35	(11) Average father's education	(12) Average no. of prenatal care visits	(13) % < than 5 prenatal care visits	(14) % prenatal care in first trimester	(15) Smoked during pregnancy	(16) Drank during pregnancy	(17) Congenital defects
Effect of unemployment: IV Results, using lagged unemployment																
Whites																
-0.00026**	-0.00012***	0.00003	-0.00031	0.00357	-0.00176	-0.00150	-0.00050	0.00061	-0.00011	0.01472	0.36051***	-0.02558***	0.00249*	-0.00119*	-0.00350***	0.00028***
(0.00013)	(0.00003)	(0.00003)	(0.00385)	(0.00585)	(0.00438)	(0.00468)	(0.00650)	(0.00678)	(0.00198)	(0.02073)	(0.04074)	(0.00270)	(0.00132)	(0.00070)	(0.00052)	(0.00006)
Black																
-0.00103***	-0.00033***	-0.00038	-0.00357	0.00169	0.00088	0.00101	-0.00393	0.00220	0.00173	0.03148***	0.26256***	-0.01659***	0.00636***	-0.00156***	-0.00187***	-0.00047***
(0.00029)	(0.00008)	(0.00023)	(0.00515)	(0.00606)	(0.00382)	(0.00203)	(0.00583)	(0.00567)	(0.00130)	(0.01218)	(0.03113)	(0.00157)	(0.00136)	(0.00045)	(0.00019)	(0.00010)
Effect of Employment to population ratio																
White																
0.03308***	0.00808***	-0.00870**	0.07709	-0.35129	0.11737	0.15682	-0.05831	0.08040	-0.02209	-0.09306	-38.4917***	3.15266***	-0.07725	-0.00229	-0.02551*	-0.0273***
(0.00808)	(0.00195)	(0.00366)	(0.23226)	(0.34263)	(0.26789)	(0.28956)	(0.40993)	(0.43210)	(0.14312)	(1.57919)	(3.24080)	(0.24509)	(0.08328)	(0.01714)	(0.01302)	(0.00364)
Black																
0.06880***	0.01940***	0.01155*	0.17470	0.01845	-0.12077	-0.07239	0.29133	-0.13041	-0.16092*	-2.56939***	-35.02***	1.95801***	-0.2896***	0.01088	0.02782***	0.01028
(0.02019)	(0.00595)	(0.00666)	(0.33337)	(0.40310)	(0.26130)	(0.14222)	(0.40290)	(0.39090)	(0.09440)	(0.92006)	(2.84984)	(0.15382)	(0.08934)	(0.01771)	(0.00783)	(0.00738)
Effect of Unemployment With time-varying controls																
White																
-0.00012	0.00001	0.00007***	0.00067	0.00102	-0.00202	0.00033	-0.00174	0.00090	0.00084	0.01181	0.39727***	-0.0236***	-0.00028	0.00263***	0.00054	0.00037***
(0.00011)	(0.00003)	(0.00002)	(0.00299)	(0.00484)	(0.00361)	(0.00391)	(0.00562)	(0.00586)	(0.00168)	(0.01774)	(0.05981)	(0.00230)	(0.00110)	(0.00041)	(0.00038)	(0.00006)
Black																
-0.00054**	-0.00007	-0.00014	-0.00244	0.00069	0.00082	0.00093	-0.00427	0.00303	0.00125	0.02204**	0.30126***	-0.0140***	0.00347***	-0.00031	-0.00089***	0.00014
(0.00024)	(0.00007)	(0.00015)	(0.00420)	(0.00495)	(0.00312)	(0.00168)	(0.00491)	(0.00477)	(0.00108)	(0.00983)	(0.04227)	(0.00136)	(0.00112)	(0.00027)	(0.00010)	(0.00011)
Effect of monthly unemployment rate																
White																
-0.00010***	-0.00004***	0.00004	0.00507***	0.00168***	-0.00386***	-0.00289***	-0.00013	-0.00007	0.00020	-0.01889***	0.26613***	-0.02143***	0.00070**	-0.00194	0.00069	0.00014***
(0.00004)	(0.00001)	(0.00014)	(0.00052)	(0.00042)	(0.00035)	(0.00056)	(0.00219)	(0.00230)	(0.00074)	(0.00469)	(0.01661)	(0.00091)	(0.00032)	0.0021)	(0.00097)	(0.00004)
Black																
-0.00067***	-0.00017***	0.00031	-0.00148***	0.00126*	-0.00003	0.00025	-0.00400*	0.00261	0.00139**	0.01499***	0.20366***	-0.01381***	0.00454***	-0.00140	-0.00087	-0.00035***
(0.00010)	(0.00004)	(0.00036)	(0.00057)	(0.00069)	(0.00059)	(0.00051)	(0.00243)	(0.00241)	(0.00061)	(0.00378)	(0.01324)	(0.00058)	(0.00038)	(0.00140)	(0.00056)	(0.00007)

Notes: Data from the Natality Files are aggregated to the state, year, and race level, for states and years as listed in Appendix A. The unemployment rate is calculated at the state-year level and matched to the Natality Files by the year of conception of the baby. Regressions include state and year fixed effects and state-specific trends. They are weighted by the number of births in the state. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Appendix E: Effect of Unemployment on Mother Characteristics and behaviors by Race and Education, 1976-1998, including state specific trends

Dependent variable	(1) % born below 2500 grams	(2) % born below 1500 grams	(3) % with Apgar score 5 and below	Mother's age greater than 35	(5) Average father's education	(6) % married	(7) Average no. of prenatal care visits	(8) % < than 5 prenatal care visits	(9) % prenatal care in first trimester	(10) Smoked during pregnancy	(11) Drank during pregnancy	Congenital deffects
White: high school dropout												
unemployment	-0.00075***	-0.00008	0.00007	-0.00147***	0.01878***	0.00040	0.00584	-0.00271***	0.00525***	0.00057	-0.00023	-0.00014
rate	(0.00022)	(0.00008)	(0.00011)	(0.00031)	(0.00631)	(0.00049)	(0.06019)	(0.00055)	(0.00076)	(0.00066)	(0.00057)	(0.00025)
White: high school graduate												
unemployment	-0.00009	-0.00008	0.00001	-0.00036**	0.00429***	-0.00005	-0.05764	0.00058	0.00233***	-0.00003	-0.00010	0.00018
rate	(0.00010)	(0.00007)	(0.00005)	(0.00015)	(0.00108)	(0.00015)	(0.06723)	(0.00039)	(0.00041)	(0.00072)	(0.00064)	(0.00017)
White: high school plus												
unemployment	-0.00002	-0.00006	0.00010*	0.00057***	0.00513***	0.00009	-0.04091	0.00082**	0.00197***	-0.00007	-0.00011	0.00027
rate	(0.00011)	(0.00006)	(0.00005)	(0.00016)	(0.00115)	(0.00012)	(0.05269)	(0.00034)	(0.00028)	(0.00077)	(0.00078)	(0.00018)
White: college or more												
unemployment	0.00002	-0.00006	0.00007	-0.00017	0.00484***	0.00013**	-0.03748	0.00123***	0.00125***	-0.00041	-0.00029	0.00029*
rate	(0.00010)	(0.00005)	(0.00005)	(0.00022)	(0.00109)	(0.00006)	(0.05040)	(0.00038)	(0.00024)	(0.00087)	(0.00086)	(0.00017)
Black: high school dropout												
unemployment	-0.00075	-0.00036*	-0.00067	-0.00033	0.05080***	0.00552***	0.11189**	-0.00641***	0.00903***	0.00033	-0.00075	-0.00087
rate	(0.00049)	(0.00019)	(0.00094)	(0.00043)	(0.01377)	(0.00106)	(0.05437)	(0.00132)	(0.00118)	(0.00077)	(0.00047)	(0.00057)
Black: high school graduate												
unemployment	-0.00105***	-0.00019	-0.00009	0.00004	0.00608	0.00219***	0.02931	-0.00252**	0.00563***	0.00034	-0.00061	-0.00032
rate	(0.00031)	(0.00013)	(0.00031)	(0.00029)	(0.00542)	(0.00065)	(0.06266)	(0.00107)	(0.00082)	(0.00073)	(0.00042)	(0.00033)
Black: high school plus												
unemployment	-0.00066**	-0.00026	0.00001	0.00074**	0.01414**	-0.00076	0.04584	-0.00043	0.00344***	0.00043	-0.00053	-0.00062*
rate	(0.00034)	(0.00017)	(0.00018)	(0.00034)	(0.00653)	(0.00075)	(0.05117)	(0.00093)	(0.00062)	(0.00070)	(0.00041)	(0.00035)
Black: college or more												
unemployment	0.00083**	0.00000	0.00047**	0.00092*	0.01631***	0.00046	0.06273	0.00220**	0.00115*	-0.00014	-0.00073*	0.00043
rate	(0.00035)	(0.00019)	(0.00021)	(0.00053)	(0.00418)	(0.00060)	(0.05609)	(0.00098)	(0.00066)	(0.00077)	(0.00041)	(0.00033)

Notes: Data from the Natality Files are aggregated to the state, year, and race level, for states and years as listed in Appendix A. The unemployment rate is calculated at the state-year level and matched to the Natality Files by the year of conception of the baby. Regressions include state and year fixed effects and state-specific trends. They are weighted by the number of births in the state. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Appendix F: Effect of Unemployment on Birth Weight and Prenatal Care, California, 1990-2000

Dependent variable	(1) born below 2500 grams	(2) born below 1500 grams	(3) Average no. of prenatal care visits	(4) < than 5 prenatal care visits	(5) prenatal care in first trimester
Panel A: All mothers					
Means and SD	0.063	0.012	12.267	0.029	0.859
Full sample (N=2,009,381)	(0.243)	(0.107)	(4.11)	(0.167)	(0.348)
White mothers (N=1,691,971)					
Unemployment rate	0.00041	0.00004	0.0348***	-0.00005	0.0025***
	(0.00037)	(0.00016)	(0.0066)	(0.00027)	(0.00060)
Add county specific trend					
Unemployment rate	-0.00095**	0.00018	0.025***	-0.00063*	0.002***
	(4.7e-04)	(1.9e-04)	(0.008)	(3.6e-04)	(7.6e-04)
Black mothers (N=317,410)					
Unemployment rate	-0.0020	-0.00076	0.0369*	-0.00045	0.00069
	(0.0014)	(0.00071)	(0.0202)	(0.0011)	(0.0019)
Add county specific trend					
Unemployment rate	-0.00095	-0.000084	-0.004	-0.002**	0.001
	(0.002)	(9.0e-04)	(0.026)	(0.001)	(0.002)
Panel B: mothers with at least 2 births in California					
Means and SD	0.072	0.013	12.289	0.030	0.864
Full sample (N=995,863)	(0.258)	(0.014)	(4.171)	(0.170)	(0.342)
NO FIXED EFFECTS					
White mothers (N=840,656)					
unemployment rate	0.0011*	-5.33e-07	0.0286***	0.00022	0.0013
	(0.00058)	(0.00024)	(0.0096)	(0.00039)	(0.00084)
Add county specific trend					
unemployment rate	0.002***	1.6e-04	0.034***	-7.7e-04	0.001
	(7.2e-04)	(2.9e-04)	(0.012)	(5.1e-04)	(0.001)
Black mothers (N=155,207)					
unemployment rate	-0.0034	-0.0015	0.0532*	-0.0016	0.0036
	(0.0022)	(0.0011)	(0.0296)	(0.0017)	(0.0028)
Add county specific trend					
unemployment rate	-0.004	-0.002**	0.033	-0.005***	0.006
	(0.003)	(0.001)	(0.038)	(0.002)	(0.004)

Notes: Robust standard errors are in parentheses. Individual level data from the California Birth Certificate Files from 1990 to 2000. The unemployment rate is calculated at the county-year level and matched by year of conception of the baby. Regressions include county and year fixed effects, and state-specific trends where specified. * significant at 10%; ** significant at 5%; *** significant at 1%