SOCIOECONOMIC DISADVANTAGE AND EARLY CHILDBEARING

Melissa S. Kearney
Department of Economics
University of Maryland
and NBER
kearney@econ.bsos.umd.edu

Phillip B. Levine
Department of Economics
Wellesley College
and NBER
plevine@wellesley.edu

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I. INTRODUCTION

Each year, roughly five percent of teenagers give birth in the United States, a level that is considerably higher than that in any other developed country (United Nations, 2006). As we show subsequently, in the United States between 7 and 10 percent of women will give birth before the age of 18 and roughly 20 percent will give birth before the age of 20.

Concern is often expressed regarding the potential harm that teen childbearing imposes on the mother, the child, and potentially to society more broadly. The National Campaign to Prevent Teen Pregnancy (2007) has summarized many of the statistics that are often used to support arguments about the potential pitfalls associated with teen childbearing. They highlight the fact that women who give birth as teens tend to subsequently have lower educational attainment and higher rates of welfare receipt. Their children are more likely to be born with low birth weight and have weaker performance in school. Although it is difficult to determine the extent to which the teen birth is the causal reason for these poor outcomes, these relationships are both sufficiently strong and alarming that they receive a great deal of attention.

If poor outcomes are associated with early childbearing, then why do women give birth at such an early age? Public discussions directed at answering this question have focused on a number of potential explanations: the incentives of the welfare system, poor labor market outcomes for teens, lack of access to affordable contraception, poor parental and peer influences, and socioeconomic disadvantage, among others. In this paper we focus on the last potential contributor.

Socioeconomic disadvantage can lead to early childbearing through a number of different mechanisms. The poor may lack the resources available to know about the different opportunities available to them or to take advantage of those opportunities. This could hinder their ability to

make optimal choices regarding contraceptive use, educational attainment, labor market training, and the like. Alternatively, those at the bottom of the economic ladder may have given up hope of improving their economic conditions or those of their offspring. Schools and/or labor market conditions in their communities may be so weak that staying in school and avoiding early motherhood might not be seen as offering any material benefit. In addition, some evidence suggests that those who grow up in disadvantaged situations have a stronger "taste" for children. Edin and Kafalas (2006) argue that "the daily stresses of an impoverished adolescence…breed a deep sense of need for something positive to 'look to'" (page 205).

Our goal in this paper is to examine the empirical relationship between socioeconomic disadvantage and rates of early childbearing. We begin by exploring past research in different disciplines that posit factors that may lead to early childbearing, focusing on the role that socioeconomic disadvantage may play. We then extend our literature review to discuss related empirical research that may inform our discussion. We continue our analysis by offering our own empirical exercises. First, we use data from the Panel Study of Income Dynamics (PSID) to provide a descriptive analysis of the relationship between socioeconomic disadvantage and early childbearing. Second, we use Vital Statistics microdata from 1968 and 2003 to conduct a cohort-based analysis of the relationship between rates of socioeconomic disadvantage of a birth cohort and the cohort's subsequent early childbearing experiences.

The question we attempt to answer with our empirical analysis is whether early childbearing – and all its associated costs – is another consequence of being born (or growing up) disadvantaged.[1] Defining disadvantage alternately as having been born to a mother with a low

[1] To be clear, we do not investigate what it is about socioeconomic disadvantage that leads young women to have children before the age of 18 or 20. Our empirical approach does not allow us to separately identify which aspects of socioeconomic disadvantage – such as poor schools, peer influences, living arrangements, or lack of optimism about future labor market opportunities – are driving this relationship. Yet, as we clarify in our literature review, the state

level of education, to an unmarried mother, or to a teen or minor mother, our cohort-based empirical analysis gives us reasons to believe that the answer to this question is yes. Children who were born into disadvantaged socioeconomic circumstances do appear to be more likely to give birth at a younger age. The magnitude of this effect, however, is rather small. In particular, our estimates imply that fairly sizeable reductions in the proportion of a state/year birth cohort born into disadvantage have only a modest impact on rates of early childbearing. For example, the elasticity of the probability of early childbearing by age 18 with respect to the probability of being born to a mother under age 18 is only 0.05. Other elasticities relating disadvantage at birth to early childbearing are all under about .25.

II. THEORETICAL CONSIDERATIONS

Non-economists typically attribute early childbearing to be the result of myriad influences that affect a youth's development and fall outside the control of a rational decision-making process (e.g., Brooks-Gunn and Furstenberg, 1989; Hardy and Zabin, 1991; Brooks-Gunn and Paikoff, 1997). Brooks-Gunn and Furstenberg (1989) consider five perspectives on adolescent sexual behavior: (1) biological perspectives; (2) parental influences; (3) peer influences; (4) academic perspectives; and (5) social cognitive perspectives. In stark contrast to the economic model of rational decision-making, the authors note that "most teens do not consciously plan to become sexually active, and they often do not foresee their first sexual experience. As such, it frequently is not experienced as a decision but rather as something that 'happened'," citing Chilman (1983) on this last point.

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of knowledge regarding the broader relationship is sufficiently limited, that we can make a substantial contribution focusing on that alone.

A focus on *biological perspectives* emphasizes the role of hormonal factors in driving the onset of sexual activity.[2] In their consideration of *parental influences* the authors highlight research suggesting that teens who have good communication with their parents, teens who have feelings of "connectedness and supportiveness" with their parents, and teens with relatively more parental supervision tend to have later onset of intercourse. In discussing *peer influences,* the authors cite work suggesting that perceptions about what is normative in one's peer group are more strongly associated with sexual behavior than the actual behavior of one's peers. But the authors suggest that the presumed effects of parental and peer influences on teenage sexual behavior are stronger than the available research evidence indicates. A focus on *academic perspectives* emphasizes the observation that teenagers with lower academic success or aspirations are more likely to have sex as teenagers. And finally, their consideration of s*ocial cognitive* abilities raises questions about the ability to "integrate domain-specific knowledge into a coherent system", i.e. into an understanding of "where babies come from." Other social cognitive processes that the authors point to as relevant and in need of greater research understanding include self-definitions, self-efficacy, and social comparisons, i.e. how a teenage girl determines what it means to be a mature woman.

A more recent article by Brooks-Gunn and Paikoff (1997) moves even further from the traditional economic approach to the issue by suggesting that the study of adolescent sexuality must consider not only behaviors, but also feelings. They write that though insightful, the framework that they and others have used to consider adolescent sexual behavior, namely in the

[2] The authors are quick to note that social and contextual effects will interact with the onset of hormonal changes: "So while very early sexual initiations may be in part hormonally mediated, by the time that behavior is normative, social factors may account for sexual initiation (p 251)." They cite research indicating that initiation of sexual behavior is highly associated with what is perceived as normative in one's peer group. They further purport that racial differences in the initiation of intercourse prior to puberty speak to the importance of social and contextual factors on sexual behavior.

contexts of family, peer, neighborhood, biological, and cognitive characteristics, has been limiting. They propose four key topics that need to be explored in order to understand adolescent sexuality: (1) sexual well-being and developmental transitions; (2) the gendered nature of sexuality; (3) decision making and sexuality, and (4) the meaning of sexuality to youth.

Economists generally do not attempt to model parental behavior or the effect of feelings directly. But that does not mean that we ignore that these factors are potentially very important, perhaps crucial, to determining whether a young woman will engage in sexual activity and give birth as a teenager. Indeed, it is the correlation of these "other" factors with observable characteristics such as childhood poverty and growing up in a single-mother household that leads us to worry that the empirical associations between such background characteristics and early childbearing cannot be interpreted as causal. For example, if single mothers tend to be the type of women who would be less likely to supervise or communicate with their adolescent daughters regardless of marital status, than it is the not the fact of being born to a single mother *per se* that leads daughters from single-parent homes to have relatively higher rates of early childbearing.

Work in other social sciences on this topic has tended to group the theoretical linkages between background characteristics and teen nonmarital childbearing into four categories, as helpfully summarized by An, Haveman, and Wolfe (1993): (1) the lifestyle characteristics of the parents; (2) information and network effects; (3) stressful childhood events; and (4) a utility maximization perspective. The first perspective emphasizes the intergenerational transmission of a culture of "welfare dependence." The idea is that a girl growing up in a mother-only family where welfare receipt is the norm will develop preferences and behaviors that lead her to repeat such a lifestyle for herself. The second perspective holds that girls who grow up in poverty or without connections to the labor market will be more likely to engage in early childbearing than

girls who grow up with economic resources and connections to a world that engenders career or educational ambitions. The third perspective is borne from research in sociology suggesting that stressful and unsettling events during childhood or early youth, such as changes in family structure, may lead to feelings of insecurity in young women. These types of feelings might lead a young girl to desire a baby or family of her own and therefore give birth as a teenager.

The fourth perspective, emphasizing a rational choice framework, tends to be the approach taken by economists who have written in this area (see e.g., Leibowitz, et al., 1986; Duncan and Hoffman, 1990; Lundberg and Plotnick, 1995). This literature builds on the seminal work of Becker (1960) and Butz and Ward (1980) by modeling fertility as a decision-making process determined by economic factors. While Becker (1960) and Butz and Ward (1980) focus on the fertility of married women, their insight can easily be applied to the decision facing unmarried teenage women. Duncan and Hoffman (1990) is an early example of a study modeling the choice to have a nonmarital birth as a rational comparison of the income outcomes associated with the choice, modeled by these authors as welfare benefits versus expected income returns from career and a higher probability of marriage.

Recent work by behavioral economists offers some important modifications that may help synthesize a rational choice model with the perspectives of other social scientists. Work in this field argues that the rational-choice model is inaccurate in some systematic and important ways. A key insight for the issue of early childbearing is that when modeling decisions to undertake actions that involve immediate gratification and future costs - such as sex or smoking - otherwise rational individuals might exhibit "present-biased preferences" (e.g. O'Donahue and Rabin, 1999; Laibson, 1994). Such preferences are characterized by "excessive myopia," whereby individuals put additional weight on the present period relative to all future periods.

When we talk about the actions of teens, such a model implies that teens might engage in too much risky behavior (say, unprotected sex) because they attach too little weight to their well-being as adults. In other words, they overly discount long-term consequences relative to short-term gratification. Economists tend to be uncomfortable normatively declaring that people's behaviors are not in their best interest; but if individuals make decisions based on present-biased preferences, that is tantamount to them making decisions about present actions that they will regret later in life. Such preferences might also be considered a reflection of self-control problems. If an otherwise rational decision-maker who is considering the costs and benefits of early childbearing has such present-biased preferences, or has self-control problems, then she might make decisions that lead to early childbearing, even if it is not in her long-term best interest.

O'Donoghue and Rabin (2001) review insights and issues raised by behavioral economists and psychologists that are relevant to modeling risky behavior by adolescents, including behaviors leading to unprotected sex and potentially early childbearing. Their reading of the behavioral/psychological evidence is that adolescents are similar to adults in terms of their ability to carry out the decision-making process but, importantly, that youths are less able to recognize the consequences associated with given actions. If minors are not fully capable of predicting the consequences of early childbearing – either for themselves or their children – they might initiate childbearing earlier than would be optimal from their own fully-informed perspective.

III. RELEVANT EMPIRICAL LITERATURES

Our analysis of the impact of socioeconomic disadvantage on early childbearing is related to several previous research studies that address this topic. There are also a number of previous studies addressing similar topics that make methodological contributions that can help inform our discussion. This section describes each of these related areas and what we can learn from them regarding the relationship between socioeconomic disadvantage and early childbearing.

A. The Costs of Teenage Childbearing

An important indicator of socioeconomic disadvantage in our analysis, described subsequently, is being born to a young mother. Previous studies have attempted to examine the consequences of giving birth at an early age. This literature has separately focused on the costs to the teen mother herself in the form of inferior subsequent outcomes (e.g. lower completed schooling and earned income) and the costs to her offspring (e.g. lower cognitive ability, higher rates of child poverty, and, potentially, early childbearing). Recent analyses have focused on methods designed to separately identify the role that early childbearing plays in altering these outcomes, abstracting from all of the other differences that exist between women who give birth at an early age and those who delay childbearing. Analysts have used approaches including examining differences in later-life outcomes between siblings who did and did not have a teen birth (Geronimus and Korenman, 1992 and Geronimus, et al., 1994); between teens who gave birth to those who were pregnant but miscarried (Hotz, et al., 2005); and between teens who gave birth to twins to those who gave birth to singletons (Grogger and Bronars, 1993). The motivation for these approaches is to find a relevant comparison group for teenage mothers whose average outcomes might reasonably be considered a proxy for what the average teen mother would have experienced had she not given birth before the age of 18 or 20.

It is important to recognize that the main purpose of our paper differs from these studies. First, studies that have attempted to identify the casual impact of a teen birth on subsequent outcomes for the mother and child deliberately hold constant other background characteristics of the teen mom. In so far as these other characteristics can be thought of as youth disadvantage, it is the impact of these other characteristics that we are interested in exploring. Second, this literature focuses on just one measure of potential disadvantage – being born to a teen mother. Our study considers multiple measures of disadvantage.

B. The Determinants of Teenage Childbearing

Two distinct literatures in economics focus directly on the determinants of teen childbearing. One focuses on the impact of policies and social conditions in a woman's state of residence and the other examines the impact of personal characteristics. The policy-related literature is methodologically stronger, applying quasi-experimental methods designed to identify causal estimates of a policy's impact on teen childbearing. Moffitt (1992, 1998, and 2003) reviews the extensive literature on the effects of welfare policy on the incidence of female-headed households.[3] Economists have also explored the role that abortion policy, and particularly parental involvement laws and Medicaid funding restrictions, play in teen fertility behavior (e.g., Levine, et al., 1996; and Levine, 2003). Kearney and Levine (2007) examine the cost of contraception, finding that publicly-funded family planning can significantly reduce teen birth rates. The role of labor market conditions also has been examined (e.g.. Dehejia and Lleras-Muney, 2004; Levine, 2001). Despite the methodological advantages of this work, the focus on specific policies and their impact on early childbearing is different than our goal of

[3]Female-headed households are not necessarily headed by women who initiated childbearing as a teen, but there is a strong correlation between the two.

examining the role of socioeconomic disadvantage. Nevertheless, these literatures do help guide our choice of other factors that are important to control for in our model.

The literature that is perhaps most closely aligned with our goals examines the impact of personal background characteristics on early childbearing outcomes. Haveman and Wolfe (1995) review a large number of studies in this area, highlighting the key contributions in this area of Duncan and Hoffman (1990), An, et al. (1993), and Lundberg and Plotnick (1995). An important contribution since this review is Duncan et al. (1998). These studies have the advantage for our purposes of specifically examining factors related to economic disadvantage (including family income, parental education, family structure), but they also tend to be methodologically limited in their ability to identify causal relationships. The methodological considerations of these studies tend to focus more on things like correlated errors in joint decision processes that include teen childbearing and welfare receipt than on finding exogenous variation in measures of economic disadvantage. Two recent studies are methodologically stronger, investigating whether greater educational attainment among young women leads to lower rates of teen childbearing (Black, et al., 2004; and McCrary and Royer 2006).[4] Yet these studies are somewhat further removed from the focus of our analysis, concentrating on the woman's own level of education rather than the education level of her parents.

C. The Intergenerational Transmission of Income

When we use being born to a young mother as our measure of disadvantage and examine its links to early childbearing, we are conducting an exercise very similar in spirit to that considered in the literatures on intergenerational transmission of personal characteristics like income, education, and health. (For a review of these literatures, see Solon, 1999). These

[4] Black, et al. (2004) uses variation in compulsory schooling laws and McCrary and Royer (2006) uses age-at-school-entry policies to identify exogenous differences in the amount of education received by women.

literatures examine the extent to which a parent's characteristic is transmitted to his or her child. The earlier economics literature on this question almost always focused on the intergenerational transmission of income from fathers to sons. In a regression framework where son's income is the dependent variable, the coefficient on father's income represents the intergenerational correlation. The methodological issue frequently grappled with in this literature is how to appropriately measure income (say, by using multiple years of earnings) in order to reduce attenuation bias due to measurement error.[5] More recent studies of intergenerational income correlation have considered the relationship between father's or family income and daughter's earnings or family income. These studies have addressed conceptual issues such as assortative mating (Chadwick and Solon, 2002) and the transmission of gender preferences for work (Altonji and Dunn, 2000).

More recent work in this area has focused on trying to identify the mechanisms for intergenerational correlations, asking whether the intergenerational correlation in income is attributable to an intergenerational correlation in health or education, for instance (e.g. Currie and Moretti, 2007; and Black, et al., 2005). If one views part of our analysis as the intergenerational correlation in early childbearing, then this may be thought of as one of the mechanisms generating an intergenerational correlation in income.[6]

IV. EVIDENCE FROM THE PANEL STUDY OF INCOME DYNAMICS (PSID)

We begin our exploration of the empirical linkages between socioeconomic disadvantage and early childbearing with an examination of data from the Panel Study of Income Dynamics

[5] In our work on early childbearing, measurement issues are less of a concern, particularly in our analysis of Vital Statistics data.

[6] This would depend upon the extent to which early childbearing is causally related to low income. As we described earlier, this proposition is not perfectly clear on the basis of past research.

(PSID). The PSID is a longitudinal survey of a representative sample of U.S. individuals and their households. It was conducted annually from 1968 to 1997 and biannually since then. We study the cohort of women age 20 to 35 in the 2003 survey and observe particular circumstances of their births using information contained in the 1968 through 1983 survey files. We focus on four measures of disadvantage at birth: being born to a mother of age less than 20, being born to a single mother, being born to a mother who has not completed high school, and being born into a family whose income is at or below the federal USDA poverty threshold. We also consider two measures of socioeconomic disadvantage during adolescence: not living with married parents (or step-parents) at age 15 and living in poverty at age 15.[7]

Our PSID sample consists of 1,741 women age 20 to 35 observed in the 2003 survey and back to the year of their birth. Table 1 reports rates of disadvantage and rates of teen childbearing by disadvantage factor. Among our sample of women, 24 percent gave birth before age 20. The rates of teen childbearing are dramatically higher for women who were born with each of our four measures of disadvantage. Forty-seven percent of women born to teen mothers give birth as teenagers themselves; 46 percent of women born to an unmarried mother; 45 person of women born to a mother with less than a high school degree (including teenagers); and 45 percent of women born into poverty.

The rates reported in Table 1 give us a sense for how the coupling of disadvantage factors increases the odds of giving birth before the age of 20. Among girls born to a teen mother, 47 percent give birth before age 20. The rate increases to 57 percent if the mother is both a teen and

[7] In our exploration of linkages between background factors and early childbearing in the PSID, we do attempt to be as exhaustive in our set of variables considered as the PSID analyses of either An, et al. (1993) or Duncan et al. (1998), which look at much larger sets of demographic characteristics for earlier cohorts of young women. We merely look to the PSID for descriptive purposes. In attempt to uncover causal relationships, we rely primarily on a cohort-based analysis of vital statistics natality data.

unmarried and to 67 percent if in addition to being born to a teen mother, the adolescent is living in poverty at age 15. Among girls born to a mother with less than a high school degree, 45 percent give birth before age 20. That increases to 55 percent if the girl is also born into poverty and to 70 percent if she is living in poverty at age 15. Indeed, this combination of having a low-education mother and living in poverty at age 15 appears to be the two-way combination with the highest "risk" of a teen birth.

Table 2 shows how moving from non-poverty to poverty alters rates of teen childbearing for women with and without the disadvantages of being born to a teen mother, being born to an unmarried mother, being born to a low-educated mother, or not living with married parents at age 15. As shown in the leftmost panel of the table, the rate of teen childbearing among women who are neither born into poverty nor to a teen mother is 20 percent. Being born into poverty doubles that rate to 43 percent, even without the disadvantage of being born to a teen mother. This is the same increase in likelihood as moving from not having a teen mother to having a teen mother (in the absence of poverty). A similar pattern holds for poverty at age 15. The rate of early-childbearing among daughters of unmarried mothers is roughly twice that of the daughters of married mothers; likewise for daughters of women with less than a high school degree compared to the daughters of more highly educated women. Among women without these disadvantage factors, the rates of early childbearing are nearly twice as high for those born into poverty or living in poverty at age 15. One conclusion from the rates presented in this table is that the increase in the likelihood of having a teen birth associated with being born to a teen mother, born to an unmarried mother, or born to a mother with less than a high school degree is on par with the increase in early childbearing propensities associated with being born into poverty (compared to not) or living in poverty at age 15 (compared to not).

Table 3 reports the results of very simple multivariate regression specifications where the dependent variable is defined as giving birth before the age of 20 and giving birth before the age of 18 and combinations of measures of disadvantage are included as explanatory variables. The results from these models can be interpreted as descriptive only, but they establish a form of "horse race" between disadvantage factors that provide at least one gauge of their relative importance. The six measures of socioeconomic disadvantage examined include the following: born to a teen mother, born to an unmarried mother, born to a mother with less than a high school degree, born into poverty, not living with married parents at age 15, and living in poverty at age 15. The coefficient estimates from these specifications imply statistically significant and substantial increases in rates of early childbearing among young women associated with most of these measures of disadvantage, even after controlling for the other correlated measures of disadvantage.

V. Analysis of Vital Statistics Birth Data

A. Data Description

In this part of our analysis, we adopt methods designed to estimate the impact of changes in alternative measures of economic disadvantage across birth cohorts on the likelihood of giving birth at an early age. To do this, we use data from the Vital Statistics Natality Detail Files between 1968 and 2003. These data represent individual records on births that took place in the United States.[8] We use data from 1968 to 1986 to identify the number of women born in each state and year along with the proportion of those births that can be classified as "disadvantaged."

[8] These data are first available starting in 1968 and 2003 is the last year currently available. From 1985 onward, these data represent a complete count of births. Prior to 1972, births were sampled at a 50 percent rate nationwide. In the intervening period, some states sampled at a 50 percent rate and others included all births. In our analysis, we applied appropriate weights to provide estimates of all births.

The alternative measures of disadvantage for those women born in these years include having a mother who is a high school dropout, unmarried, or under age 18 or under age 20 at the time of giving birth.[9] These data provide us with rates of "disadvantage" for the women born in these birth cohorts and also provide us with a denominator for a measure of the rate of early childbearing that these women subsequently experience.

To get the numerator for this early childbearing statistic, we use data from the 1980 through 2003 Vital Statistics data. With these data, we can attribute every birth that takes place in the United States to the mothers' state/year of birth cohort along with the mother's age.[10] For any particular state/year birth cohort (say the 1970 cohort from New York), we use the data from the years in which the women in that cohort would be childbearing age, but still "young" (either under 18 or 20 – years 1983 through 1987 or 1989, respectively, for the 1970 cohort).[11] From these data, we tally all first births that occur to women from that state/year of birth cohort. Dividing this count by the size of that cohort (as determined from the 1970 data) provides a measure of the rate of early childbearing.

The ability to link births to mothers' birth cohorts is crucial for our purposes. In effect, we are linking three generations: we look at birth records in a given year and identify the age – and birth cohort – of the mother. We then look to the birth records for that cohort of teenage mothers and identify the characteristics (e.g., age) of their mothers. The completeness of Vital Statistics birth records substantially reduces measurement error in our estimated rates of early childbearing. Nevertheless, the data are not perfect. First, our identification of a teen mother's

[9] We also experimented with a measure of the poverty rate, but decided not to include it in our analysis because of data limitations. Poverty rates by state and year are not available for the birth cohorts in our sample. Instead, we tried using county level data from the 1970 Census, attaching to each birth cohort the poverty rate that existed in the relevant county of birth. As the geographic composition of births changed over time within a state, this measure would provide some within state variation in poverty. Unfortunately, we found that this variation was insufficient to provide robust parameter estimates.

[10] For a very small number of births, this information is missing. These births are not included in the analysis.

[11] When we consider births before age 20, we can only use birth cohorts through 1984.

birth cohort relies on the reporting of a mother's age on the birth record; the natality data does not report the exact year in which the mother was born. We simply subtract the mother's age from the year she gave birth to determine her birth year, so there may be a misclassification by up to one year in the mother's birth cohort associated with an early birth. [12]

Another important limitation of these data is that information on mother's education and marital status is not complete in the years in which we are measuring the size of birth cohorts and recording their rates of disadvantage. First, data on maternal education is not available at all for the 1968 birth cohort and they exist for only a subset of states for the years between 1969 and 1979. To balance the panel when we use this variable, we include in our analysis just the 36 states for which these data are available in all years. Similarly, direct information on marital status of the mother is only available in all years for 37 states; we focus our attention on just those states in analyses regarding marital status.[13]

B. Descriptive Analysis

Figures 1 through 4 provide a description of these data, separately considering the conditions at birth for these cohorts of women along with their subsequent rates of early childbearing. Figure 1 displays trends in the percentage of each birth cohort that exhibit each form of disadvantage. The first conclusion that one can draw from this figure is that there are very distinct trends over time that differ across measures of disadvantage. The percentage of birth cohorts that are born to less-educated mothers (defined as not having completed high

[12] Another minor limitation of these data is that births to women who were born in the United States but gave birth in another country would not be captured in these data. It is our impression that this is a very infrequent event and we ignore it here.

[13] The set of states with missing information on maternal education is the following: AL, AR, CA, CT, DE, DC, FL, GA, ID, MD, NM, OR, PA, TX, and WA. The set of states with missing marital information is the following: CA, CT, GA, ID, MD, MA, MT, NM, NY, OH, VT, MI, NV, and TX. Beginning in 1980, several states added data on the marital status of the mother by inferring it from matched last names of the mother and father. There are obvious limitations in using this approach, but it does not affect our analysis because we are not including these states.

school) has fallen rather consistently from slightly more than 31.7 percent among the 1969 birth cohort to 20 percent for the 1986 birth cohort. The fraction of a birth cohort born to a mother less than age 20 has likewise fallen from a high of 19.7 percent among the 1973 birth cohort to 12.5 percent among the 1986 birth cohort. On the other hand, the fraction of each birth cohort born to an unmarried mother has risen continuously over this period (and beyond). In the youngest birth cohort we study, nearly one in four women (23.1 percent) were born to unmarried mothers, compared to roughly one in ten among the oldest birth cohort. These secular changes over time, driven by other social forces, are the type of variation in the data that needs to be held constant in an analysis trying to identify the causal impacts of disadvantage.[14]

Similar variation exists in these measures of disadvantage across states at a point in time. Figure 2 displays one representative measure, the percentage of a birth cohort born to teen mothers, across states. Among the 1969 birth cohort, over 20 percent were born to teen mothers in Mississippi and Alabama, but less than half that percentage in Massachusetts and Minnesota. Clearly, at least a portion of this gap may be attributable to different social customs that exist across these states. This is apparent in the fact that most states that have rates of births to teen mothers in 1969 also have relatively high rates in 1983. Again, these longstanding differences in state attitudes towards fertility need to be held constant if we are going to attempt to identify the causal impact of disadvantage.[15]

It is interesting to note in Figure 2 that the change between 1969 and 1983 within states in the percentage of a birth cohort born to teen mothers varies considerably across states. This rate fell in every state over the 14 year period, but it fell by more in some states than others. For instance, Rhode Island and New Mexico experienced a trivial drop, but the percentage of a birth

[14] Our regression analysis, described below, does this with the inclusion of birth cohort fixed effects.
[15] Our regression analysis, described below, does this with the inclusion of state fixed effects.

cohort born to teen mothers fell by roughly one-third in Washington and Kansas. Although it is not clear that the variation in changes in measures of birth cohort disadvantage – such as being born to a teen mother – over time between states is purely exogenous to preferences/tastes for early childbearing (as we will discuss later), focusing on these within-state, across-birth-cohort changes as our identifying source of variation removes the confounding influences of secular changes that occurred over time nationally and longstanding cross-sectional variation across states.

Figures 3 and 4 provide analogous information about the patterns in early childbearing for women in these birth cohorts. Figure 3 displays the aggregate trend over time.[16] It shows that the percentage of women giving birth either before age 18 or before age 20 rose somewhat among women born for the early 1970s birth cohorts, but then fell subsequently. This pattern roughly corresponds to the aggregate trends in annual teen childbearing rates, which spiked in the late 1980s and early 1990s. Figure 4 displays cross-sectional variation in the percentage of women giving birth by age 20 (similar patterns exist for births by age 18). Again, there is substantial cross-sectional variation in early childbearing rates. Among women in the 1969 birth cohort, about 30 percent in Mississippi and the District of Columbia gave birth by age 20. The comparable figure for women born in Massachusetts and Connecticut is closer to 10 percent. For women born in most states, the rate of early childbearing fell somewhat between the 1969 and 1983 birth cohorts. Importantly, there is considerable variation across states in the extent of the reduction in rates of early childbearing between 1969 and 1983. Our empirical approach relates this variation in state-year birth cohort rates of early childbearing to the variation described above in rates of state-year birth cohort disadvantage.

[16] No data is available for births by age 19 beyond the 1984 birth cohort because 2003 is the most current Vital Statistics data available.

C. Econometric Specification

Our goal in this analysis is to attempt to identify a causal link between these measures of disadvantage at birth and the likelihood of early childbearing 17 to 19 years down the road. Finding purely exogenous variation to identify this relationship, however, is not a simple task. In this discussion, we will develop our thinking regarding the models that we will estimate and report, highlighting their strengths and their limitations.

To begin our discussion, consider the following model based on cross-sectional data that relates early childbearing (EC) to some measure of economic disadvantage in the individual's past (D) and other personal characteristics (X) for individual i.

$$EC_i = \beta_0 + \beta_1 D_i + \beta_2 X_i + v_i \quad (1)$$

This equation is a simplification of the approaches reviewed in Haveman and Wolfe (1995), emphasizing the cross-sectional nature of the variation in the data available. The main limitation of this approach is that there are likely to be factors that are related to both the measure of disadvantage and the early childbearing outcome that are not controlled for and may even be very difficult or impossible for the researcher to observe. As such, they lead to omitted variable bias. Suppose, for instance, that a woman's own values lead her to have a child early and to instill those values in her daughters, leading them to have children early as well. If those values are related to lower socioeconomic outcomes, then we may erroneously attribute the relationship in early childbearing across generations to economic disadvantage. Those unobservable factors also may take the form of cultural differences that exist in the different locations in which women live. Early childbearing may be more supported/less stigmatized in some communities than others and this may be related to the socioeconomic characteristics of those communities. This would also erroneously relate early childbearing to economic disadvantage.

One approach to help resolve this problem is to rely on repeated cross-sections of individuals. Consider the following modification to equation (1):

$$EC_{ics} = \beta_0 + \beta_1 D_{ics} + \beta_2 X_{ics} + \gamma_c + \gamma_s + \eta_{ics} \quad (2)$$

In this specification, we now also identify each individual i by the "community" (state in this example, denoted by s) that they live in. Since we are tracking people over time, we can now also separately consider their birth cohort, c. With repeated cross-sections, we can control for both state- and birth cohort-specific fixed effects (γ_s and γ_c). This approach eliminates two possible forms of unobservable heterogeneity. First, cultural differences across locations that are longstanding in nature and that may be related to both early childbearing and economic disadvantage are captured by the state-fixed effects. Second, cultural differences in the acceptability of early childbearing that change over time and that also may be related to economic disadvantage can be captured by cohort-specific fixed effects.

With our data, we do not have repeated cross-sections of individuals, but rather we have data on repeated cross-sections of birth cohorts. Rather than estimating equation (2), with our data we estimate:

$$EC_{cs} = \beta_0 + \beta_1 D_{cs} + \beta_2 X_{cs} + \gamma_c + \gamma_s + \eta_{cs} \quad (3)$$

This differs from equation (2) solely in the subscripts, indicating the aggregated nature of the data within cohorts. Each variable is now the average over individuals within the state/birth cohort cell. This approach also resolves another potential source of unobservable heterogeneity in that any differences in unobservable characteristics across women within state/year of birth cohorts are averaged out.

In this specification, we also control for a set of X variables that vary at the level of state/year birth cohort. This vector includes state/year cohort size as well as a set of variables that

are designed to measure observable characteristics at about the time that early childbearing decisions are being made.[17] We simplify the measurement of these variables by including their values at the time each birth cohort was age 17 or age 19 in specifications in which our measure of early childbearing is births by age 18 and births by age 20, respectively. The specific variables we include represent: (A) economic conditions, measured by the unemployment rate, (B) demographic factors, such as marital status, age, and racial/ethnic composition and level of educational attainment among women 15-44 in the state/year, and (C) policy variables, including abortion restrictions, welfare benefit levels and reform indicators, and SCHIP implementation. Further details regarding the specific variables used and their sources are available in Kearney and Levine (2007).

How should we interpret the results of estimating equation (3)? The first relevant issue is the extent to which unobservable heterogeneity remains. As the preceding discussion makes clear, we have eliminated many of its potential sources, moving us far in the direction of identifying a causal impact of disadvantage. Nevertheless, what remains is the possibility that, say, values change within locations across birth cohorts in a way that is correlated with both economic disadvantage and early childbearing.[18] Therefore, we cannot conclusively determine that all sources of unobservable heterogeneity have been eliminated and must interpret our results in that light.

[17] The results are virtually unchanged when cohort size is excluded from the model.

[18] One methodological approach that would, in principle, be useful to eliminate this remaining source of unobservable heterogeneity is instrumental variables. To implement this approach, one would need instruments that are correlated with our measures of disadvantage without being correlated with the residual in early childbearing. The difficulty in identifying such an instrument is that any variable that shifts the characteristics of a birth cohort, like the fraction born to teen mothers, is likely to alter other characteristics of that cohort, like its values/tastes. For instance, we experimented with using variation in abortion legalization across states and over time in the early 1970s, like Ananat, et al. (2006). The problem with this is that if abortion legalization changed the selection process determining who is born (like the percentage to teen mothers), it is likely also to affect attributes of that birth cohort other than their socioeconomic disadvantage (like their tastes/values). Without any other obvious suitable instruments, we have chosen not to pursue this estimation strategy.

The second relevant issue is the interpretation of the coefficient, β_1, even ignoring the potential for bias attributable to any remaining unobservable heterogeneity. In our analysis, we proxy for economic disadvantage using individual characteristics such as having a less-educated mother or a teen mother. In models of this form, the coefficient on the specific characteristic captures both the specific effect of that characteristic on the early childbearing of the next generation as well as the broader effect of socioeconomic disadvantage. As we described earlier, recent attempts to identify the impact of, say, teen childbearing is largely focused on identifying the "taste" effects of that particular characteristic, holding constant differences in socioeconomic disadvantage. We are explicitly interested in examining the impact of differences in socioeconomic disadvantage.

D. Results

The results of our analysis using Vital Statistics data are reported in Table 4. The left panel of the table uses data from the 1968 through 1986 birth cohorts and considers a dependent variable measuring their rate of early childbearing, defined as giving birth before age 18. The mean value of this early childbearing rate across states and birth cohorts is 8.4 percent. The right panel uses data from the 1968 through 1984 birth cohorts and is comparable, but defines early childbearing to be that occurring before age 20; the mean of this rate is 20.1 percent.

The first row of Table 4 presents sample means for each measure of disadvantage at birth for the relevant subset of birth cohorts. These data indicate that about 26 percent of the women in these birth cohorts were born to mothers who had not yet completed high school, about 16 percent to mothers who were not yet married, over 16 percent to mothers who were teens, and over six percent to mothers who were minors.

The first panel of regression results reflects estimates from simple regressions where the dependent variable is the relevant rate of early childbearing for the birth cohort and the independent variable is the rate of economic disadvantage at birth among that state/year female birth cohort. These results show a very strong intergenerational linkage between disadvantage at birth and subsequent rates of early childbearing. For instance a literal interpretation of these figures indicates that a birth cohort with an additional one percentage point higher rate of children in it born to minors will have about a one percentage point higher rate of childbearing as minors themselves. A similar result is obtained for births by age 20 as a function of the proportion of the cohort born to teen mothers. Although these data are not at the individual level, this is analogous to an outcome where all children born to minors (teens) go on to have births as minors (teens) themselves. It is very difficult to attribute causality to this relationship, however, given the inherent econometric limitations of this analysis.

The remainder of the table seeks to correct these limitations to the extent possible. In the second panel of the table, we report OLS estimates in models that are augmented by state and birth cohort fixed effects, but with no other covariates. In these models, the estimated coefficient on the relevant measure of disadvantage is greatly attenuated compared to the results from the simple regression models. Although considerably smaller in magnitude, many of the estimates still are statistically significant, at least at the 10 percent level.

The coefficient on the proportion of a state/year birth cohort born to a minor in a model where the dependent variable is defined as giving birth before age 18 falls from 1.097 (standard error of 0.059) to 0.250 (standard error of 0.114). This estimate implies that a cohort with a one percentage point higher rate of being born to a minor (a 16 percent increase from a 6.1 percent base) will, net of state and birth year fixed effects, have a roughly 0.25 percentage point higher

rate of childbearing as minors themselves. With a mean rate of childbearing as minors of 8.4 percent, this is a very small impact for a sizeable intervention.

Similarly, the estimated coefficient on the proportion of a state/year birth cohort born to mothers without a high school degree (base rate of 25.7 percent) in the model focusing on births by age 18 falls from 0.261 (standard error of 0.021) to 0.106 (standard error of 0.022). This means that if the rate of less educated mothers fell from 25.7 percent to, say, 20.7 percent, then the rate of early childbearing by age 18 would fall by about half a percentage point. Again, given that the mean rate of childbearing before age 18 is 8.4 percent, this is not a very large impact for a substantial reduction in the rate of socioeconomic disadvantage.

Table 5 replicates the analysis in Table 4, reporting models of the form described by equation (3), but in log-log form so that the coefficients can be interpreted as elasticities. Once we include fixed effects, we see that a 10 percent decrease in the proportion born to a mom with less education than a high school degree is associated with a 2.5 percent reduction in the rate of childbearing by age 18. The analogous decrease in the proportion born to a teen mom is also associated with a decrease of approximately 2 percent. These are the two largest elasticities that we observe and they are not that large. Other elasticities are considerably smaller. For instance, a 10 percent reduction in the proportion of a cohort born to minors only reduces the rate of childbearing by age 18 in that cohort by about .5 percent.

It is interesting to note that once the model controls for state and birth year fixed effects, there no longer appears to be a statistically significant relationship between the percentage of a birth cohort born to unmarried mothers and childbearing by age 18 (it still has a statistically significant impact on childbearing by age 20 in levels, but not in logs). Nevertheless, this may indicate that mother's marital status may not be as good an indicator of socioeconomic

disadvantage as mother's age or educational attainment. One might even expect that it would become an even poorer measure of disadvantage at birth as we go forward since the last birth cohort we are analyzing here is from 1986. As nonmarital childbearing continues its steady growth, it is reasonable to assert that it has become less selective on economic disadvantage.

The remaining panel of Tables 4 and 5 includes a large array of variables controlling for differences in population characteristics (age/race/educational attainment/marital status) in each state/year at the time each birth cohort reached age 17 or 19 as well as differences in relevant policies (abortion, welfare, Medicaid) in place and labor market conditions at those times. As we discussed earlier, including birth cohort and state fixed effects helps control for important elements of heterogeneity that may introduce bias, but they do not solve the problem. In particular, omitted variables that reflect differences across cohorts in different locations may still result in bias. Although we recognize the possibility of unobservable factors that have this feature, we incorporate these additional variables here as an attempt to reduce the problem.

The results reported in the bottom panel of the tables are very similar to those reported in the middle panel, from models that include no additional covariates besides the state and birth year fixed effects. Among the additional variables included, the unemployment rate at about the time that early childbearing would take place is estimated to be positively related to early childbearing. Similarly, when the population of women 15-44 in a state/year is comprised of more high school dropouts, the rate of early childbearing at that time in that location tends to be higher. Other than that, all other factors tend to be statistically insignificant. The fact that adding these observable factors that vary by birth cohort/state had so little impact on the disadvantage coefficient estimates may provide a glimmer of hope that much of the unobservable

heterogeneity has been eliminated. Of course, it would be imprudent to rely on this proposition too heavily.

VI. CONCLUSIONS

This paper has addressed the question of whether socioeconomic disadvantage *per se* leads to early childbearing. After presenting a review of relevant theoretical and empirical literatures from economics as well as other disciplines, we provided a descriptive analysis from the PSID of the relationship between socioeconomic disadvantage and early childbearing. Confirming what many previous studies have shown, we find that being born to a young mother, a mother with a low level of education, or an unmarried mother is associated with substantically higher rates of teen childbearing. The increase in "risk" associated with these factors is roughly commensurate with the increased risk of teen childbearing associated with poverty.

The main empirical contribution of this paper is a cohort-based analysis of the relationship between cohort rates of socioeconomic disadvantage and cohort rates early childbearing. Our cohort-based approach surmounts many of the issues of unobserved heterogeneity that preclude drawing causal inferences about socioeconomic disadvantage and the propensity to bear a child during one's teenage years from individual-level analyses. Our cohort-based analysis leads us to conclude that early childbearing – and all its potential associated costs – is a consequence of growing up disadvantaged. Nevertheless, we find that its impact is not very large. Our elasticity estimates indicate that interventions that would substantially reduce the rate of growing up in disadvantaged circumstances would have a farily modest impact on rates of early childbearing. For each of our four measures of socioeconomic disadvantage, our estimates imply that a 10 percent reduction in the proportion of a cohort with that particular proxy

characteristic would lead to a decline of less than about 2.5 percent in the proportion who give birth by age 18.

An important limitation of this paper is that we have not attempted to get inside the "black box" of disadvantage to determine what it is about socioeconomic disadvantage that leads young women to initiate childbearing before the age of 18 or 20. We present the empirical relationships but leave it to future research to investigate precisely *why* being born to a young mother or a mother with a low level of education leads a young girl to have a higher likelihood of giving birth before the ages of 18 and 20.

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Figure 1: Trends in Conditions at Birth

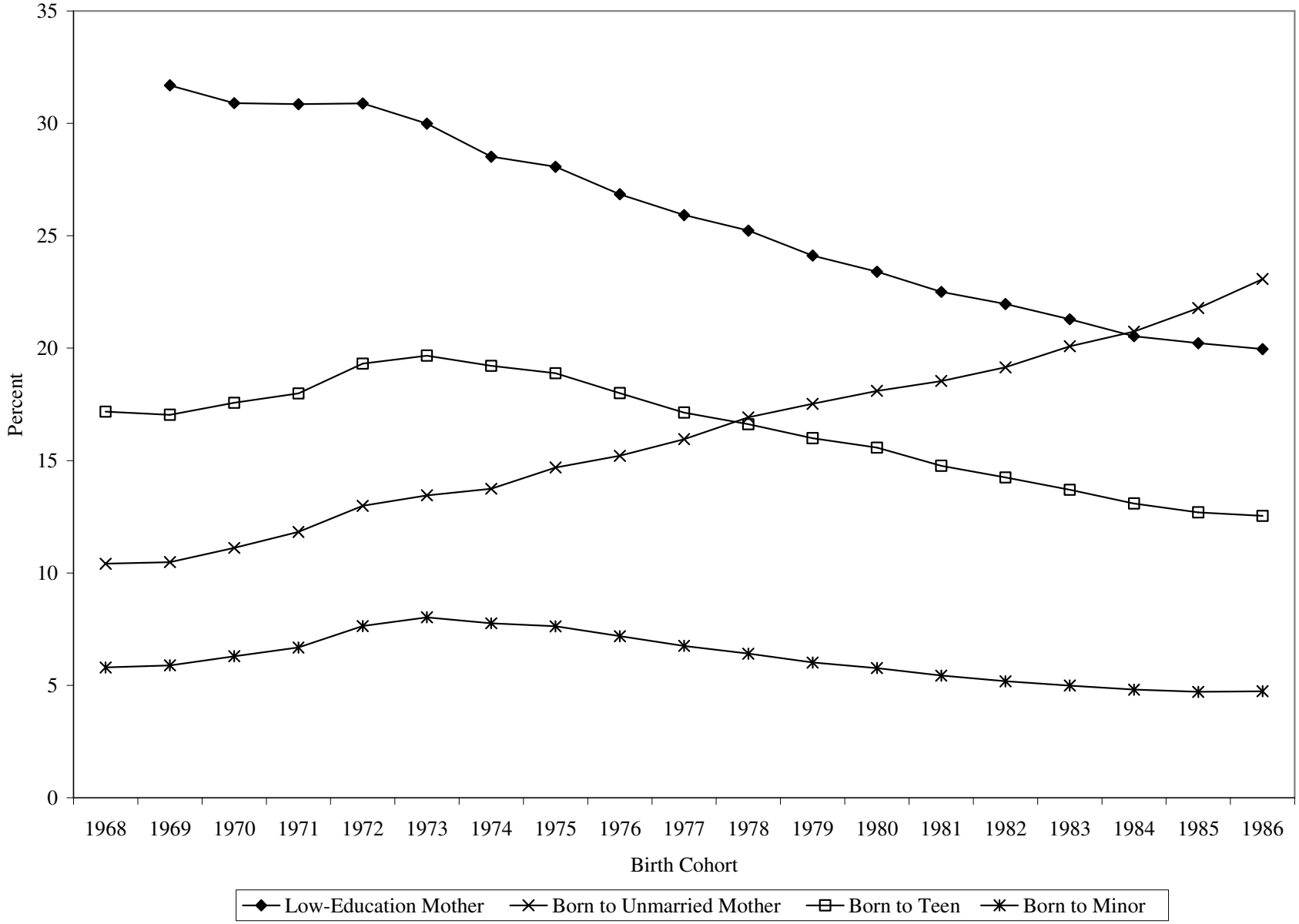


Figure 2: Cross-Sectional Variation in Percentage of Birth Cohorts Born to Teen Mothers

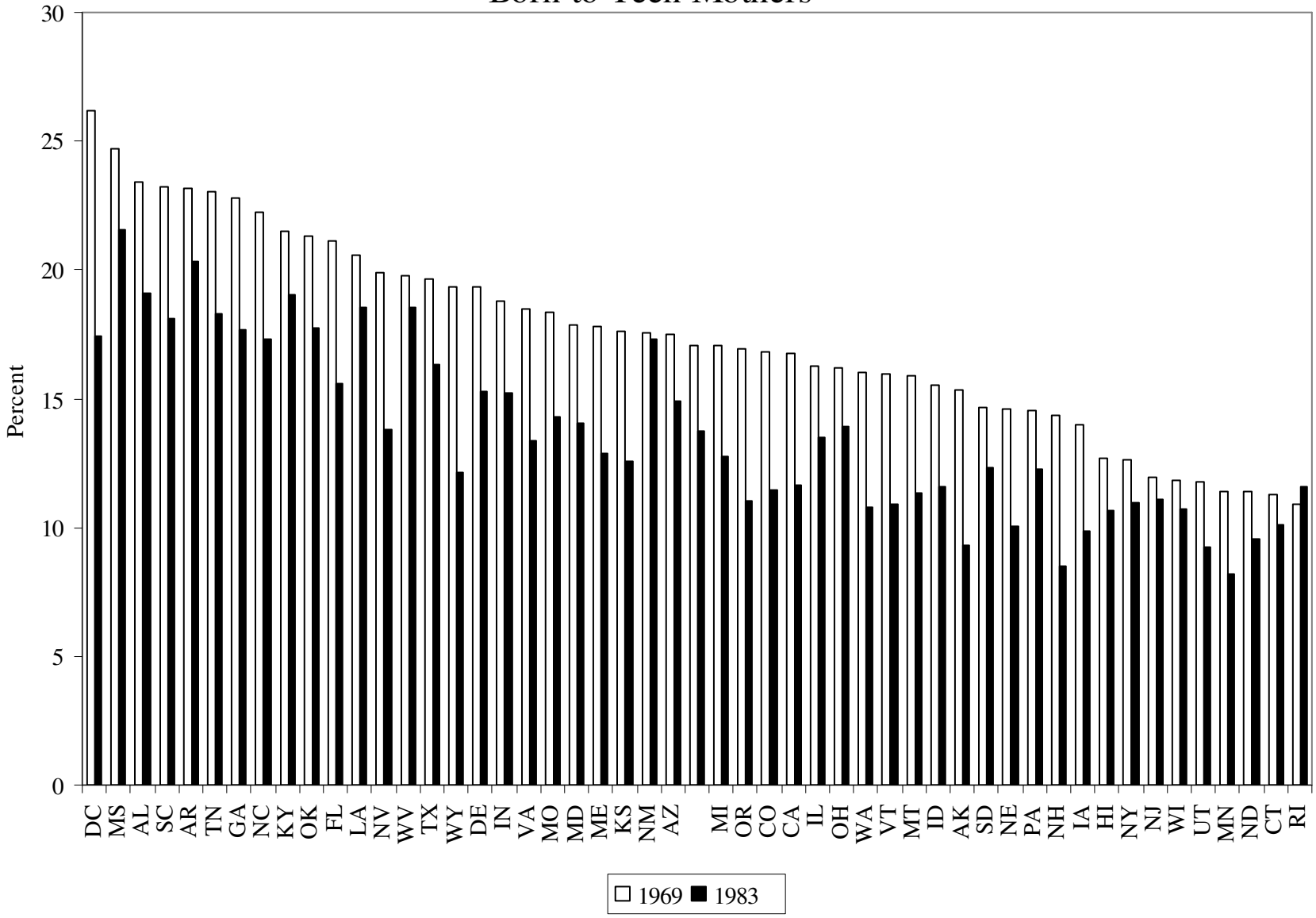


Figure 3: Trends in Rates of Early Childbearing

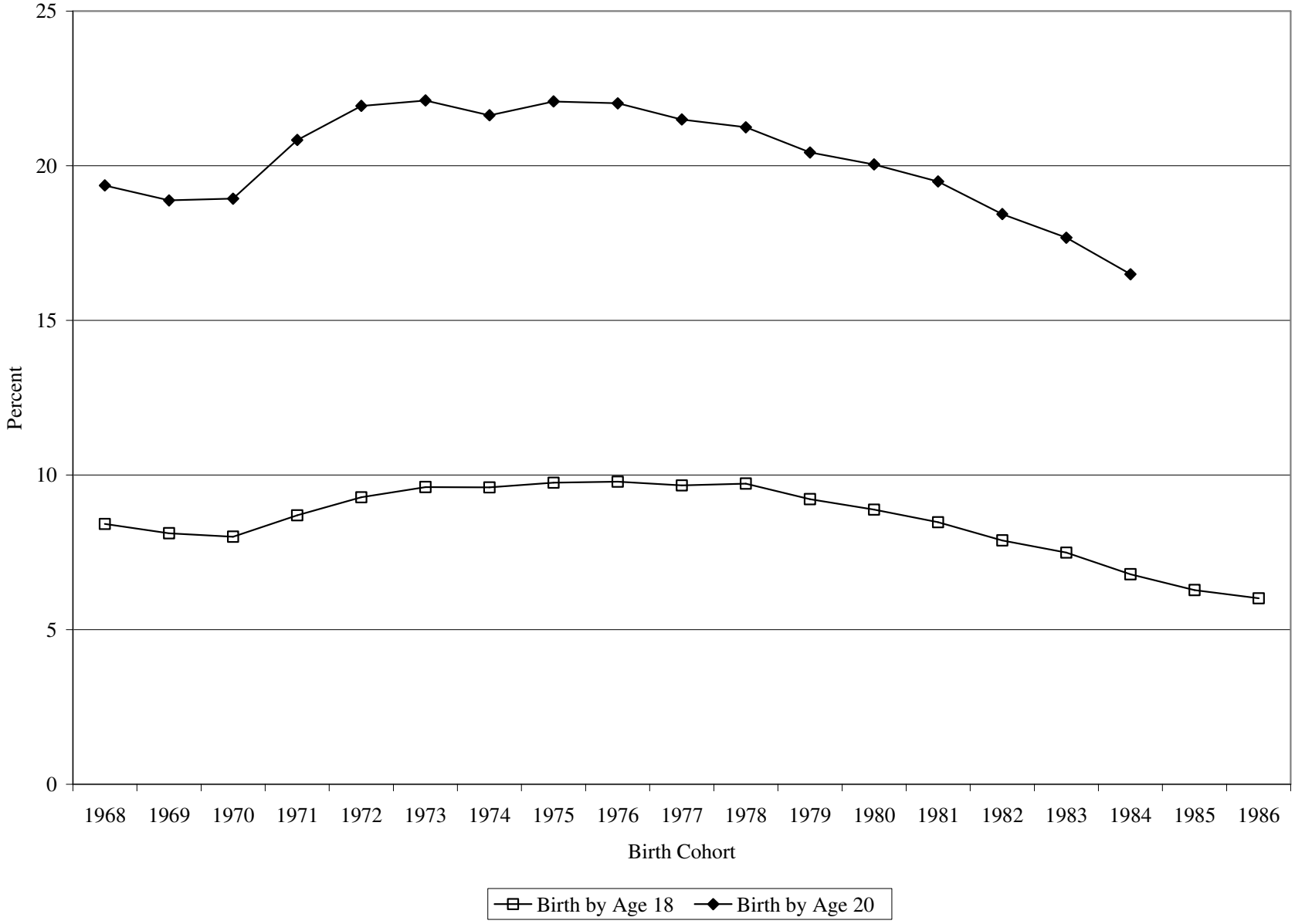


Figure 4: Cross-Sectional Variation in Percentage of Birth Cohorts Giving Birth by Age 20

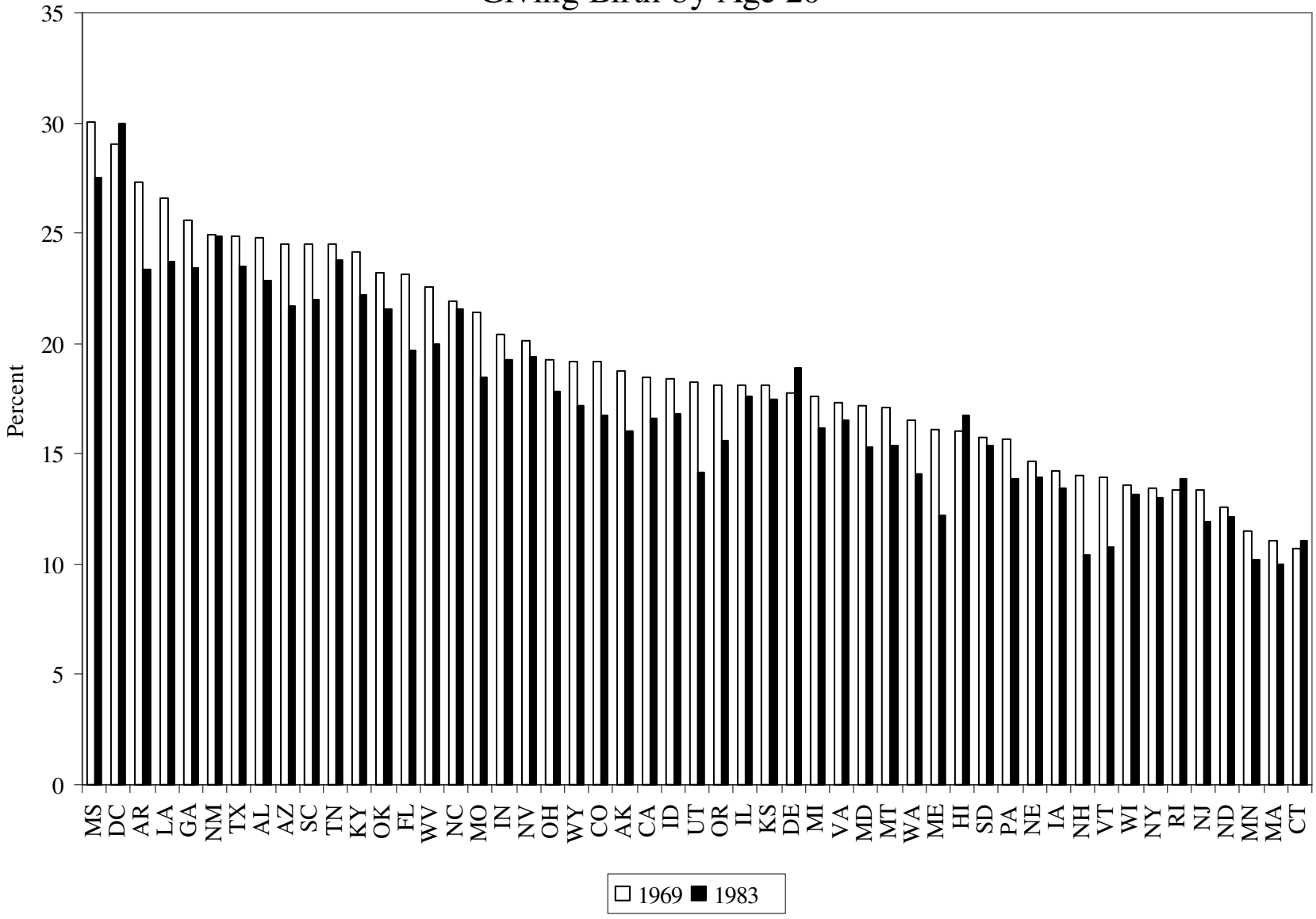


Table 1: Rates of early childbearing by disadvantage factor and two-way combinations

	All	Born to mother less than age 20	Born to unmarried mother	Born to mother with less than HS degree	Born into Poverty	Not living with married parents at age 15	Living in poverty at age 15
Percent with disadvantage factor		0.09	0.22	0.28	0.10	0.42	0.04
Percent with birth before age 20	0.24	0.47	0.46	0.45	0.45	0.36	0.50
Born to mother less than age 20							
Percent with disadvantage factor	0.09	1.00	0.65	0.84	0.23	0.75	0.11
Percent with birth before age 20	0.47	-	0.57	0.50	0.54	0.54	0.67
Born to unmarried mother							
Percent with disadvantage factor	0.22	0.27	1.00	0.57	0.27	0.80	0.12
Percent with birth before age 20	0.46	0.57	-	0.53	0.53	0.48	0.55
Born to mother with less than HS degree							
Percent with disadvantage factor	0.28	0.28	0.46	1.00	0.25	0.61	0.07
Percent with birth before age 20	0.45	0.50	0.53	-	0.55	0.54	0.70
Born into poverty							
Percent with disadvantage factor	0.10	0.21	0.57	0.65	1.00	0.65	0.10
Percent with birth before age 20	0.45	0.54	0.53	0.55	-	0.45	0.50

Sample: 1,741 women age 20-35 in the 2003 PSID

Table 2: Percent of women age 20-35 in 2003 PSID who give birth by age 20

	Born to mother less than age 20		Born to unmarried mother		Born to mother with less than HS degree		Not living with married parents at age 15	
	no	yes	no	yes	no	yes	no	yes
Not born into poverty	0.20	0.43	0.17	0.44	0.16	0.41	0.14	0.34
Born into poverty	0.43	0.54	0.35	0.53	0.27	0.55	0.47	0.45
Not in poverty age 15	0.21	0.45	0.18	0.44	0.16	0.43	0.16	0.35
Poverty age 15	0.43	0.67	0.38	0.55	0.32	0.70	0.40	0.51

Table 3: OLS regressions

	Dep var: Gave birth by age 20			Dep var: Gave birth by age18		
Born to Mom <20	0.019	-	-0.001	0.006	-	-0.005
	(0.048)	-	(0.049)	(0.038)	-	(0.039)
Born to Single Mom	0.103	-	0.092	0.065	-	0.054
	(0.036)	-	(0.037)	(0.028)	-	(0.029)
Born to Mom lt Hsgrad	0.204	-	0.191	0.143	-	0.125
	(0.032)	-	(0.033)	(0.026)	-	(0.026)
Born into Poverty	-	0.222	0.112	-	0.159	0.081
	-	(0.041)	(0.028)	-	(0.032)	(0.035)
Age 15- Not living w/ married parents	0.122	-	0.112	0.065	-	0.081
	(0.028)	-	(0.028)	(0.022)	-	(0.035)
Age 15 - Living in poverty	-	0.215	0.093	-	0.196	0.119
	-	(0.067)	(0.068)	-	(0.051)	(0.054)
constant	0.113	0.208	0.112	0.048	0.105	0.047
	(0.017)	(0.013)	(0.017)	(0.014)	(0.009)	(0.014)
sample size	1,043	1,134	1,022	1,043	1,134	1,022
Adjusted R^2	0.115	0.036	0.117	0.075	0.043	0.081

Table 4: Estimates of the Impact of Alternative Measures of Economic Disadvantage on Early Childbearing

	Dep. Var: Proportion of Cohort Giving Birth by Age 18 (mean = 0.084)				Dep. Var: Proportion of Cohort Giving Birth by Age 20 (mean = 0.201)			
Measure of Disadvantage:	Mother with Low Education	Unmarried Mother	Born to Teen	Born to Minor	Mother with Low Education	Unmarried Mother	Born to Teen	Born to Minor
Proportion w/ disadvantage	0.257	0.162	0.163	0.061	0.264	0.154	0.167	0.063
				No Other Covariates				
coeff./s.e.	0.261	0.184	0.550	1.097	0.478	0.327	1.062	2.037
	(0.021)	(0.040)	(0.033)	(0.059)	(0.035)	(0.078)	(0.061)	(0.124)
R-squared	0.635	0.168	0.746	0.776	0.588	0.153	0.792	0.783
				State and Birth Cohort Fixed Effects				
coeff./s.e.	0.106	0.060	0.122	0.250	0.095	0.137	0.172	0.292
	(0.022)	(0.053)	(0.063)	(0.114)	(0.038)	(0.071)	(0.088)	(0.164)
R-squared	0.982	0.968	0.974	0.974	0.988	0.984	0.985	0.985
				State and Birth Cohort Fixed Effects along with Additional Policy and Demographic Control Variables				
coeff./s.e.	0.137	0.057	0.129	0.272	0.161	0.155	0.187	0.342
	(0.022)	(0.040)	(0.056)	(0.095)	(0.036)	(0.065)	(0.074)	(0.128)
R-squared	0.983	0.974	0.98	0.98	0.989	0.985	0.985	0.986
Num obs.	612	666	918	918	576	629	867	867

Note: Standard errors are clustered at the state level.

Table 5: Elasticity Estimates of the Impact of Alternative Measures of Economic Disadvantage on Early Childbearing

	Dep. Var: Log Proportion of Cohort Giving Birth by Age 18				Dep. Var: Log Proportion of Cohort Giving Birth by Age 20			
Measure of Disadvantage:	Mother with Low Education	Unmarried Mother	Born to Teen	Born to Minor	Mother with Low Education	Unmarried Mother	Born to Teen	Born to Minor
				No Other Covariates				
coeff./s.e.	0.852	0.256	1.115	0.861	0.623	0.227	0.915	0.669
	(0.055)	(0.076)	(0.059)	(0.041)	(0.050)	(0.063)	(0.052)	(0.040)
R-squared	0.646	0.095	0.78	0.799	0.557	0.127	0.803	0.792
				State and Birth Cohort Fixed Effects				
coeff./s.e.	0.252	0.103	0.101	0.049	0.196	0.000	0.124	0.054
	(0.120)	(0.067)	(0.100)	(0.082)	(0.075)	(0.041)	(0.055)	(0.042)
R-squared	0.983	0.981	0.979	0.979	0.988	0.985	0.985	0.985
				State and Birth Cohort Fixed Effects along with Additional Policy and Demographic Control Variables				
coeff./s.e.	0.282	0.052	0.129	0.054	0.229	0.002	0.140	0.065
	(0.088)	(0.055)	(0.092)	(0.063)	(0.056)	(0.036)	(0.046)	(0.029)
R-squared	0.987	0.985	0.984	0.984	0.99	0.987	0.987	0.987
Num obs.	612	666	918	918	576	629	867	867

Note: All measures of disadvantage are included in the right hand side as the log of the proportion in the cohort with each disadvantage. Standard errors are clustered at the state level.