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Community-Wide Job Loss and Teenage Fertility: Evidence From North Carolina

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Abstract Using North Carolina data for the period 1990–2010, we estimate the effects of economic downturns on the birthrates of 15- to 19-year-olds, using county-level business closings and layoffs as a plausibly exogenous source of variation in the strength of the local economy. We find little effect of job losses on the white teen birthrate. For black teens, however, job losses to 1 % of the working-age population decrease the birthrate by around 2 %. Birth declines start five months after the job loss and then last for more than one year. Linking the timing of job losses and conceptions suggests that black teen births decline because of increased terminations and perhaps also because of changes in prepregnancy behaviors. National data on risk behaviors also provide evidence that black teens reduce sexual activity and increase contraception use in response to job losses. Job losses seven to nine months after conception do not affect teen birthrates, indicating that teens do not anticipate job losses and lending confidence that job losses are "shocks" that can be viewed as quasi-experimental variation. We also find evidence that relatively advantaged black teens disproportionately abort after job losses, implying that the average child born to a black teen in the wake of job loss is relatively more disadvantaged.

Keywords Teen births · Economic downturns · Fertility · Job loss

Introduction

In the United States, overall fertility falls during economic downturns (Bongaarts and Feeney 1998; Fishback et al. 2007; Rindfuss et al. 1988). These aggregate declines, however, mask heterogeneous responses across demographic groups. Different racial, marital status, and education groups diverge in their fertility responses to weakened

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economic circumstances, in both magnitude and direction (Dehejia and Lleras-Muney 2004; Schaller 2012). The response of teen fertility to downturns is even less clear. Little research has focused on teen fertility, and the scant research that does exist provides inconclusive evidence (Arkes and Klerman 2009; Levine 2002). Contradictory findings may be due to the endogeneity and imprecision of the economic measures used, combined with the low base rate of teen (compared with adult) childbearing (Martin et al. 2012).

Although teen fertility accounts for a relatively small share of U.S. births, it is nevertheless of independent demographic and policy interest. Teen childbearing is believed to be influenced by a different set of decisions than is adult fertility (Levine 2001). Many teens are deciding whether to initiate sexual activity, or whether to initiate sex within the context of their current relationship (Abma et al. 2010), whereas adults are typically sexually active. As a result, teens have three behavioral margins through which to react to economic news (sexual activity, contraception, and abortion), while the vast majority of adults have only two (contraception and abortion). In this article, we provide evidence on all three potential ways in which teens may respond to downturns.

Teens also have different primary activities as alternatives to paid employment. Many teens view education as the main alternative to work, but many adult women view childbearing as the main alternative. Within Becker's (Becker 1960; Becker and Tomes 1976) canonical framework on fertility, this difference means that although the income effects of downturns (that is, reduced economic support from family members for new mothers and their babies) may be similar between teens and adults (Caldwell and Antonucci 1997), substitution effects (moving toward childbearing when pushed by market forces away from paid employment) may be substantially weaker for teens. Indeed, research on teens' educational investments suggests that the high school dropout rate declines (Black et al. 2005) and college attendance increases (Betts and McFarland 1995) in response to downturns. Moreover, because teens have longer time horizons for future childbearing, postponing fertility in response to income shocks may be less costly for teens than for adults. In the Becker framework, then, reduced family resources put downward pressure on both teen and adult fertility, but teens may be more likely than adults to substitute toward education rather than childbearing when the labor market is weak. Thus, the net response of teen fertility to downturns is predicted to be more strongly negative than the adult response.

There are, however, reasons why teen fertility might increase in response to downturns. A weak economy increases stress and anxiety (Catalano et al. 2011) and depresses expectations and aspirations about the future (Guiliano and Spilimbergo 2009). These types of changes have been linked to increased teen sexual activity (Buhi and Goodson 2007; Carpenter 2005; Kirby 2001a; Vesely et al. 2004). Moreover, Kearney and Levine (2012) argued that U.S. teens exhibit higher fertility when they face greater "despair" about the prospects of advancing economically.

Finally, changes in teen and adult fertility have different policy implications. Neither pronatalist nor antinatalist policies are popular in the United States, suggesting that policymakers do not have strong opinions about the current overall fertility rate. By contrast, the U.S. teen fertility rate is the highest in the developed world (Kearney and Levine 2012), and policymakers of all political persuasions generally agree that teen fertility should be reduced. Although recent research argues that teen fertility is a symptom rather than a cause of disadvantage (Kearney and

Levine 2012), disagreement on this point remains, and concerns about the impact of having a teen mother on child outcomes persist (National Campaign to Prevent Teen and Unplanned Pregnancy 2011).

This study aims to shed light on the relationship between downturns and teen childbearing. The colloquial term "downturn," however, lacks a precise economic definition. National recessions are denoted by negative growth in gross domestic product, but a "bad economy" on a smaller scale generally refers to weak demand in the local labor market. However, most easily available (and therefore most commonly used) measures of labor market conditions—including local unemployment rates, the employment-to-population ratio, or total area income—are influenced by changes in labor supply as well as labor demand. A negative correlation between changes in the employment-to-population ratio and changes in area fertility, for example, may reflect an impulse to increase childbearing that leads to lower labor force attachment among women instead of a decline in labor market conditions that drives residents to consider parenthood as an alternative to work.

To avoid these concerns, we instead use a measure of sudden increases in forced separations from employment to capture change in local economic conditions. We measure monthly county-level business closings and layoffs, which, as shown in previous studies (Jacobson et al. 1993; Stevens 1997) and confirmed in our own tests (Ananat et al. 2011, 2013), typically occur because of changes in local circumstances that are unrelated to changes in the characteristics of the workers (e.g., increased pressure from globalization). Such job losses are considered exogenous "shocks" to the workers and allow us to estimate the causal effect of local downturns on fertility rates.

We constructed a dataset of county-level monthly business layoffs and closings for North Carolina from 1990 to 2010, and combined these data with vital statistics records of births among women aged 15–19 over the same period. We use the timing of job loss relative to gestation, which is included in the birth record, to estimate whether variation in the fertility rate is driven by changes in abortion or preconception behaviors. We infer that changes in the birthrate arising from job losses that occur zero to four months postconception reflect changes in abortion behavior (given that these pregnancies already existed when the job loss occurred). We infer that changes in the birthrate arising from job losses that occur one to nine months before conception reflect the net effect of changes in contraceptive practice and sexual activity as well as decisions about abortion made after conception. We also conduct falsification tests in which we measure the effect of job loss seven to nine months after conception on births, because teens cannot alter their fertility decisions so close to giving birth. Significant results in these tests would suggest either that job losses do not come as a surprise or that some other community change simultaneously leads both to job losses and to changes in teen fertility. We also use data from national surveys to provide additional evidence on sexual activity and contraceptive practices.

We examine outcomes separately for white and black teens.[1] Although both white and black communities experience and are affected by job loss (Ananat et al. 2013), black teen fertility may respond differently to local job losses than white teen fertility

[1] In the early years of the sample, the Latino population in North Carolina was too small to provide stable county-level measures of teen birthrates. Throughout the article, the terms "white" and "black" are used to refer to non-Hispanic members of those racial groups.

does, for two reasons. First, underlying patterns of teen reproductive behavior vary by race. In 2008, the birthrate in the United States was 26.7 per 1,000 for white teens and 62.8 per 1,000 for black teens (Martin et al. 2010). In North Carolina, teen birthrates were 32.8 for whites and 64.4 for blacks (authors' calculation). White teens also use contraception less consistently than blacks, but blacks have higher pregnancy rates and are disproportionately more likely to have an abortion (Jones et al. 2010; Martinez and Copen 2010). This apparent contradiction in contraception use and pregnancy rates could be due to differences in sexual activity between black and white teens. These different underlying patterns may also change in divergent ways in response to community-wide job losses. Second, black teenagers may feel the economic effects of job loss more immediately than whites. Black families may be more likely to directly experience job loss than white families (Kletzer 1998). Given that black teenagers are more likely to live in households with lower incomes and fewer assets (Darity and Nicholson 2005), their families may also be less able to buffer the economic consequences of job loss. Among those not experiencing individual or family job loss firsthand, black teenagers may also be more worried than whites about their future job prospects, since minority workers are more vulnerable to economic downturns than white workers (Kletzer 1998).

Our study makes several contributions to the literature. First, ours is the first study of teen fertility to use forced job losses, rather than the unemployment rate, to determine the causal relationship between economic downturns and teen birthrates. As we discussed earlier, forced job losses, unlike changes in other measures of the local labor market, are likely to be exogenously related to changes in fertility. Moreover, business closings and layoffs represent unequivocally bad economic news. By contrast, changes in other measures, such as the unemployment rate, are an ambiguous measure of changes in economic circumstances. That rate can increase because positive economic news or a promising new job placement program draw new potential workers into job search, and it can decrease if workers become discouraged in their search and drop out of the labor market. Although measures such as the employment-to-population ratio or total local income are unaffected by discouraged workers, they may change spuriously for other reasons (e.g., because women decide to leave work to start families, or because changing technology causes workers to voluntarily go back to school). Reliance on any of these more traditional measures as the measure of a bad economy may partially account for the inconclusiveness of past studies on the effects of downturns (e.g., Arkes and Klerman 2009; Levine 2002). Using forced job losses ensures that our measure of economic change is both exogenous and clearly negative.

Second, our study is the only one of which we are aware to use monthly, rather than yearly or quarterly, measures of economic circumstances and teen births. Monthly data are critical because they allow us to calculate the elapsed time between the month of the negative economic shock and the month of conception, permitting us to distinguish termination and preconception fertility responses to job loss. Monthly data also allow us to precisely identify how long economic shocks continue to influence teen fertility after they occur.

Third, this is the first study to estimate the effect of local job loss on county-level birthrates. Using a more highly resolved geographic unit allows us to more closely measure local economic circumstances. North Carolina is the only U.S. state to

provide a long-term panel of job loss estimates at the county level. Fourth, to bolster our results from North Carolina, we use national-level data to demonstrate that the behavioral responses found in North Carolina reflect those in the United States overall and to lend insight into the mechanisms by which teen fertility falls.

Finally, our data set includes data through 2010, making our results reflective of current patterns of teen childbearing, and therefore directly relevant to the recent Great Recession.

We find that black but not white teens reduce their childbearing in response to local job losses. Reductions are concentrated among black teens who are relatively advantaged, as proxied by having made age-appropriate educational progress. Evidence from the timing of job loss and from surveys suggests that reductions are driven by all three potential channels: increased abortion, increased contraceptive use, and decreased sexual activity. Job losses that occur seven to nine months after conceptions do not affect teen birthrates; passing this falsification check suggests that job losses are a surprise to the community and provides confidence that job losses are exogenous to fertility behavior. Complementary models on women aged 20–24 reveal small and insignificant effects of job loss on fertility, consistent with the hypothesis that the pressures of downturns are more uniformly and strongly negative for teen fertility than for young adults' fertility.

Method

Data

Birth data come from the North Carolina Detailed Birth Record Database (NCDBR). The NCDBR contains information on all live births in the state, obtained through long-form birth certificates, including maternal demographic information (age, race, and residence at time of delivery). The data include births that occurred to white or black women aged 15–19 residing in North Carolina, totaling 231,712 births between January 1990 and June 2010.[2] County-level monthly birthrates for white and black teens serve as the dependent variables in the analysis. Birthrates are indexed by the month of conception, rather than the month of delivery, using the exact date of birth and gestational age at birth (reported on the long-form birth certificate) to calculate the date of conception. Birthrates for each county-month are calculated as the number of births conceived that month in that county to women in that age and race group per 1,000 women in that age and race group in that county in that year.[3] The monthly birthrates are then annualized (multiplied by 12) for ease of interpretation.

The independent variable of interest, community-wide job loss, comes from the North Carolina Job Loss databank (NCJLD). The NCJLD uses data from the North Carolina Employment Security Commission (NCESC) to construct monthly

[2] In July 2010, North Carolina instituted a new birth certificate form, with changes in the type and measurement of outcomes, and post-June data are not comparable to pre-June data.

[3] We considered three sources of time-varying measures of county population: decennial census data with linear interpolation used for intercensus years (estimates from the North Carolina Governor's Office, and Surveillance Epidemiology and End Results estimates from the National Cancer Institute). Each source provided data that correlated above .99 with each other source, and estimates were robust to using any source.

information on businesses that close or lay off workers. The NCESC gathers information from both firms and a statewide survey of newspaper accounts of closings and layoffs. The NCJLD contains, for all 100 counties in North Carolina and for the years 1990–2010, the company name, industry, and number of workers terminated. Total job losses in each county in each month are scaled by the working-age (ages 25–64) population in that county that year. Roughly two-thirds of the job losses reflect firm closings; the rest represent layoffs.

Job losses vary both across counties and over time. Maximum losses in each county over the time period under observation range from zero (for five small farming communities) to 9 % of the working-age population. The intraclass correlation, calculated as the ratio of the between-county variance in job loss to the total variance, is .0119. Thus, only 1.19 % of the variation in job loss occurs because of variation between counties; the remaining variation arises from within-county variation over time.

Our job loss measure is more likely to reflect exogenous changes in the local economy than is the unemployment rate, which is determined both by economic change and by phenomena such as "discouraged workers" that may separately influence fertility. As one would expect, however, our measure does predict an increase in the unemployment rate. Within counties (controlling for county and year fixed effects and county-specific linear trends), a job loss to 1 % of a county's working-age population leads to an increase in the unemployment rate the following quarter of 0.49 % (standard error = 0.06); the effect fades in the next quarter, causing an increase in unemployment relative to baseline of 0.37 % (standard error = 0.04). The effect continues to fade in subsequent quarters.

The entire period January 1990–June 2010 consists of 24,600 county-months (100 counties in North Carolina, with 12 months per year, spanning 20.5 years). However, conceptions occurring during months for which job losses for the relevant time periods (either 12 months before or nine months after conception) are not available are excluded from the sample. This restriction eliminates conceptions occurring in 1990, the last three months of 2009, and the first six months of 2010, with 22,500 county-months remaining. We further restrict the sample to a balanced panel of counties that contain at least five white and five black teens during the entire period; 91 counties meet this restriction. The final analysis sample includes 20,475 county-months.

Analytic Plan

We use ordinary least squares (OLS) regression to model the effect of community job loss on birthrates. The models estimate the effect of the number of recent jobs lost in a given county in a given month on the subsequent birthrates for teens in that county. Following Chamberlain (1982), we include job losses with different timing relative to conception in the same model, using the following equation:

$$BR_{cmy} = \varphi_1 \sum_{i=m}^{m+4} JL_{ci} + \varphi_2 \sum_{i=m-9}^{m-1} JL_{ci} + \varphi_3 \sum_{i=m+7}^{m+9} JL_{ci} + \theta_m + \theta_c + \theta_c \times y + \theta_y + \varepsilon, \quad (1)$$

where BR_{cmy} is the annualized rate of births to a given demographic group (e.g., white teens) conceived in month m in year y in county c; and JL_c represents the number of jobs

lost to closings and layoffs in that county *c* in month *i*, as discussed in more detail later. Time is indexed relative to conception date, rather than birth date, because birth dates conditional on conception timing might be affected by a worsening economy (e.g., the share of births that are preterm might increase). The models include dichotomous indicators for the following: month of conception (θ_m), in order to capture seasonal variation in conceptions; county of residence (θ_c) and county over-time trends ($\theta_c \times y$), in order to capture permanent and linearly evolving differences in conceptions by county; and year of conception (θ_y), in order to capture statewide changes that may affect conceptions in all counties in a given year. Heteroskedasticity-robust standard errors are clustered at the county level to adjust for nonindependence of observations within a county over time. All models are weighted by the county-level race-specific population of 15- to 19-year-olds. Unweighted models provide very similar but less-precise results.

This modeling approach isolates the effect of job losses that were "shocks" to a county, relative to the overall economy in the state each year and relative to the county's own gradually evolving labor market. Likewise, estimates isolate birthrate "jumps" in a county, relative to overall birthrates for that demographic group in the state in that year and relative to the county's own gradually evolving birthrate for that demographic group.

Job losses are measured over three time periods relative to pregnancies. First, φ_1 represents the effect of job losses that occur zero to four months postconception on the number of already-extant pregnancies that result in births. Abortion behavior, but not contraception or sexual-activity decisions, can affect births on this margin. Second, φ_2 represents the effect of job losses that occur one to nine months preconception[4] on the rate of pregnancies conceived and then realized as births. Job losses may affect births on this margin by changing prepregnancy health behaviors that affect conception rates (sexual activity and/or contraception) and/or by changing abortion behavior postconception. Third, φ_3 represents the effect of job losses that occur seven to nine months postconception on the number of already-extant pregnancies that result in births. We expect that $\varphi_3 = 0$ because teens cannot respond to job losses that occur so close to the birth by avoiding birth. An estimate of φ_3 that is significantly different from zero would suggest that (1) teens anticipate job losses; (2) their observed birthrates are affected by other actions taken in response to job losses, such as migration; or (3) some other community change is occurring that drives both job losses and teen fertility. Any such explanation would cast doubt on the validity of our identification strategy. Therefore, estimates of φ_3 serve as falsification checks.

The underlying rates of prepregnancy behaviors or abortion cannot be estimated using North Carolina data because they are not accurately observed at the county level by demographic group.[5] Instead, *changes* in prepregnancy and abortion behaviors are inferred by examining changes in birthrates in response to differently timed job displacement. (In addition, in the Results section, we examine national evidence

[4] When separate measures for job losses in each of a series of three-month intervals preceding the conception are included in a model, effects for one to three, four to six, and seven to nine months are significant and of similar magnitude, while effects more than nine months prior to conception are small and insignificant; results are presented in Table 8 in the Appendix. For efficiency, we combine job losses for one to nine months into a single measure and do not include job losses for earlier periods in our main specification.

[5] Attempts were made to analyze micro-level North Carolina abortion data; however, these data were missing important demographic indicators in such a high percentage of cases as to render the data unusable. Nationally, both black and white teens have significant abortion rates (Jones et al. 2010).

on changes in reported prepregnancy behaviors.) For example, consider an instance of job loss that occurred in January 2000. Any deviation from the expected average birthrate from May to September among births with conceptions prior to January (a change in the rate of births in May of at least 20 weeks gestation, or a change in the rate of births in September of at least 34 weeks gestation) would represent a change in the outcome of pregnancies that were already conceived when the job loss occurred. The most likely cause is a change in the termination rate. (Changes in miscarriage rates are discussed later.) Deviations from the expected average birthrate among births conceived during February–November 2000, after job loss takes place, could by contrast result from any or all of the following: changes in the termination rate, changes in sexual activity, and changes in contraception.

In the text, we interpret our results as a percentage change in the birthrate associated with a 1 % job loss to the working-age population, by dividing the OLS estimates by the average county base rate of births during the period under study.

Results

Main Results

North Carolina's teen birthrate tracks well with the national birthrate (results not presented, but available upon request). During the period 1991–2010, the teen birthrate in North Carolina has always been higher than the national rate but followed the same general trend: rising in the early 1990s and declining steadily thereafter.

Table 1 displays descriptive statistics for the community-wide job losses, and Table 2 displays descriptive statistics for teen birthrates and teen sexual behavior. In a typical county, on average each month, job losses affected 0.05 % of the working-age population; the maximum was 9.01 % (Table 1). During the five months postconception, the average total job loss was 0.27 %; during the nine months before conception, the average total job loss was 0.47 %. For comparison, during the Great Recession (December 2007—June 2009), the average monthly rate of job loss nationally was 0.22 %.[6] Consistent with other research on teenage fertility (Hamilton et al. 2010), the average county-level teenage birthrate was nearly twice as high for blacks as for whites (Table 2).

Table 3 presents the results of Eq. (1) for all teens, divided by race.[7] Job losses have no effect on white teen fertility but negatively affect black teen fertility. Effects of job losses are significantly different for blacks and whites (p = .020 for the difference between early pregnancy estimates; p = .0001 for the difference between preconception estimates). Effects for blacks are large in magnitude: job losses that occur zero to four months after conception to 1 % of the working-age population

[6] Authors' calculations, using data obtained from the U.S. Bureau of Labor Statistics (retrieved from http://data.bls.gov).

[7] In other specifications, we considered whether job loss was nonlinearly related to teen fertility by squaring job loss, by logging job loss, and by dividing our continuous measure of job loss into dichotomous categories (e.g., no job loss, .01 to 1 % job loss). We also considered specifications in which the effect of job loss varied by the level of preexisting unemployment. We found little evidence supporting a nonlinear model of the relationship between job losses and teen fertility, or that the effect of job loss varied by levels of preexisting unemployment.

Table 1 Summary statistics: Job losses as a percentage of working-age (25–64) population

	Mean	SD
North Carolina Counties[a]		
0–4 months after conception	.27	(.55)
1–9 months prior to conception	.47	(.76)
7–9 months after conception	.16	(.40)
Overall monthly job loss	.05	(.22)
Sample size (county-months)	20,475	
Overall annual job loss	.61	(.90)
Sample size (county-years)	1,729	
U.S. States		
Annual separations[b]	.75	(.48)
Annual total initial claimants[c]	.72	(.54)
Sample size (state-years)	506	

[a] Measured as the total number of workers who lost jobs during the period as a percentage of the county's working-age (25–64) population.

[b] Measured as the total number of workers separated from employment because of mass layoffs or mass closings as a percentage of the state's working-age (25–64) population.

[c] Measured as the total number of initial claimants for Unemployment Insurance because of mass layoffs or mass closings as a percentage of the state's working-age (25–64) population.

decrease the birthrate by 1.15 births per 1,000; job losses that occur one to nine months before conception decrease the birthrate by 1.74 births per 1,000 ($p < .05$ for both). These changes in births represent a 1.6 % to 2.4 % decrease in the birthrate of black teens. The estimated effects on black teen fertility for prepregnancy and early-pregnancy job losses do not differ from each other ($p = .379$), leaving it unclear whether black teens respond to job loss only by adjusting their termination behavior in response to both preconception and early-pregnancy shocks, or whether preconception behaviors also change when teens receive information about changes in their communities' economic circumstances prior to conception. We explore this topic further in the section on mechanisms.

Job losses seven to nine months after conception do not affect the birthrates of either blacks or whites; point estimates for both groups are small and insignificant. Further, for blacks, the effect of job losses seven to nine months after conception differs significantly from the estimate for preconception losses ($p = .069$) and is in the opposite direction from both preconception and early-pregnancy losses. These findings provide evidence that estimates of the relationship between job losses and fertility are not driven by spurious factors, given that such factors would be unlikely to operate just before or four months after conception, but not seven months after conception. These findings also provide reassurance that job losses are unanticipated; if information about upcoming job losses typically leaks prior to occurrence, then teens would be able to respond to the news prior to its announcement in their third trimester.

Table 4 presents the results for the effect of job loss on the birthrates of young women aged 20–24. Job loss does not affect the birthrates of either white or black women in their early 20s. Point estimates for black young women are one-third to

Table 2 Summary statistics: Birthrates, characteristics of teen mothers, and sexual behaviors

	Whites Aged 15–19 Mean (SD)	Blacks Aged 15–19 Mean (SD)
North Carolina Counties		
Birthrate per 1,000	43.7	73.2
	(36.6)	(72.6)
Sample size (county-months)	20,475	
Female population	1,842	809
	(2,246.9)	(1,340.8)
Sample size (county-years)	1,729	
Share of births to teen mothers:		
Who do not report father characteristics (%)	14.93	30.95
	(21.35)	(29.59)
Sample size	17,755	15,165
Who have not made age-appropriate (%)	32.32	22.19
educational progress[a]	(27.43)	(24.72)
Sample size	17,750	15,160
U.S. States		
Had sexual intercourse in past 3 months (%)	31.12	39.88
	(46.3)	(48.97)
Sample size	109,523	20,548
Had sexual intercourse with 2 or more partners (%)	14.02	17.42
in past 3 months[b]	(34.72)	(37.93)
Sample size	43,472	11,089
Used any birth control, last time had sex[b] (%)	81.70	75.76
	(38.67)	(42.85)
Sample size	46,697	11,318

[a] Mother has not completed minimum grade that would be expected for her age.

[b] Among those who have ever had sex.

one-half the size of those for black teens and do not approach statistical significance. Further, because birthrates are much higher for adult women than for teens, the point estimates imply potential birthrate changes of only 0.3 % to 0.5 %—nearly an order of magnitude smaller than our estimates for teens. The null findings among young women support the hypothesis that the pressures of local downturns are more uniformly and strongly negative for teen fertility than for adult women's fertility.

Specification Checks

To further address potential concerns that findings represent a spurious correlation between job loss and fertility rates, we estimate several additional models that test the validity of the main findings. First, we examine whether out-migration rather than

Table 3 Regressions of birthrates on job loss, women aged 15–19, by race: 1991–2010

	White	Black
Job Loss[a]		
0–4 months after conception	0.331	−1.149*
	(0.331)	(0.546)
1–9 months prior to conception	0.078	−1.736**
	(0.251)	(0.385)
7–9 months after conception	0.267	0.311
	(0.424)	(0.984)
Number of Counties	91	91
Sample Size (county-months)	20,475	20,475

Notes: Heteroskedasticity-robust standard errors, clustered at the county level to adjust for nonindependence of observations within a county over time, are in parentheses. Dates refer to dates of conception.

[a] Measured as the total number of workers who lost jobs during the window, as a percentage of the county's working-age (25–64) population.

*$p < .05$; **$p < .01$

individual fertility declines can account for the observed drop in births by measuring the relationship between county-level population counts for teenagers and job losses last year (Table 5).[8] Significant effects of job losses on migration would affect the interpretation of the main results because it would open the possibility that some of the effect of job loss on teenage birthrates might stem from changes in the size or composition of the teenage population in a given county. Results indicate no relationship between lagged job losses and the total number of white female teens or black female teens. Thus, migration does not appear to be driving the results.

In a series of models, we omit the county, the year, or the monthly fixed effects; results are similar in magnitude and direction, although less precisely estimated when fewer fixed effects are included. In other models, each county or each year is dropped one at a time; results are substantially similar across all of these models, indicating that results are not driven by one county or one year. Finally, we run models controlling for county female population over time or for the contemporaneous unemployment rate; again, results are substantially similar. These models provide additional evidence that we have identified a true relationship between community job loss and teen birthrates and that the main findings are not a spurious result of a particular regression approach or set of observations.

[8] These analyses can be conducted only with Surveillance, Epidemiology and End Results (SEER) data, because SEER measures vary nonlinearly within decade, population group, and county. Monthly population counts of teenagers are not available. In other work (Ananat et al. 2011), we estimated the effect of job losses last year on this year's county public school enrollment for various grades and found no relationship; because those data represent actual counts rather than population estimates, they provide a stronger additional falsification test and lend confidence that endogenous migration is not occurring.

Table 4 Regressions of birthrates on job loss, women aged 20–24, by race: 1991–2010

	White	Black
Job Loss[a]		
0–4 months after conception	0.287	−0.677
	(0.362)	(0.888)
1–9 months prior to conception	0.280	−0.471
	(0.396)	(0.599)
7–9 months after conception	0.500	0.408
	(0.511)	(1.166)
Birthrate		
Mean	116.3	144.2
SD	85.42	135.23
Number of Counties	91	91
Sample Size (county-months)	20,475	20,475

Notes: Heteroskedasticity-robust standard errors, clustered at the county level to adjust for nonindependence of observations within a county over time, are in parentheses. Dates refer to dates of conception.

[a] Measured as the total number of workers who lost jobs during the window, as a percentage of the county's working-age (25–64) population.

Mechanisms

We next explore why the decrease in black teen childbearing occurs. In particular, we examine *who* among black teens appears to reduce their fertility, and *how* they reduce fertility.

To answer the first question, we examine changes in characteristics of teens observed giving birth. We use the NCDBR to measure two characteristics that likely identify levels of sociodemographic disadvantage: whether the teen fails to report the father's name on the birth certificate, and whether the teen has not made age-appropriate educational progress. We define a teen as having not made age-appropriate educational progress if she has not completed the minimum grade that

Table 5 Regressions of logged county female population, aged 15–19, on job loss in the prior year, by race: 1991–2010

	White	Black
Job Loss in the Prior Year	−0.0026	−0.0007
	(0.0034)	(0.0037)
Number of Counties	91	91
Sample Size (county-years)	1,729	1,729

Notes: Coefficients represent estimated change in the logged female teenage population from job losses to 1 % of the county's working-age population.

Heteroskedasticity-robust standard errors, clustered at the county level to adjust for nonindependence of observations within a county over time, are in parentheses.

would be expected for her age (e.g., a teen who is 15 should have at least finished eighth grade; a 19-year-old should have graduated from high school).[9] Following the "marginal child" literature (Ananat et al. 2009; Gruber et al. 1999), we identify those who select out of childbearing when local job losses occur by estimating changes in the average characteristics of those who give birth, using Eq. (2):

$$\ln\left(S_{cmy} = \varphi_1 \sum_{i=m}^{m+4} JL_{ci} + \varphi_2 \sum_{i=m-9}^{m-1} JL_{ci} + \varphi_3 \sum_{i=m+7}^{m+9} JL_{ci} + \theta_m + \theta_c + \theta_c \times y + \theta_y + \varepsilon\right), \tag{2}$$

where S_{cmy} is the share of teens observed giving birth in county c in month m in year y, who have a given characteristic (e.g., failed to make age-appropriate educational progress), and the other variables are as defined in Eq. (1).

Estimates of Eq. (2) are presented in Table 6. Consistent with our findings of no change in the birthrate for white teens, we also find no effects of job loss on the markers of social disadvantage for white teens. By contrast, results indicate that job losses, in reducing the black teen birthrate, also alter the composition of the population of black teenagers who give birth. Black teens with lower levels of disadvantage become less represented among black teens giving birth in the first few months after job losses occur. Job losses zero to four months postconception increase the share of black teens giving birth who have not made age-appropriate educational progress by 0.52 % and increase the share of black teens giving birth who do not report the father's name on the birth certificate by 0.34 %. These point estimates suggest that the entire increase in abortions among those black teens who are pregnant at the time of the job loss occurs among those who have made age-appropriate educational progress and who would have identified the father if they had given birth. By contrast, there is no change in the educational composition of black teens giving birth among those who conceive *after* job losses; and the share reporting father characteristics actually increases, a point we explore further later.

We next examine how teens appear to reduce their fertility. From our earlier results, we have evidence that black teens reduce fertility by increasing pregnancy terminations, and our results are consistent with the possibility that black teens increase pregnancy avoidance as well. Our data do not provide direct evidence on pregnancy avoidance, however; it is possible that job losses, even when they occur prior to conception, do not affect conceptions but instead merely increase abortions. Moreover, if job losses do increase pregnancy avoidance, they could do so through either reduced sexual activity, increased use of contraception, or both. Unfortunately, no representative county-level data on sexual activity and use of contraception exist. Therefore, to investigate whether and how pregnancy avoidance behaviors change in response to job losses, we turn to U.S. state-level survey data on sexual activity and contraceptive behaviors and U.S. state-level data on job loss.

Data on teen sexual behaviors are taken from the Youth Risk Behavior Survey (YRBS), which is fielded biannually in February through April of odd years by the Centers for Disease Control (CDC). In states that agree to participate, the CDC draws a probability sample of all high schools in the state and then randomly samples

[9] Other measures of disadvantage, such as whether the mother used Medicaid to pay for the birth, are not available until December 2010.

Table 6 Regressions of share of births for which father's characteristics are not reported and the teen has not made age-appropriate educational progress, by race: 1991–2010

	Has Not Made Age-Appropriate Educational Progress[a]		Father's Characteristics Not Reported	
	White	Black	White	Black
Job Loss[b]				
0–4 months after conception	−0.0032	0.0527**	0.0036	0.0341*
	(0.0193)	(0.0173)	(0.0207)	(0.0162)
1–9 months prior to conception	0.0072	−0.0184	−0.0228	−0.0313*
	(0.0125)	(0.0152)	(0.0170)	(0.0146)
7–9 months after conception	0.0165	−0.0411	−0.0160	0.0204
	(0.0219)	(0.0362)	(0.0267)	(0.0300)
Sample Size	17,750	15,160	17,755	15,165

Notes: Heteroskedasticity-robust standard errors, clustered at the county level to adjust for nonindependence of observations within a county over time, are in parentheses. Dependent variables are logged. Dates refer to dates of conception.

[a]Mother has not completed minimum grade that would be expected for her age.

[b]Measured as the total number of workers who lost jobs during the window, as a percentage of the county's working-age (25–64) population.

*$p < .05$; **$p < .01$

individual classes from within each high school (e.g., "Mrs. Smith's second period Algebra class"). All students in the selected classes compose the sample for that state. If the overall survey response rate is at least 60 %, the CDC considers the results to be generalizable to the entire population of the state's high school students. Only years in which states' response rates meet this threshold are included in the analyses.

The YRBS asks teens to report on recent sexual behaviors. We consider three behaviors by female respondents: whether the teen has had sexual intercourse in the past three months; whether, among those who have had sexual intercourse, the teen has had sex with two or more partners in the past three months; and whether, among those who have had sexual intercourse, the teen used any method of birth control the last time she had sex. Because this sample is school-based, it will not capture behaviors of teens who are not in school; however, because changes in fertility appear to occur either proportionally or more than proportionally among teens who have made age-appropriate educational progress, these data can nonetheless be informative about the behavioral margins driving fertility reductions.

U.S. state-level job loss data are taken from the Bureau of Labor Statistics (BLS) Mass Layoff Statistics, which report, for each state and the District of Columbia when available, the number of workers in a year who are affected by mass closings or mass layoffs that last longer than 30 days.[10] Data are available from 1995 to 2009.

[10] "Mass" is defined as 50 or more workers. BLS does not collect data on layoffs or closings affecting fewer than 50 workers.

Summary statistics indicate that on average, 0.72 % of the working-age population files unemployment claims resulting from mass layoffs and closings each year (Table 1), and the measure has substantial variation in job losses across states and years. For more details on the U.S. state-level job loss data, see Ananat et al. (2013).

To identify the effects of job losses on sexual behavior, we estimate Eq. (3):

$$Behavior_{ist} = \beta JobLoss_{st-1} + \delta_t + \delta_s + \varepsilon, \quad (3)$$

where $Behavior_{ist}$ is the self-reported behavior (e.g., having used contraception the last time she had sex) of teen girl i[11] surveyed in state s in year t. $JobLoss_{st-1}$ is the percentage of workers in a state affected by mass job losses[12] for the yearlong period up to and including the quarter when the YRBS was administered. The fixed effects for state (δ_s) and year (δ_t) are included to control for persistent differences between states and for any event that may have affected all states in a given year. We report heteroskedasticity-robust standard errors that are clustered at the state level. All models are weighted to correct for the YRBS's complex survey design.

Results are presented in Table 7. In response to job loss, black teenagers report no change in the incidence of sex in the past three months; however, they are significantly less likely to have had two or more sexual partners and are significantly more likely to report using a method to prevent pregnancy the last time they had sex. White teenagers report no change in the incidence of sex or the number of sexual partners; the latter effect is significantly different from the effect for black teens ($p = .07$). White teens are more likely to employ pregnancy prevention in the wake of job losses than they are in the absence of job loss; however, the effect for whites is half the size of the effect for blacks, and the difference between the black and white coefficients is statistically significant ($p < .05$). These results are consistent with the hypothesis that black teens increase pregnancy avoidance behaviors in response to job losses more than white teens. In addition, the reduction in black teens' reports of multiple sexual partners after job losses can help explain why the share of births with no father characteristics reported falls for births conceived after job losses (see Table 5). A shift toward monogamous partnering will increase certainty about paternity and may improve relationship quality as well. Thus, the smaller number of black teens who do conceive and give birth after job losses may, on average, be more comfortable reporting the father on the birth certificate than were the teens who gave birth prior to the job loss. Although results from the YRBS can only be suggestive about the case of North Carolina,[13] estimates are consistent with the hypothesis that the decrease in black teen fertility in North Carolina subsequent to job losses is driven by changes in sexual activity and increased pregnancy avoidance as well as increases in the use of abortion.

[11] We are unable to measure outcomes as logged population shares as in Eq. (2) because of the YRBS's complex survey design. Therefore, we estimate Eq. (3) as a linear probability model.

[12] The technique used to combine the two measures of job loss available at the state level, separations and total initial claimants (see Table 1), are described in Ananat et al. (2013).

[13] State-level estimates of effects of job losses on black and white teen fertility are consistent with our North Carolina estimates. However, because job loss data for other states are provided only quarterly, it is not possible to estimate our models using state-level data.

Table 7 Regressions of female teens' sexual behaviors on statewide job loss, by race: 1997–2009

	Sex in Last 3 Months		Sex With 2 or More Partners in Last 3 Months[a]		Any Birth Control Method, Last Time Had Sex[a]	
Dependent Variable	White	Black	White	Black	White	Black
Job Losses in Prior Year	0.0187	0.0118	0.0016	−0.0615*	0.1253**	0.2438**
	(0.0189)	(0.0508)	(0.0154)	(0.0307)	(0.0243)	(0.0451)
Sample Size	65,765	17,114	27,137	9,196	28,533	9,357

Notes: Heteroskedasticity-robust standard errors, clustered at the county level to adjust for nonindependence of observations within a county over time, are in parentheses. Dates refer to dates of conception.

[a] Among those who have ever had sexual intercourse.

*$p < .05$; **$p < .01$

Discussion

The decision to bear a child as a teenager is a profoundly important choice with potentially life-altering implications. We find evidence that changes to the local economy affect black teens' childbearing choices. Job losses to 1 % of a county's working-age population decrease black teenagers' fertility by about 2 %. White teen fertility is not affected, nor is the fertility of women in their early 20s.

Our identification strategy allows us to use the timing of job loss relative to the timing of births to examine how teens' fertility responses to losses vary depending on when, relative to conception, the losses occur. Community-wide job losses significantly affect the realization of black teen births that have already been conceived. Although we cannot measure abortion rates directly, changes in abortion behaviors most likely account for these effects because job losses zero to four months, but not seven to nine months, after conception affect the birthrate. Local job losses also affect the rate of black teen births conceived one to nine months later. Given that job losses could affect births that have not yet been conceived by causing changes in sexual activity or contraception, as well as by continuing to affect termination behaviors, we are unable to say exactly what behavioral change or changes account for this decline in births. Using national data, however, we find evidence that job losses decrease the likelihood that a black teen had two or more sexual partners in the past three months and increase the probability that a black teen used birth control the last time she had sex. White teen girls reported a much smaller increase in birth control use, and reported no change in having had two or more partners. The concordance of these self-reported behavior patterns by race nationally with the race-specific birth responses we observe in North Carolina lends confidence that we are identifying a true, rather than spurious, set of causal relationships between job losses and teen fertility.

We find no evidence that local job losses affect the fertility of young women aged 20–24. These results are consistent with a Becker-style model in which the effects of local downturns on teen fertility are more strongly and uniformly negative than are effects on young adult women.

Evidence on changes in the composition of the population of teens who give birth subsequent to job losses suggests that relatively advantaged black teens disproportionately increase terminations in response to local downturns. Among those who persist in giving birth when job losses occur during pregnancy, the share of black mothers who do not report father characteristics on the birth certificate increases, as does the share who are not making age-appropriate educational progress. One implication of this pattern is that job losses temporarily worsen the birth circumstances of the average child born to a black teen mother, although sexual and contraceptive behavioral changes after job losses counteract some of these effects in the medium term. Concordant with our other findings, we observe no change in the composition of white teens giving birth.

An alternate explanation for declines in teen births is increased miscarriage. We believe this is unlikely to be the correct explanation, for the following reasons. First, it is somewhat unlikely that black but not white teens would experience increased miscarriage; it is even less plausible that black teens who are making age-appropriate educational progress would experience larger increases in miscarriage than would others. Second, although stress has been associated with increased miscarriage risk (Burton and Jauniaux 2004), most of the variance in the miscarriage rate occurs because of congenital anomalies, not because of maternal behaviors or experiences (Goddijn and Leschot 2000; Regan and Rai 2000). The declines in births observed here could only be accounted for by a 20 % increase in miscarriage,[14] which is much larger than research on miscarriage has suggested is plausible. Third, the national data showing changes in sexual activity and contraceptive use imply that not all of the change in fertility could result from miscarriage.

We also do not believe the drop in observed black teen births is driven by migration among prospective mothers out of the community. Although we cannot test migration in a manner completely parallel with the fertility analysis because of data limitations, we find no significant relationship between last year's job losses and this year's teenage population. Moreover, for migration to account for our results, it would have to be of a very specific form and follow a very specific pattern of timing. It would have to differentially occur among black teens; differentially occur among those black teens who have made age-appropriate educational progress; differentially occur among those black teens who report father characteristics on the birth certificate in a way that varies based on pregnancy timing; and occur five to nine months after job losses occur but not one to three months afterward. By contrast, at the state level, job losses would have to cause out-of-state migration differentially among black teens, and differently among those black teens who do not use contraception and who have multiple sexual partners. Thus, we do not believe migration can account for our results.

[14] The miscarriage rate for women is estimated to range from 11 to 12 miscarriages per 1,000 pregnancies (Knudsen et al. 1991; Regan et al. 1989; Warburton and Fraser 1964). Assuming a miscarriage rate of 12 %, then the implied pregnancy rate is 84.2 (based on a birthrate of 74.1 births per 1,000 women and pregnancy rate of 74.1 / (100 – .12), or 84.2 %). A miscarriage rate of 12 % would thus translate into 10.1 losses per 1,000 black teens (82.6 – 74.1); for miscarriage rate of 11 %, 9.2 losses would be found. The observed decrease of more than two births for this group, if caused by increased miscarriage, implies more than a 20 % increase in the miscarriage rate due to job loss.

We therefore believe that we have identified true changes in black teens' decision-making about fertility, and not changes in miscarriage or migration. Although it is possible that teens reduce fertility because of a perception that their families are now less able to provide them with financial support (an effect likely to be stronger among black teens, given that black families have lower levels of resources and assets than white families (Darity and Nicholson 2005)), local job losses may change teens' sexual and fertility behaviors even if they do not experience personal financial hardship, especially for black teens. For example, in the wake of a changed opportunity structure following job losses, teens—especially those who are making age-appropriate educational progress—may feel an increased impetus to further educational investment; and because black teen mothers are much more likely to have made age-appropriate educational progress than white teen mothers (see Table 2), this effect may be concentrated among blacks. In addition, teens may perceive that their communities will be less able to provide them with assistance, and because black families have lower resources than white families, black teens may be particularly dependent on community support.[15] Finally, teenage sexual behavior is partly determined by perceived norms (Kirby 2001b), which can spread quickly throughout a peer group (Fletcher 2007). Job loss that affects some teens' decisions might in this way have ripple effects on other teens, particularly within race group, throughout a community. Unfortunately, we cannot identify which of these mechanisms account for the effects we identify; this is a promising area for future research. In addition, we have concentrated on one U.S. state. Although North Carolina is varied in population, its birthrate tracks well with national averages, and our state-level analysis is consistent with our North Carolina findings, further work is necessary to fully document the relationships between job losses and teen fertility across the United States.

Despite these limitations, we provide important results showing that increases in community-wide job losses decrease the birthrates of black teens but not of white teens or of young adult women. These results align with those of other studies of fertility (Levine 2002), as well as those showing that blacks are disproportionately impacted by economic downturns (Fairlie and Kletzer 1998; Farber 2004). Moreover, our results underscore that economic contractions have consequences that reach far beyond those typically considered by policy makers.

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[15] Immediate changes in funding for community services, however, are unlikely to be responsible for the decrease in teen fertility because effects occur too quickly after job losses to be driven by government or nonprofit funding cycles.

Appendix

Table 8 Regressions of birthrates on job loss, women aged 15–19, by race: 1991–2010

	White	Black
Job Loss[a]		
0–4 months after conception	0.353	−1.109*
	(0.342)	(0.545)
1–3 months prior to conception	0.528	−1.652*
	(0.432)	(0.661)
4–6 months prior to conception	0.121	−2.006*
	(0.438)	(0.903)
7–9 months prior to conception	−0.382	−1.869*
	(0.386)	(0.761)
10–12 months prior to conception	−0.131	−0.282
	(0.458)	(0.842)
7–9 months after conception	0.315	0.462
	(0.434)	(0.968)
Number of Counties	91	91
Sample Size (county-months)	20,202	20,202

Notes: Heteroskedasticity-robust standard errors, clustered at the county level to adjust for nonindependence of observations within a county over time, are in parentheses. Dates refer to dates of conception.

[a] Measured as the total number of workers who lost jobs during the window, as a percentage of the county's working-age (25–64) population.

*$p < .05$

References

Abma, J. C., Martinez, G. M., & Copen, C. E. (2010). *Teenagers in the United States: Sexual activity, contraceptive use, and childbearing, National Survey of Family Growth 2006–2008* (Vital and Health Statistics 23(30)). Hyattsville, MD: National Center for Health Statistics.

Ananat, E. O., Francis, D. V., Gassman-Pines, A., & Gibson-Davis, C. (2013). *Children left behind: The effects of statewide job loss on student achievement* (NBER Working Paper No. 17104). Cambridge, MA: National Bureau of Economic Research.

Ananat, E. O., Gassman-Pines, A., & Gibson-Davis, C. (2011). The effects of local employment losses on children's educational achievement. In G. J. Duncan & R. Murnane (Eds.), *Whither opportunity? Rising inequality and the uncertain life chances of low-income children* (pp. 299–313). New York: Russell Sage Foundation.

Ananat, E. O., Gruber, J., Levine, P. B., & Staiger, D. (2009). Abortion and selection. *The Review of Economics and Statistics, 91,* 124–136.

Arkes, J., & Klerman, J. A. (2009). Understanding the link between the economy and teenage sexual behavior and fertility outcomes. *Journal of Population Economics, 22,* 517–536.

Becker, G. S. (1960). An economic analysis of fertility. In G. S. Becker (Ed.), *Demographic and economic change in developed countries* (pp. 209–231). Princeton, NJ: Princeton University Press.

Becker, G. S., & Tomes, N. (1976). Child endowments and the quantity of children. *Journal of Political Economy, 84,* S143–S162.
Betts, J. R., & McFarland, L. L. (1995). Safe port in a storm: The impact of labor market conditions on community college enrollments. *Journal of Human Resources, 30,* 741–765.
Black, D. A., McKinnish, T. G., & Sanders, S. S. (2005). Tight labor markets and the demand for education: Evidence from the coal boom and bust. *Industrial & Labor Relations Review, 59,* 3–15.
Bongaarts, J., & Feeney, G. (1998). On the quantum and tempo of fertility. *Population and Development Review, 24,* 271–291.
Buhi, E. R., & Goodson, P. (2007). Predictors of adolescent sexual behavior and intention: A theory-guided systematic review. *Journal of Adolescent Health, 40,* 4–21.
Burton, G. J., & Jauniaux, E. (2004). Placental oxidative stress: From miscarriage to preeclampsia. *Reproductive Sciences, 11,* 342–352.
Caldwell, C. H., & Antonucci, T. C. (1997). Childbearing during adolescence: Mental health risks and opportunities. In J. Schulenberg, J. L. Maggs, & K. Hurrelmann (Eds.), *Health risks and developmental transitions during adolescence* (pp. 220–245). Cambridge, UK: Cambridge University Press.
Carpenter, C. (2005). Youth alcohol use and risky sexual behavior: Evidence from underage drunk driving laws. *Journal of Health Economics, 24,* 613–628.
Catalano, R. F., Goldman-Mellor, S., Saxton, K., Margerison-Zilko, C., Subbaraman, M., LeWinn, K., & Anderson, E. (2011). The health effects of economic decline. *Annual Review of Public Health, 32,* 431–450.
Chamberlain, G. (1982). Multivariate regression models for panel data. *Journal of Econometrics, 18,* 5–45.
Darity, W. A., Jr., & Nicholson, M. J. (2005). Racial wealth inequality and the black family. In V. C. McLoyd, N. E. Hill, & K. A. Dodge (Eds.), *African American family life: Ecological and cultural diversity* (pp. 78–85). New York: The Guilford Press.
Dehejia, R., & Lleras-Muney, A. (2004). Booms, busts, and babies' health. *Quarterly Journal of Economics, 119,* 1091–1130.
Fairlie, R. W., & Kletzer, L. G. (1998). Jobs lost, jobs regained: An analysis of black/white differences in job displacement in the 1980s. *Industrial Relations, 37,* 460–477.
Farber, H. S. (2004). Job loss in the United States, 1981–2001. *Research in Labor Economics, 23,* 69–117.
Fishback, P. V., Haines, M. R., & Kantor, S. (2007). Births, deaths, and New Deal relief during the Great Depression. *The Review of Economics and Statistics, 89,* 1–14.
Fletcher, J. M. (2007). Social multipliers in sexual initiation decisions among U.S. high school students. *Demography, 44,* 373–388.
Goddijn, M., & Leschot, N. J. (2000). Genetic aspects of miscarriage. *Baillière's Clinical Obstetrics and Gynaecology, 14,* 855–865.
Gruber, J., Levine, P., & Staiger, D. (1999). Abortion legalization and child living circumstances: Who is the "marginal child"? *Quarterly Journal of Economics, 114,* 263–291.
Guiliano, P., & Spilimbergo, A. (2009). *Growing up in a recession: Beliefs and the macroeconomy* (NBER Working Paper No. 15321). Cambridge, MA: National Bureau of Economic Research.
Hamilton, B. E., Martin, J. A., & Ventura, S. J. (2010). *Births: Preliminary data for 2009* (National Vital Statistics Reports 59(3)). Hyattsville, MD: National Center for Health Statistics.
Jacobson, L. S., LaLonde, R. J., & Sullivan, D. G. (1993). Earnings losses of displaced workers. *American Economic Review, 83,* 685–709.
Jones, R. K., Finer, L. B., & Singh, S. (2010). *Characteristics of U.S. abortion patients, 2008*. New York: Guttmacher Institute.
Kearney, M. S., & Levine, P. B. (2012). Why is the teen birth rate in the United States so high and why does it matter? *Journal of Economic Perspectives, 26,* 141–166.
Kirby, D. (2001a). *Emerging answers: Research findings on programs to reduce teen pregnancy.* Washington, DC: National Campaign to Prevent Teen Pregnancy.
Kirby, D. (2001b). Understanding what works and what doesn't in reducing adolescent sexual risk-taking. *Family Planning Perspectives, 33,* 276–281.
Kletzer, L. G. (1998). Job displacement. *Journal of Economic Perspectives, 12,* 115–136.
Knudsen, U. B., Hansen, V., Juul, S., & Secher, N. J. (1991). Prognosis of a new pregnancy following previous spontaneous abortions. *European Journal of Obstetrics, Gynecology, and Reproductive Biology, 39,* 31–36.
Levine, P. (2001). The sexual activity and birth-control use of American teenagers. In J. Gruber (Ed.), *Risky behavior among youths: An economic analysis* (pp. 167–217). Chicago, IL: University of Chicago Press.
Levine, P. (2002). *The impact of social policy and economic activity throughout the fertility decision tree* (NBER Working Paper No. 9021). Cambridge, MA: National Bureau of Economic Research.

Martin, J. A., Hamilton, B. E., Sutton, P. D., Ventura, S. J., Mathews, T. J., & Osterman, M. J. K. (2010). *Births: Final data for 2008* (National Vital Statistics Reports 59). Hyattsville, MD: National Center for Health Statistics.

Martin, J. A., Hamilton, B. E., Ventura, S. J., Osterman, M. J. K., Wilson, E. C., & Mathews, T. J. (2012). *Births: Final data for 2010* (National Vital Statistics Reports 60(2)). Hyattsville, MD: National Center for Health Statistics.

Martinez, G., & Copen, C. E. (2010). *Teenagers in the United States: Sexual activity, contraceptive use, and childbearing, National Survey of Family Growth 2006–2008* (Vital Health Statistics 23(30)). Hyattsville, MD: National Center for Health Statistics.

National Campaign to Prevent Teen and Unplanned Pregnancy. (2011). *Counting it up: The public costs of teen childbearing*. Washington, DC: National Campaign to Prevent Teen and Unplanned Pregnancy.

Regan, L., Braude, P. R., & Trembath, P. L. (1989). Influence of past reproductive performance on risk of spontaneous abortion. *British Medical Journal, 299,* 541–545.

Regan, L., & Rai, R. (2000). Epidemiology and the medical causes of miscarriage. *Baillière's Clinical Obstetrics and Gynaecology, 14,* 839–854.

Rindfuss, R. R., Morgan, S. P., & Swicegood, G. (1988). *First births in America: Changes in the timing of parenthood*. Berkeley: University of California Press.

Schaller, J. (2012). *Booms, busts, and fertility: Testing the Becker model using gender-specific labor demand*. Davis: University of California–Davis.

Stevens, A. H. (1997). Persistent effects of job displacement: The importance of multiple job losses. *Journal of Labor Economics, 15,* 165–188.

Vesely, S. K., Wyatt, V. H., Oman, R. F., Aspy, C. B., Keglerd, M. C., Rodine, S., & McLeroy, K. R. (2004). The potential protective effects of youth assets from adolescent sexual risk behaviors. *Journal of Adolescent Health, 34,* 356–365.

Warburton, D., & Fraser, F. C. (1964). Spontaneous abortion risks in man: Data from reproductive histories collected in a medical genetics unit. *American Journal of Human Genetics, 16,* 1–25.