The Impact of Macroeconomic Conditions in Childhood on Adult Labor Market Outcomes

Neel Rao*
University at Buffalo, SUNY

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Abstract

This paper examines the influence of business cycles in childhood on economic performance later in life. I relate unemployment rates between the year before one's birth and the year of one's fifteenth birthday to schooling, employment, and income as an adult. The analysis exploits variation in macroeconomic conditions across states over time. I address a number of identification challenges related to cohort effects, linear trends, current events, and economic persistence. The caregiving behaviors and background characteristics of parents are also studied. The average unemployment rate in childhood normally has a negative effect on human capital in adulthood.

JEL Classification: J11, J24, J31

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*E-mail: neelrao@buffalo.edu. Tel: 716-645-8674. Address: 423 Fronczak Hall, Buffalo, NY 14260. I thank Raj Chetty, Rajeev Dehejia, Oliver Hart, Lawrence Katz, and seminar participants at Harvard University and the Society of Labor Economists for helpful discussions and suggestions. I am also grateful to an anonymous referee and the co-editor Lars Lefgren for constructive comments. Part of this research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS.

1 Introduction

The process of skill formation in childhood is an important area of research. An assessment of the effects of business cycles on child development can be useful to policymakers when designing and targeting economic stimulus plans or health care programs. This paper identifies how macroeconomic conditions during one's formative years affect one's labor market performance in adulthood. An economic downturn might lower the amount of resources that parents spend on educating their children or the quality of the neighborhood in which children are raised. Alternatively, the opportunity cost of making time-consuming investments in child care might decrease in a recession. By altering the environment in which children grow up, business cycles may impact the productivity of future generations of workers.

This paper builds on existing research that studies how macroeconomic fluctuations affect health outcomes.[1] Ruhm (2000) uncovers a procyclical relationship between mortality and unemployment, although suicides rise during recessions. Using data on babies born in the late twentieth century, Dehejia & Lleras-Muney (2004) find that infant health tends to improve when state unemployment rates increase. Based on a sample of individuals born in the Netherlands between 1812 and 1912, van den Berg *et al.* (2006) observe that children born during recessions display higher mortality later in life.[2] The current paper addresses an important question related to this literature. Do business cycles in childhood have persistent effects not only on health but also on economic variables such as schooling, income, and employment?[3] Depending on the nature of such effects,

[1] Other relevant studies include: Beaudry & DiNardo (1991), who analyze the impact of the lowest unemployment rate since beginning a job on the wage; Malmendier & Nagel (2011), who examine the influence of stock market returns during one's adult lifetime on risk preferences; Giuliano & Spilimbergo (2014), who investigate the effect of a recession in early adulthood on attitudes toward government redistribution; Oreopoulos *et al.* (2012), who identify the lasting reduction in earnings due to an economic downturn at college graduation; and Oyer (2006), who evaluates the repercussions of business cycles on the career trajectories of academic economists.

[2] Using a sample of births in Denmark around the turn of the twentieth century, van den Berg *et al.* (2009) estimate the effect of economic conditions between the ages of 1 and 4 on mortality among adults. Based on data from eleven European countries during the twentieth century, Hessel & Avendano (2013) investigate the relationship of economic conditions between the ages of 16 and 49 on physical capabilities in old age.

[3] In order to explore the mechanisms through which business cycles at birth might contribute to cardiovascular disease, van den Berg & Modin (2013) test for a relationship of economic conditions at birth to educational attainment. They do not find evidence of this in their dataset, which contains individuals born in Sweden between 1915 and 1929. Using data from the Netherlands between 1815 and 2000, van den Berg & Gupta (2015) examine the interaction of marital status with economic conditions in childhood.

the adult outcomes of children might be improved by policies that provide funds to jobless parents for child rearing or that give parents time off from work for child care.

This topic connects with a substantial literature that traces the lasting consequences of adverse conditions during childhood, in infancy, and before birth. Several authors have studied individual economic shocks like parental job loss. Oreopoulos *et al.* (2008) and Bratberg *et al.* (2008) test whether the displacement of fathers affects future earnings among offspring. Coelli (2011) and Hilger (2013) identify the impact of parental layoffs on the schooling of children. Other researchers investigate biological shocks like disease and famine. Almond (2006) links influenza exposure in utero to lower earnings and greater disability as an adult. A number of epidemiologists have examined how severe malnutrition around the time of birth influences health later in life (Stein *et al.*, 1975; Kannisto *et al.*, 1997; Stanner *et al.*, 1997).

The analysis proceeds in a number of stages and combines multiple sources of data. I begin by documenting the relationship of unemployment rates during childhood to labor market outcomes as an adult. A large extract from the American Community Survey (ACS) is used for this purpose. A significant challenge is to separate the effect of economic conditions in childhood from other determinants of adult performance related to place, cohort, date, and age. The coefficients are identified from variation in unemployment rates across locations over time. That is, the estimates are based on macroeconomic shocks that are specific to a particular birth cohort and birth state. The specifications account for a variety of influences such as cohort effects, linear trends, current events, and economic persistence.

The estimating equations control for basic demographics in addition to fixed effects for birth state, birth year, current year, and current age. They also include interactions between birth state and current year as well as a linear trend in birth year specific to each birth state. The fixed effects for birth year represent the shared experiences of a birth cohort. The age-specific effects reflect the evolution of labor market performance over the life cycle. The interactions between birth state and current year capture the impact of contemporaneous conditions on labor market outcomes. The state-specific linear trend in birth year helps to absorb long-run differences in economic progress

across states. The specification is also extended to incorporate economic conditions around school graduation and during early adulthood.

A potential complication is that the background characteristics of parents who select to give birth and rear children might vary with macroeconomic conditions. Consequently, differences over the business cycle in the underlying quality of parents raising children might partly explain the observed impacts of childhood conditions on adult outcomes.[4] In order to evaluate this issue, a matched sample of parents and children from the Panel Study of Income Dynamics (PSID) is constructed. I examine how the estimated coefficient on the unemployment rate changes after controlling for parental background variables, and I describe the relationship of the unemployment rate during childhood to parental characteristics.

A final question concerns the mechanisms through which childhood economic conditions affect the stock of human capital as an adult. One possibility is that the state of the macroeconomy affects the home environments of children and the caregiving practices of parents.[5] This effect is illustrated using information from the Child Supplement of the National Longitudinal Survey of Youth 1979 (NLSY79-CH). I estimate the impact of the current unemployment rate on the quality of a child's home environment, which is measured using parental assessment tools from the child development literature. These assessments cover a variety of topics such as visiting a museum or the theater, providing books or toys at home, and spending time or eating meals as a family.

A notable feature of this study is the compilation of a state unemployment rate series covering a long time horizon. The Bureau of Labor Statistics (BLS) provides data on state unemployment rates only from 1976 onwards. Nonetheless, information on unemployment for each state in prior years can be derived from ET Financial Data Handbook 349, which assembles the statistical reports of state workforce agencies. These data enable the estimation of state unemployment rates for the entire second half of the twentieth century.

Overall, there is evidence of a negative impact of the unemployment rate early in life on eco-

[4] See Dehejia & Lleras-Muney (2004) for a theoretical and empirical discussion of how the unemployment rate affects the characteristics of women selecting to give birth.

[5] Other possible factors include changes over the business cycle in the quality of medical care, schooling systems, and neighborhoods.

nomic performance as an adult. This finding is unlikely to be explained by changes over the business cycle in the underlying quality of parents raising children. The remainder of this paper is organized as follows. Section 2 summarizes the information on unemployment rates as well as the data from the ACS, PSID, and NLSY79-CH. Section 3 contains a graphical presentation that helps to motivate the statistical analysis. Section 4 describes the empirical strategy and discusses how potential threats to identification are addressed. Section 5 provides the estimation results. Section 6 concludes.

2 Data

This section summarizes the datasets used in the paper. Section 2.1 describes the source of the state unemployment rates. Sections 2.2, 2.3, and 2.4 document the main estimation samples from the ACS, PSID, and NLSY79-CH.[6]

2.1 Unemployment Rate Series

Statistics on the national unemployment rate in each year are available from the BLS starting in 1947. However, the BLS provides data on the annual average unemployment rate of each state beginning only in 1976. Therefore, information on the state unemployment rate in prior years is constructed based on ET Financial Data Handbook 349, which compiles the accounting records of state workforce agencies that administer unemployment insurance.

A state unemployment rate series from 1947 to 2011 is generated as follows.[7] For each year from 1976 to 2011, the annual average unemployment rate for each state is obtained from the BLS. In addition, yearly information on the rate of insured unemployment is obtained for each state from ET Financial Data Handbook 349. The rate of insured unemployment is formally defined as the average weekly number of insured unemployed divided by the sum of the average monthly number of covered employed and the average weekly number of insured unemployed. It is conceptually similar to an unemployment rate, which is the number of unemployed divided by the sum of the number employed and the number unemployed. The rate of insured unemployment is available for every state from 1947 to 2011.[8]

[6] Further information about each sample is located in the notes to the tables.

[7] The District of Columbia is included as a state.

[8] Only three states—Georgia, Hawaii, and Oregon—have data on the rate of insured unemployment before 1947.

The rate of insured unemployment from ET Financial Data Handbook 349 is converted to a form that is comparable to the unemployment rate from the BLS. In order to estimate the unemployment rate for each state between 1947 and 1975, the annual average unemployment rate for a given state is regressed on the rate of insured unemployment, the national unemployment rate, and a linear trend in year using the observations on that state between 1976 and 2011. The estimated regression equation for that state is then applied to the rates of insured unemployment and the national unemployment rates to predict the annual average unemployment rates between 1947 and 1975.

Some alternative specifications or robustness checks use the labor force participation rate or the employment-to-population ratio as a measure of macroeconomic conditions. The national labor force participation rate and employment-to-population ratio are available yearly from the BLS starting in 1947, but the BLS provides annual data on these variables at the state level only from 1976 onwards. The values of these variables for each state in earlier years are derived from ET Financial Data Handbook 349 along with the intercensal estimates of state populations from the Census Bureau. For each year from 1947 to 2011, a proxy for the labor force participation rate in a given state is generated by dividing the sum of the average monthly number of covered employed and the average weekly number of insured unemployed by the population of that state, and a proxy for the employment-to-population ratio in a given state is generated by dividing the average monthly number of covered employed by the population of that state.

These proxies are then transformed so as to make them comparable to the official statistics from the BLS on the labor force participation rate and employment-to-population ratio. In order to estimate the actual labor force participation rate for each state between 1947 and 1975, the official labor force participation rate for a given state is regressed on the proxy for the state labor force participation rate, the official national labor force participation rate, and a linear trend in year using the observations on that state between 1976 and 2011. The estimated regression equation for that state is then applied to the proxies for the state labor force participation rate and the official national labor force participation rates to predict the actual state labor force participation rates

between 1947 and 1975. The actual state employment-to-population ratios between 1947 and 1975 are estimated by performing an analogous procedure using the official state employment-to-population ratio, the proxy for the state employment-to-population ratio, and the official national employment-to-population ratio.

Since the unemployment rate is imputed using parameters estimated from a regression, the key explanatory variable is substituted with a generated regressor for some birth cohorts. As explained by Pagan (1984), the inclusion of a constructed variable results in invalid standard errors, although the coefficient estimates are typically consistent. This problem arises because the ordinary least-squares regression in the second stage does not account for sampling error in the estimates from the first-stage regression. Methods for deriving correct standard errors are presented by Murphy & Topel (1985) as well as Newey (1984). Such procedures are difficult to implement in the current setting because the error structure across observations is relatively complicated with arbitrary clustering at the state level.

Nonetheless, this issue can be addressed to some extent. First, Pagan (1984) notes that the usual standard errors are asymptotically valid under the null hypothesis that the coefficient is zero on the unobserved variable being replaced by a generated regressor. Hence, the test of a zero coefficient on the key explanatory variable is conducted properly at least in the baseline specification. In addition, a robustness check is performed in which the regressions are replicated using the raw data on the rate of insured unemployment as a measure of economic conditions. Thereby, the adoption of a generated regressor is avoided, although the coefficients are less interpretable with regard to conventional unemployment statistics. The results are qualitatively similar to the main estimates in terms of the sign of the effects and statistical significance.

2.2 ACS Sample

In order to investigate the relationship between unemployment rates in childhood and economic outcomes as an adult, I construct a large sample using the Integrated Public Use Microdata Series (IPUMS) for the 2000 to 2011 waves of the ACS.[9] The dataset is restricted to individuals aged

[9]The ACS is a monthly survey conducted by the U.S. Census Bureau and is intended to replace the long form of the decennial census.

between 30 and 65 at the time of the survey who have data on educational attainment, working last year, employment status, labor force status, and wage income.[10] Only persons born in one of the fifty states or the District of Columbia are included. Because of the age restriction, the sample omits respondents born after 1981. In addition, recall that state unemployment rates are available for all states only from 1947 onwards. Because the key explanatory variable is the state unemployment rate between the year before one's birth and the year of one's fifteenth birthday, the sample excludes individuals born before 1948.

The first column of Table 1 displays summary statistics for the dataset from the ACS. The sample contains 8,491,751 observations. The mean year of birth is 1962, and the mean age is 45. The average state unemployment rate between the year before one's birth and the year of one's fifteenth birthday has mean 6.34 and standard deviation 1.47. The outcomes examined are: indicators for high school completion, college graduation, and receipt of some graduate education; indicators for having worked in the past calendar year, currently being in the labor force, and being employed at present; and indicators for having both worked in the past calendar year and received a wage income of at least \$10,000, \$20,000, and \$30,000 during that period.[11] The analysis of income levels utilizes joint work-wage outcomes instead of log wages so as to account for selection into employment.[12]

2.3 PSID Sample

In order to assess whether the observed impact of unemployment rates in childhood can be attributed to changes in the background characteristics of parents raising children, I construct a matched sample of parents and children from the 1968 to 2009 waves of the PSID.[13] The dataset contains sample family members from both the Survey Research Center (SRC) and Survey of Eco-

[10] Because the exact year of birth is not provided in the ACS, the year of birth is approximated by subtracting age from the survey year. The empirical results are similar if one imputes the birth year by subtracting one plus age from the survey year or if one uses data from earlier Censuses in which the exact birth year is known.

[11] All income figures are expressed in 1982-1984 terms.

[12] Other methods of accommodating the employment decision include the use of a median regression or a selection correction. However, such procedures are difficult to justify here because they usually rely on an assumption about the wage offers of nonparticipants relative to participants or the existence of a variable affecting participation but not wage offers.

[13] The data from the PSID are annual from 1968 to 1997 and biennial thereafter.

nomic Opportunity (SEO) components of the PSID. The analysis is restricted to individuals with valid data on year of birth who grew up in one of the fifty states or the District of Columbia. The dataset includes only respondents whose mother or father has information on first occupation and birth year as well as years of schooling, total hours worked, total labor income, and employment status for some survey year when aged between 30 and 65.

One observation is generated on an individual for each survey year in which he or she is a head or wife between the ages of 30 and 65 as of the end of the year and has data on years of schooling, total hours worked in the past calendar year, total labor income in the past calendar year, and current employment status. Given that state unemployment rates are available for all states only from 1947 onwards and that the key explanatory variable is the average state unemployment rate between the year before one's birth and the year of one's fifteenth birthday, the sample includes observations on individuals with birth years ranging from 1948 to 1979. Descriptive statistics for the main sample from the PSID are presented in the second column of Table 1.

2.4 NLSY79-CH Sample

In order to demonstrate how parental caregiving and home environments change with the unemployment rate, I construct a sample of individuals from the 1986 to 2008 waves of the NLSY79-CH, which surveys children born to female participants in the NLSY79.[14] The restricted-access geocode files for the NLSY79 and NLSY79-CH are obtained so as to match respondents to state-level data on the unemployment rate.

The quality of each child's household surroundings is measured using information from the Home Observation for Measurement of the Environment-Short Form (HOME-SF) inventory.[15] The scores on the HOME-SF inventory are based on both parental reports and interviewer observations. The topics covered by the HOME-SF vary with each child's developmental level: infant/toddler (part A, ages 0-2), early childhood (part B, ages 3-5), middle childhood (part C, ages 6-9), and early adolescence (part D, ages 10-14). Examples of items on the HOME-SF in-

[14] Individuals in the NLSY79-CH are interviewed biennially.

[15] The HOME-SF is a condensed version of the Home Observation for Measurement of the Environment (HOME) inventory. The HOME-SF inventory was developed for use in the NLSY79-CH and is also administered in the PSID. See Caldwell & Bradley (2003) for more details on the HOME inventory.

clude: number of children's books and toys at home; frequency of visits to the grocery, theater, and museum; whether the child eats meals with his/her mother and father; whether the child's mother spoke to, caressed, or spanked the child during the interview; how often the child spends time with his/her father; whether the child's mother helps teach the child numbers, letters, colors, and shapes; whether the child is expected to make his/her bed, clean up after him/herself, and perform regular housekeeping tasks; whether the child's home appears to be well lighted, clean, and free of trash. The HOME inventory has been widely employed in the child psychology literature to study how the family setting affects cognitive and behavioral development.[16]

The sample from the NLSY79-CH contains individuals whose mother belongs to the cross-sectional or supplemental sample of the NLSY79. The analysis is restricted to observations on children who live in one of the fifty states or the District of Columbia and are aged between 0 and 15 as of the end of the survey year. The dataset includes only children whose mother has information on first occupation, years of schooling, and AFQT score. Each observation is classified into one of four categories, depending on which age-appropriate part of the HOME-SF inventory was administered to the child in that survey year. Each category includes only observations in which the child has valid data on the total, cognitive stimulation, and emotional support raw scores for the applicable part of the HOME-SF inventory. Table 2 summarizes the main sample of children from the NLSY79-CH.

3 Graphical Analysis

This section graphically illustrates the data in order to explain the intuition behind the empirical strategy. The labor market outcomes of individuals born in the Rust Belt and Sun Belt are analyzed. These two regions had divergent economic trajectories during the second half of the twentieth century, which helps to visualize regional differences in the paths of the variables over time. In particular, a differences-in-differences analysis is presented. That is, I relate the difference in adult outcomes between individuals born in the two regions during the same year to the corresponding difference in economic conditions during childhood.

[16]For example, see Elardo *et al.* (1977), Bradley & Caldwell (1980), and Bradley *et al.* (1988).

The exercise is implemented as follows. The Rust Belt is defined as the states in the Middle Atlantic and East North Central divisions of the Census.[17] The Sun Belt is defined as the states along the Gulf Coast or the southern border with Mexico.[18] The explanatory variable is the average state unemployment rate between the year before one's birth and the year of one's fifteenth birthday. The dependent variables are indicators for high school completion, for currently being in the labor force, and for having both worked in the past calendar year and received a wage income of at least $30,000 during that period.[19]

The data points for the Rust Belt are derived by restricting the main estimation sample for the ACS to individuals who were aged between 40 and 49 at the time of the survey and who were born in one of the states in the Rust Belt. Because the survey years range from 2000 to 2011, individuals in their 40's were born between 1951 and 1971. The averages of the explanatory and dependent variables are taken over all individuals born in the same year. An analogous procedure is used to compute the data points for the Sun Belt. The raw statistics are exhibited in the online appendix so as to demonstrate a simple difference method. That is, average adult outcomes for individuals born in a given region are plotted against the average state unemployment rate in childhood, which varies across birth cohorts.

The current section implements a differences-in-differences technique. In particular, I plot the difference in average adult outcomes between individuals born in the Rust Belt and Sun Belt during the same year against the corresponding difference in the average state unemployment rate during childhood. The observations are obtained by differencing the data points between regions. To generate the variable on the horizontal axis, the average state unemployment rate in childhood for individuals born in the Sun Belt during a given year is subtracted from the average state unemployment rate in childhood for individuals born in the Rust Belt during the same year. For the

[17] In particular, the Rust Belt consists of the following states: Illinois, Indiana, Michigan, New Jersey, New York, Ohio, Pennsylvania, Wisconsin. States such as Missouri and West Virginia can be added to the Rust Belt without substantially changing the results.

[18] In particular, the Sun Belt consists of the following states: Alabama, Arizona, California, Florida, Louisiana, Mississippi, New Mexico, Texas. The results do not change substantially if the Sun Belt is expanded to include Arkansas, Georgia, Nevada, North Carolina, South Carolina, and Tennessee.

[19] The general pattern of results is similar if alternative measures of education, earnings, and labor force attachment are used.

variable on the vertical axis, the average of the adult outcome for a particular birth cohort from the Sun Belt is subtracted from the average of the adult outcome for the corresponding birth cohort from the Rust Belt.

The resulting graphs are displayed in figure 1. For earlier birth cohorts, the unemployment rate in childhood is lower in the Rust Belt than in the Sun Belt. The opposite holds for later birth cohorts as the Sun Belt overtakes the Rust Belt in economic conditions. Correspondingly, adult outcomes in the Rust Belt seem to deteriorate relative to those in the Sun Belt across successive cohorts. The inverse relationship between differences in unemployment rates during childhood and differences in labor market outcomes as an adult is statistically significant.[20]

The graphs account for some fundamental determinants of adult outcomes. Because the dataset is limited to prime age individuals, the figures hold constant the general age level at which adult performance is measured.[21] That is, the analysis largely controls for the progression of labor market outcomes with age. Since the sample is restricted to particular geographic regions, the figures hold constant the general locations of the groups of people being compared.[22] That is, the analysis controls for consistent differences in economic conditions between locations.

Furthermore, the empirical strategy addresses the following issues. First, different birth cohorts reach the same age in different years. Accordingly, the differences-in-differences procedure allows for fixed effects for survey year. Because of the differencing across regions, the plots essentially control for economic conditions at the national level in the survey year when adult outcomes are measured. Second, members of the same birth cohort tend to share common shocks to technology, institutions, and the environment. Accordingly, the differences-in-differences procedure allows for fixed effects for birth year. Due to the differencing of variables, the plots effectively control for cohort effects at the national level.

Nonetheless, the basic differences-in-differences methodology has some limitations. First, it

[20]Using the observations in figure 1 to perform a univariate regression of the difference in average adult outcomes on the difference in the average state unemployment rate during childhood, the point estimate (standard error) of the coefficient on the explanatory variable is respectively -0.0084 (0.0015), -0.0068 (0.0024), and -0.0153 (0.0047) when the dependent variable is the difference in high school graduation, labor force participation, and earnings over $30,000.

[21]The regressions in the subsequent sections control more precisely for a fixed effect for each age.

[22]The regressions in the subsequent sections control more precisely for a fixed effect for each state.

does not allow for state-specific trends in birth year. There might be heterogeneity across states in the evolution of school quality, health care, and other factors. That is, cohort effects might follow a different time path in each state. Second, it does not allow for state-specific shocks in each survey year. Hence, economic conditions are assumed to vary across states over time in childhood but not in adulthood. The regression specifications in the ensuing sections deal with these complications by including a linear trend in birth year specific to each birth state as well as a complete set of interactions between survey year and birth state.

4 Methods

This section presents the empirical methodology for estimating the impact of childhood economic conditions. Section 4.1 describes the main estimating equation, and section 4.2 explains how the parameters are identified. Sections 4.3 and 4.4 discuss the influence of economic conditions around school graduation and in early adulthood. Section 4.5 examines the role of parental background, and section 4.6 assesses the home environment.

4.1 Baseline Specification

The data from the ACS are used to investigate the relationship between state unemployment rates in childhood and labor market outcomes as an adult. A negative association might arise if a recession lowers spending on education and health care, elevates stress among parents and children, or lessens the amenities offered by neighborhoods. A positive association is possible if parents are more likely to make time-consuming investments in caring for and bringing up children when the economy slackens.

I first present the baseline regression. Let h_{it} be an indicator variable representing the schooling, employment, or income of person i in year t. Let $b(i)$ be person i's birth year and $s(i)$ be person i's birth state. Let x_i be a vector of basic demographic variables like race and gender for person i. Denoting by $u_{b(i),s(i)}$ the average unemployment rate between years $b(i)-1$ and $b(i)+15$ in state $s(i)$, the following equation is estimated:

$$h_{it} = \beta u_{b(i),s(i)} + \delta^1_{b(i)} + \delta^2_{s(i)} + \delta^3_t + \delta^4_{t-b(i)} + \delta^5_{s(i)} b(i) + \delta^6_{s(i),t} + \Delta' x_i + \nu_{it}, \tag{1}$$

where $\delta^1_{b(i)}$, $\delta^2_{s(i)}$, δ^3_t, and $\delta^4_{t-b(i)}$ are fixed effects for birth year, birth state, survey year, and age,

respectively. The parameter $\delta^5_{s(i)}$ allows for a linear trend in birth year specific to each birth state. The parameter $\delta^6_{s(i),t}$ is a fixed effect for the interaction between birth state and survey year. The coefficient β represents the influence of the state unemployment rate in childhood. The error term ν_{it} is clustered by state of birth so as to account for serial correlation across birth years among individuals born in the same state.[23]

I also estimate an extended version of the specification. Some authors such as Cunha & Heckman (2007) and Almond & Currie (2011) have suggested that early childhood is a critical period for skill development. To permit such a distinction, I include separate regressors for the average unemployment rates in the year before one's birth, the year of one's birth, the first to fifth years after one's birth, the sixth to tenth years after one's birth, and the eleventh to fifteenth years after one's birth. These intervals correspond to the prenatal stage, infancy, early childhood, middle childhood, and early adolescence.

4.2 Identifying Variation

The coefficient β in equation (1) reflects the effect of the average state unemployment rate in childhood on labor market outcomes as an adult. It is identified based on differences among states in the change in childhood economic conditions across birth cohorts. To isolate such variation, the equation contains fixed effects $\delta^1_{b(i)}$ and $\delta^2_{s(i)}$ for year and state of birth. The fixed effect for birth year controls for a cohort effect at the national level. This captures shared experiences with technical innovations, government policies, or educational systems. The fixed effect for birth state accounts for the persistent component of economic conditions within a state. This absorbs unobserved factors that might cause a state to continually have a strong or weak economy. The term $\delta^5_{s(i)}b(i)$ in equation (1) is a linear trend in year of birth for each state. It represents variation among states in the underlying trajectory of omitted factors that may be related to the economy. It allows the cohort effect to evolve differently in each state.

The dependent variable in equation (1) is a measure of labor market performance, which is affected by the age of an individual as well as economic conditions in the current year. Hence, the

[23] See Bertrand *et al.* (2004) for a discussion of how serial correlation affects the standard errors for differences-in-differences estimates.

regression specification includes fixed effects $\delta^4_{t-b(i)}$ and δ^3_t for age and survey year. The former term accounts for changes in human capital over the life cycle, and the latter term controls for the influence of current conditions on adult outcomes. Since the unemployment rate is assumed to vary across states over time in childhood, there should also be variation across states in economic conditions over time in adulthood. Thus, the empirical model includes an interaction effect $\delta^6_{s(i),t}$ between each birth state and each survey year. This term reflects business cycles at the state level in adulthood.[24]

Specification (1) can also be explained in terms of the graphical analysis in section 3. Figure 1 illustrates a differences-in-differences strategy in which the difference between states in childhood economic conditions for individuals born in the same year is plotted against the respective difference in outcomes during the same set of survey years. Correspondingly, equation (1) contains fixed effects $\delta^1_{b(i)}$ and δ^3_t for birth year and survey year. In figure 1, the outcomes of individuals born in given sets of states are compared at similar ages. Correspondingly, equation (1) includes fixed effects $\delta^2_{s(i)}$ and $\delta^4_{t-b(i)}$ for birth state and current age.

In addition to the controls suggested by the graphical analysis, specification (1) includes a state-specific linear trend in birth year and a state-specific shock in each survey year. These factors are represented by the terms $\delta^5_{s(i)}b(i)$ and $\delta^6_{s(i),t}$ in the regression model. The coefficient $\delta^5_{s(i)}$ allows for a linear trend across birth cohorts in unobservable variables particular to a given state. The parameter $\delta^6_{s(i),t}$ accounts for a shock to the economy of a particular state in a given survey year.

An important assumption for identifying and interpreting the model is that the unemployment rate in childhood is conditionally correlated with economic fluctuations early in life but not with other relevant variables shared by individuals from the same cohort and state. The controls for birth state, year born, and cohort trends in each state help to make this property more plausible. Nonetheless, there are some confounders that might cause it to be violated. First, the unemployment rate during childhood may be associated with macroeconomic conditions during later stages

[24]It is not feasible to control for a complete set of interactions among current age, survey year, and birth state. If all these interactions were added to the model, then the main coefficient β would not be identified due to collinearity between the average state unemployment rate in childhood and the other regressors.

of life. Second, cohort quality may vary due to changes over the business cycle in the background characteristics of couples selecting to have children. These issues are discussed in greater detail below.

4.3 School Graduation

Some authors have noted that economic conditions at labor market entry have a persistent impact on earnings. Oreopoulos *et al.* (2012) find that Canadian students graduating college in a recession experience a lasting decline in earnings. Kahn (2010) obtains similar results for the United States, and Genda *et al.* (2010) replicate the analysis for Japan. If the unemployment rate in childhood is correlated with the state of the labor market at school graduation, then the observed influence of business cycles in childhood might be attributable to economic conditions upon leaving school.

In order to assess this issue, further control variables can be included in specification (1). First, a majority of the individuals in the data completed high school but not college. Therefore, I add the state unemployment rate at age eighteen as an explanatory variable in the regressions. Second, a significant minority finished college but not graduate school. Therefore, I also add the state unemployment rate at age twenty-two.

Third, I estimate equation (1) with the state unemployment rate in the estimated year of school leaving as an additional regressor. The year of graduation is approximated by adding six to the sum of the year of birth and the number of years of schooling. Nonetheless, the unemployment rate at graduation is endogenous because individuals can choose between remaining in school and entering the workforce based on the current state of the economy. By contrast, economic conditions at age eighteen or twenty-two are more likely to be exogenous. Therefore, the first two alternatives are preferred over the third, especially if the dependent variable is a measure of education.

4.4 Economic Persistence

Specification (1) allows for some forms of persistence in economic conditions over time. First, it includes a fixed effect $\delta^2_{s(i)}$ for birth state. This controls for the consistently high or low unemployment rates of some states relative to others. Second, it contains a linear trend $\delta^5_{s(i)} b(i)$ in birth year specific to each birth state. This accounts for the fact that changes in unemployment rates

over the long term are bigger or smaller in some states than in others. Hence, the coefficient on childhood economic conditions is identified based on relatively transient deviations of the unemployment rate from its state-specific mean and trend. Moreover, the interaction term $\delta^6_{s(i),t}$ between each birth state and each survey year largely absorbs the relationship between current economic conditions and the unemployment rate in childhood.

Despite conditioning on these and other covariates, the unemployment rate in childhood might still be correlated with economic conditions later in life. If so, then the estimated coefficient on childhood economic conditions might actually reflect macroeconomic fluctuations at other stages of life. In order to evaluate this question, I extend specification (1) by including a number of control variables for economic conditions in emerging adulthood. First, I add the state unemployment rates at each age between sixteen and twenty-nine as explanatory variables in the regressions.[25] Moreover, past unemployment might be related not only to subsequent unemployment but also to future labor force participation.[26] For example, job seekers might be discouraged by unemployment and withdraw from the labor force for an extended time. Therefore, I also add the state labor force participation rates at each age between sixteen and twenty-nine.

Nevertheless, the baseline specification in equation (1) might be preferred over these extended versions. First, the persistence of economic conditions may itself be partly due to the impact of business cycles on skill formation in childhood. For example, a recession might lower the human capital of children growing up during that period. Consequently, these children have poor employment prospects as adults, generating an economic contraction in future years. Second, a relationship between childhood conditions and adult outcomes may have important policy and welfare implications regardless of the underlying explanation. For example, children growing up during a downturn might have low earnings power as adults either because their parents have fewer resources to spend on their education or because the labor market is still poor early in their

[25] Childhood economic conditions are measured based on unemployment rates between the year before birth and age fifteen, and the samples used to study adult outcomes are restricted to individuals between the ages of thirty and sixty-five. Hence, the fourteen regressors for unemployment rates between ages sixteen and twenty-nine cover the period from the end of childhood to full adulthood.

[26] Schweitzer & Smith (1974) as well as Heckman & Borjas (1980) examine whether unemployment has lasting impacts on labor force participation.

careers. In both cases, these children have worse economic performance and may need greater public assistance than cohorts growing up during an economic boom.

4.5 Parental Background

The data from the PSID are used to evaluate whether changes over the business cycle in parental background can explain the impact of childhood economic conditions on adult outcomes.[27] If children are a normal good, then a recession might decrease fertility by reducing family income. If parenting is time intensive, then fertility might increase in a recession due to a lower opportunity cost of time. Depending on how such income and substitution effects differ across demographic groups, the background characteristics of parents raising children might be related to macroeconomic conditions.

In order to analyze how selection into child rearing affects the empirical results, I first estimate specification (1) both excluding and including control variables for parental background.[28] The controls are indicators for mother's and father's first occupation, educational attainment, and birth year. I study how the addition of these regressors changes the estimated coefficient on the unemployment rate in childhood.

I next examine the relationship between the unemployment rate in one's childhood and the characteristics of one's parents. Let k_{it} be an indicator variable encoding the schooling, employment, or income in year t for the parent of person i.[29] Recall that $b(i)$ is person i's birth year. Let $s(i)$ be person i's state of residence during childhood. Let z_{it} be a vector containing dummies for the race and age of person i's parent. Recall that $u_{b(i),s(i)}$ is the average unemployment rate between years $b(i)-1$ and $b(i)+15$ in state $s(i)$. The following equation is estimated separately for the mothers and fathers of the youths in the sample:

$$k_{it} = \zeta u_{b(i),s(i)} + \phi^1_{b(i)} + \phi^2_{s(i)} + \phi^3_t + \phi^4_{s(i)} b(i) + \phi^5_{s(i),t} + \Phi' z_{it} + \upsilon_{it}. \tag{2}$$

The terms $\phi^1_{b(i)}$, $\phi^2_{s(i)}$, and ϕ^3_t are fixed effects for the youth's birth year, the youth's childhood state,

[27] Dehejia & Lleras-Muney (2004) discuss in detail how the unemployment rate can affect the decision to give birth.

[28] Although the ACS provides information on the birth state of each respondent, the PSID lists only the state in which each participant grew up. Therefore, childhood state is substituted for birth state when computing estimates for the PSID.

[29] The time t can be any survey year in which person i's parent is aged between 30 and 65.

and the parent's survey year, respectively. The parameter $\phi^4_{s(i)}$ allows for a state-specific linear trend in the youth's birth year. The regressor $\phi^5_{s(i),t}$ is a fixed effect for the interaction between the youth's childhood state and the parent's survey year. The coefficient ζ reflects the association of economic conditions in childhood with parental characteristics. The error term υ_{it} is clustered by the youth's childhood state.[30]

The purpose of specification (2) is to document a compositional effect. It is not intended to test for a causal effect of recessions on the labor market performance of parents. It instead describes whether high or low status families tend to have children during a recession. This pattern of selection is identified based on shocks to a specific state in a particular year. The regression controls for differences between states in the mean and trend over time in the unemployment rate.

Equation (2) emphasizes the permanent component of parental status. The attributes of parents are measured not only during their child-rearing years, but during their general adult lifetime up to retirement. Furthermore, the interaction term between the youth's childhood state and the parent's survey year absorbs the impact of contemporaneous economic conditions on parental outcomes. Hence, the regression controls for transitory fluctuations in economic success due to business cycles at the state or national level.

4.6 Home Environments

The data from the NLSY79-CH are used to illustrate how macroeconomic fluctuations affect home environments and caregiving practices. An economic contraction might have both positive and negative influences on parental investments in children. On the one hand, parents may have less money to spend on toys, books, lessons, or magazines. On the other hand, parents may have more time to spend eating meals as a family or taking children on outings. Furthermore, parental stress might vary over the business cycle, altering how parents interact with children.

I begin by computing the impact of the state unemployment rate on the quality of the home environment. Let r_{it} denote the standardized value of the emotional, cognitive, or total score from

[30]The use of Huber-White standard errors with clustering at the state level accounts for the panel structure of the data, in which each respondent is surveyed in multiple years. Because the childhood state is the same for all observations related to a person, clustering by childhood state enables observations involving the same person to have correlated error terms.

the HOME-SF inventory for child i in year t. Let $s(i)$ be child i's state of residence and $b(i)$ be child i's year of birth. Recall that x_i is a vector of basic demographic variables for person i. Denoting by $u_{s(i),t}$ the unemployment rate in state $s(i)$ during year t, the following equation is estimated for the scores on each part of the HOME-SF inventory:

$$r_{it} = \lambda u_{s(i),t} + \kappa^1_{s(i)} + \kappa^2_t + \kappa^3_{t-b(i)} + \kappa^4_{s(i)} t + K' x_i + o_{it}, \tag{3}$$

where $\kappa^1_{s(i)}$, κ^2_t, and $\kappa^3_{t-b(i)}$ are fixed effects for state, year, and age, respectively. Note that κ^2_t captures the influence of economic conditions at the national level. The parameter $\kappa^4_{s(i)}$ accounts for a linear trend in year specific to each state. The coefficient λ reflects the effect of the state unemployment rate. It is identified from macroeconomic fluctuations across states over time. The error term o_{it} is clustered at the state level. In order to assess whether changes in parental background are driving the results, estimates are presented that control for the first occupation, test score, schooling level, and birth year of a child's mother.

5 Results

This section describes the empirical findings on the impact of unemployment rates in childhood. Section 5.1 estimates the relationship between childhood conditions and adult outcomes. Sections 5.2 and 5.3 examine how the background characteristics of parents and the quality of home environments vary over the business cycle. Section 5.4 outlines some robustness checks.

5.1 Childhood Conditions and Adult Outcomes

The upper panel of Table 3 provides estimates from the ACS sample for equation (1), which relates state unemployment rates early in life to labor market performance in the future. The average state unemployment rate in childhood has significantly negative impacts on finishing college, attending graduate school, working last year, being in the labor force, being currently employed, and earning at least $10,000 in wage income. These negative effects are substantial in size. A one percentage point increase in the unemployment rate decreases the probability of each of these outcomes by over a third of a percentage point. In most cases, the decline is larger than two thirds of a percentage point. Only at the upper end of the wage distribution is there evidence of a positive impact of the unemployment rate in childhood.

The lower panel of Table 3 contains results using the average unemployment rates at different stages of childhood as individual regressors. The pattern of estimates is complex. Both significantly positive and negative impacts are found depending on the stage of childhood, the control variables, and the outcome analyzed. Unemployment rates earlier in childhood do not seem to have a larger influence on adult economic outcomes than unemployment rates later in childhood. Nonetheless, these results should not necessarily be interpreted as evidence against the importance of critical periods in child development. An economic downturn can have both positive and negative effects on skill formation among children. Parents might have less money but more time to invest in child rearing, and parents might have more or less stress depending on the stability and intensity of their jobs. These competing effects may offset each other to varying degrees for different groups of the population or at different times in childhood.

Table 4 presents estimates that control for conditions in the labor market around the time of school leaving. The top panel adds the state unemployment rate at age eighteen as a regressor, and the middle panel also includes the state unemployment rate at age twenty-two. These extensions do not substantially change the magnitude or significance of the coefficient on the average unemployment rate in childhood. Hence, the main findings are unlikely to be explained by business cycles at labor market entry. The unemployment rate at age eighteen generally has a negative impact on labor market outcomes, except at the upper end of the wage distribution. By contrast, there is no evidence that the unemployment rate at age twenty-two adversely influences these variables, perhaps because most sample members do not complete college and thus join the workforce before this age.

If the state unemployment rate in the imputed year of school graduation is inserted in the regression, then the unemployment rate in childhood still has a significantly negative impact on several outcomes including the probability of employment and labor force participation. In some cases, the estimated influence of childhood conditions becomes weaker, and a significant negative impact is no longer found on education. Nonetheless, the state of the economy at school graduation is an endogenous regressor, particularly when schooling is the dependent variable. Therefore, the

estimates in the bottom panel of table 4 may be less credible than those in the other two panels.

In addition, the unemployment rate upon leaving school enters some specifications with a significantly positive coefficient. This finding may be due to a selection effect. If more able students can find a job despite slackness in the labor market, then they may be more likely to graduate in a recession than less able students. For example, Genda *et al.* (2010) discuss the potential for positive selection among individuals who find jobs during a recession in Japan, and Brunner & Kuhn (2014) present evidence of higher ability among workers entering the labor market during a downturn in Austria. Given the endogeneity of the unemployment rate at school leaving, some studies, including Oreopoulos *et al.* (2012) and Kahn (2010), attempt to instrument for this variable by predicting the year of graduation based on age and the normal length of a degree program. An important question for future research is how ability interacts with economic conditions to affect educational decisions. Relatedly, Bedard & Herman (2008) outline a simple model of selection into graduate school over the business cycle. Depending on how macroeconomic fluctuations affect the quality composition of available jobs, the average ability of school enrollees may rise or fall when the economy contracts.

The results in table 5 seek to account for the serial correlation in economic conditions. The regressions in the first panel include the average state unemployment rate between ages sixteen and twenty-nine, and the estimates in the third panel also control for the average labor force participation rate during this transitional period. The unemployment rate in childhood continues to have a significantly negative impact on labor force attachment as well as some measures of educational attainment. There is evidence of a negative influence at the lower end of the wage distribution, but the coefficient is significantly positive at higher levels of earnings.

Some measures of human capital appear to be positively related to the state unemployment rate in early adulthood or negatively related to the labor force participation rate during this stage of life. A possible interpretation is that a recession induces young adults to obtain more schooling or training due to a reduction in the opportunity cost of time.[31] The effect of business cycles on

[31] Another explanation for a positive coefficient on the unemployment rate may be changes over the business cycle in the background characteristics of couples choosing to have children. Such compositional effects might generate a

skill acquisition is an active area of research. For example, Dellas & Sakellaris (2003) analyze the mechanisms through which macroeconomic fluctuations influence educational attainment, and Méndez & Sepúlveda (2012) characterize the cyclicality of different forms of human capital investment. The results in the current paper are consistent with previous empirical work. Betts & McFarland (1995) document an increase in attendance at community colleges during periods of high unemployment. Similarly, Light (1996) finds that an economic downturn raises the likelihood of young adults returning to school. A study by Sakellaris & Spilimbergo (2000) suggests that college enrollment is countercyclical for more developed countries due to opportunity costs, whereas the opposite applies to less developed countries because of credit constraints and income effects.

In table 5, the second panel controls for the state unemployment rate at each age between sixteen and twenty-nine, and the labor force participation rates at all of these ages are included as covariates in the fourth panel. The coefficient on the unemployment rate in childhood remains significantly negative for most employment and educational outcomes. In some cases, the size of the point estimates is smaller than in the baseline specification, and the impact on the upper part of the income distribution is significantly positive. As explained previously, childhood conditions might affect labor market performance during emerging adulthood. Therefore, controls for conditions between childhood and adulthood may absorb some of the real effects that childhood conditions have on economic success and welfare as an adult.

5.2 Environmental Changes versus Selection Effects

Table 6 reports estimates for equation (1) based on the PSID sample. The impact of economic conditions in childhood on adult outcomes is computed both excluding and including control variables for parental background. The negative impacts of the unemployment rate in childhood on finishing college and attending graduate school become statistically significant after controlling for parental background variables related to occupation, education, and age. Because the addition of these controls strengthens the negative coefficient on the main explanatory variable, changes

positive relationship between parental quality and the unemployment rate at a particular stage of life. Nonetheless, parents raising children in a downturn are seen to have relatively high levels of human capital, and so the overall negative impact of a recession in childhood cannot be attributed to selection into giving birth.

in parental background over the business cycle do not seem to explain the negative impact of the unemployment rate in childhood on economic performance as an adult.

Table 7 displays results for specification (2), which relates the unemployment rate in one's childhood to the labor market characteristics of one's parents during their adult lives. Because the regressions control for current labor market conditions through fixed effects for the interaction of state and year, the estimates are more reflective of permanent qualities than transitory macroeconomic fluctuations. The unemployment rate in one's childhood has a significantly positive association with some measures of the schooling of one's parents and the earnings of one's father. There is no significant evidence of a negative relationship. Because families with better underlying attributes tend to be raising children in periods of high unemployment, it is unlikely that the deterioration in the future prospects of individuals growing up during times of high unemployment is attributable to selection by families over the business cycle into child rearing.

5.3 Unemployment Rates and Home Environments

Table 8 provides estimates from the NLSY79-CH sample for specification (3), which describes how the quality of a child's home environment varies with the unemployment rate. As explained previously, household surroundings and caregiving behaviors are rated based on the HOME-SF inventory. Results are presented both before and after adding controls for the background characteristics of a child's mother. In most cases, the point estimate for the coefficient on the unemployment rate is negative, indicating that a higher unemployment rate is associated with a worse home environment. Regardless of whether control variables for maternal characteristics are excluded or included, the unemployment rate has a significantly negative impact on the total and emotional scores in middle childhood and early adolescence.[32]

5.4 Robustness Checks

Two sets of robustness checks are conducted. First, alternative formulations of the estimating equation are discussed. Second, changes to the explanatory variable and estimation sample are evaluated.

[32]To investigate the mechanisms behind the effect on aggregate scores, many specific parenting activities were separately analyzed. Outcomes studied include breastfeeding frequency, disciplinary actions, educational outings, extracurricular programs, and family meals. The resulting estimates are available from the author on request.

5.4.1 Alternative Econometric Specifications

Several modifications of the statistical model are considered. The online appendix displays the results described here.

One issue is a potential correlation among observations on individuals born in the same region. This can generate inconsistent estimates of the standard errors. In order to absorb such correlations, the econometric specification is augmented with three-way interactions among indicators for survey year, year born, and region of birth.[33] Also included are two-way interactions between dummy variables for survey year and year born and between dummy variables for birth region and year born. As in the baseline specification, the estimates also control for pairwise interactions between birth state and survey year as well as for the main effects of birth state, year born, and survey year. Overall, there continues to be significant evidence of a negative impact of unemployment rates in childhood. The positive coefficients on unemployment rates at school graduation or in early adulthood are also robust to this extension.

In order to further examine correlations among observations involving nearby states, the standard errors of the estimates are calculated with clustering at the division level instead of by state.[34] Since there are only nine geographic divisions, the asymptotic standard errors may not be an accurate approximation. As a partial but not complete solution, the critical values for the hypothesis tests are computed based on a t-distribution with eight degrees of freedom as opposed to a standard normal distribution. Although the standard errors increase moderately with the critical values becoming more conservative, statistically significant estimates are obtained for the coefficients on the unemployment rate during childhood as well as at school leaving and in early adulthood.

Another issue may be the large number of controls in the estimating equation. Consequently, the source of identifying variation could be complicated to interpret. A state-specific linear trend in year born is included in the baseline specification because a long sequence of birth cohorts is being analyzed and unobservable factors within each state may be evolving over time. These trends

[33]The four Census regions are: Northeast, Midwest, South, West.

[34]The nine Census divisions are: New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, Pacific.

help to capture ongoing processes like economic modernization, sectoral shifts, and demographic change. Such processes may be correlated with unemployment rates and may directly affect labor market outcomes. Nonetheless, estimates are also computed that omit state-specific linear trends. The results are mostly similar. A recession in childhood still exerts a significantly negative impact on employment as an adult, although there is little evidence of adverse effects on education. The coefficients on unemployment rates around labor market entry are often significantly positive.

Finally, a parsimonious specification is estimated that includes even fewer regressors. The baseline model contains interactions between birth state and survey year so as to control for current business cycles at the state level. However, the unemployment rate at present might be endogenously influenced by economic conditions that individuals experienced in the past. Therefore, regressions are performed excluding both fixed effects for the interaction of birth state with survey year and linear trends in year born for each birth state. The resulting specification resembles a basic differences-in-differences setup as explained in section 3. The removal of interaction effects does not substantially change the pattern of estimates. Significant negative coefficients are observed on the unemployment rate in childhood, whereas unemployment rates in early adulthood enter significantly with the opposite sign.

5.4.2 Variable Definitions and Sample Construction

Several exercises are performed to assess the sensitivity of the results to changes in the construction of the estimation samples and the measurement of economic conditions.[35] First, I replicate the analysis using the raw data on the rate of insured unemployment for each state instead of the estimates for the state unemployment rate.[36] Second, I perform the regressions using the employment-to-population ratio instead of the unemployment rate as an indicator of economic conditions.[37] A third issue concerns the national representativeness of the results. For specifications

[35] These results are available from the author on request.

[36] As described in section 2.1, the rate of insured unemployment from ET Financial Data Handbook 349 is used to estimate the annual state unemployment rates between 1947 and 1975, because the BLS does not provide annual state unemployment rates prior to 1976.

[37] As noted by Dehejia & Lleras-Muney (2004), the use of the employment-to-population ratio instead of the unemployment rate avoids measurement error in determining the size of the labor force and the number of unemployed workers.

estimated using data from the ACS, I recompute the estimates after weighting each observation by its person weight for the survey.[38] The specifications using the PSID are estimated only for members of the nationally representative SRC sample, and regressions involving the NLSY79-CH are performed based only on children with a mother in the cross-sectional sample.[39]

Overall, the findings are largely unaffected by these changes. A downturn in childhood is seen to have an adverse impact on economic performance in adulthood. The home environment worsens during periods of high unemployment, but parents raising children in a recession are not less skilled.

6 Conclusion

This paper documents the influence of macroeconomic fluctuations in childhood on labor market outcomes as an adult. The empirical strategy exploits differences in unemployment rates across states over time. The estimates account for a number of confounding factors related to cohort effects, current economic shocks, time trends, life cycle patterns, and serial correlation. I also examine how the background characteristics of parents raising children vary over the business cycle, and I summarize the impact of economic conditions on home environments and parenting activities.

In general, the evidence suggests a negative effect of the unemployment rate in childhood on several measures of human capital as an adult. The coefficients are often large in magnitude. In terms of policy implications, the empirical results provide a rationale for targeting economic stimulus programs towards children. Policies designed to enhance household resources and parental caregiving may help mitigate some of the adverse impacts of a recession on adult economic outcomes. Improvements in neighborhoods and schools might also be beneficial for this purpose. Both older and younger children may be in need of assistance.

[38] In some cases, the use of sample weights can make the results more representative of the general population. See Solon *et al.* (2013) for a discussion of the advantages and disadvantages of using sample weights.

[39] The primary estimates for the PSID combine the SRC and SEO samples. Low-income households are the main constituents of the SEO sample. The original dataset from the NLSY79-CH contains individuals with a mother in the cross-sectional or supplemental sample. Blacks, hispanics, and disadvantaged whites are overrepresented in the supplemental sample.

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Table 1: Descriptive Statistics for ACS and PSID Samples

	ACS Sample	PSID Sample
Basic Demographics		
Pct. White	85.49	58.29
Pct. Female	50.71	53.99
Pct. South	29.80	42.45
Mean (S.D.) Year Born	1961.72 (8.48)	1957.47 (6.89)
Mean (S.D.) Age	45.34 (8.53)	38.23 (6.78)
Unemployment Rate		
Mean (S.D.) State U.E. Rate btw. Ages -1 and 15	6.34 (1.47)	5.96 (1.60)
Schooling		
Pct. High School and Above	93.65	90.39
Pct. College and Above	31.51	24.13
Pct. Some Graduate School	11.59	9.84
Employment		
Pct. Worked Last Year	88.68	87.68
Pct. in Labor Force	84.59	85.83
Pct. Currently Employed	81.12	79.39
Wage Income		
Pct. Worked and Income $\geq$ \$10K	63.16	61.61
Pct. Worked and Income $\geq$ \$20K	37.79	32.59
Pct. Worked and Income $\geq$ \$30K	19.66	14.71
Sample Size		
Individuals	8,491,751	6,439
Observations	8,491,751	58,642

Note: The summary statistics above are based on the main estimation samples for the ACS and PSID. Wage income is deflated using the CPI with 1982-1984 as the base period. State unemployment rates are constructed as described in the text.

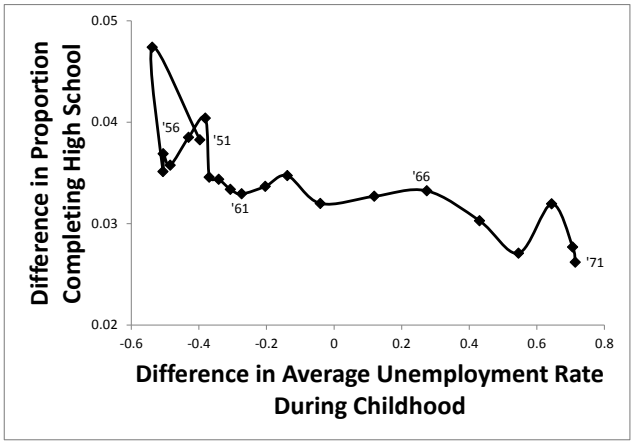
Table 2: Descriptive Statistics for NLSY79-CH Sample

	Part A: Infant/ Toddler	Part B: Early Childhood	Part C: Middle Childhood	Part D: Early Adolescence
Basic Demographics				
Pct. White	55.29	54.46	51.41	48.34
Pct. Female	49.19	49.56	49.44	49.80
Pct. South	35.06	36.66	38.16	38.84
Mean (S.D.) Year	1991.29 (4.73)	1992.59 (5.23)	1994.53 (5.89)	1997.59 (5.51)
Mean (S.D.) Age	1.59 (0.93)	4.51 (0.94)	8.02 (1.30)	12.16 (1.36)
Unemployment Rate				
Mean (S.D.) State U.E. Rate	6.13 (1.64)	5.98 (1.61)	5.83 (1.57)	5.57 (1.41)
HOME-SF Inventory				
Mean (S.D.) Total Raw Score	140.86 (24.33)	204.81 (36.28)	198.84 (38.02)	202.09 (35.85)
Mean (S.D.) Cognitive Stimulation Raw Score	67.85 (15.67)	117.14 (22.57)	98.40 (24.52)	92.98 (23.19)
Mean (S.D.) Emotional Support Raw Score	73.03 (14.77)	87.60 (20.24)	100.45 (20.86)	109.11 (20.38)
Sample Size				
Individuals	5,410	6,600	7,659	6,734
Observations	6,723	8,593	12,323	11,999

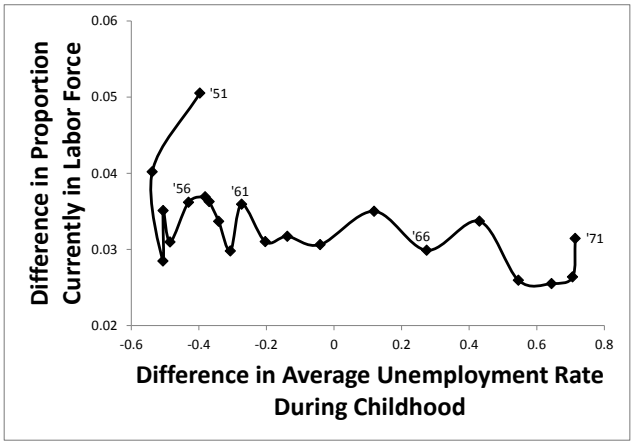
Note: The summary statistics above are based on the main estimation sample for the NLSY79-CH. Parts A, B, C, and D of the HOME-SF inventory are generally administered to children aged 0-2, 3-5, 6-9, and 10-14 years, respectively. The annual average unemployment rate for each state is obtained from the BLS.

Figure 1: Relationship of Difference in State Unemployment Rate During Childhood to Difference in Adult Outcomes Between Individuals Born in Rust Belt and Sun Belt

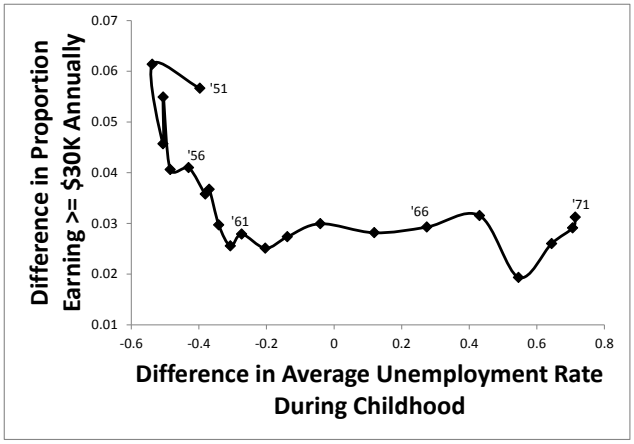
(a) Completion of High School



(b) Current Participation in Labor Force



(c) Annual Income of at Least $30,000



Note: The difference in average adult outcomes between individuals born in the Rust Belt and Sun Belt during the same year is plotted against the corresponding difference in average economic conditions during childhood. Adult outcomes are indicators for high school completion, for currently being in the labor force, and for having both worked in the past calendar year and received a wage income of at least $30,000 during that period. Childhood economic conditions are measured as the average state unemployment rate between the year before one's birth and the year of one's fifteenth birthday. The average of each variable for individuals born in the Sun Belt during a given year is subtracted from the respective value for the Rust Belt. The following states are classified as belonging to the Rust Belt: Illinois, Indiana, Michigan, New Jersey, New York, Ohio, Pennsylvania, Wisconsin. The Sun Belt includes: Alabama, Arizona, California, Florida, Louisiana, Mississippi, New Mexico, Texas. Statistics are computed using data from the main estimation sample for the ACS on individuals aged between 40 and 49 when surveyed. Birth cohorts range from 1951 to 1971.

Table 3: Relationship of State Unemployment Rate in Childhood to Adult Outcomes for ACS Sample

	H.S. Diploma	College Degree	Grad. School	Worked Last Yr.	In Labor Force	Currently Employed	Worked & Y $\geq$ \$10K	Worked & Y $\geq$ \$20K	Worked & Y $\geq$ \$30K
				Average State Unemployment Rate in Childhood					
U.E. Rate btw. Ages -1 and 15	-0.0018* (0.0011)	-0.0074*** (0.0025)	-0.0044** (0.0018)	-0.0066*** (0.0012)	-0.0075*** (0.0014)	-0.0083*** (0.0013)	-0.0086*** (0.0019)	-0.0012 (0.0016)	0.0035*** (0.0009)
				Average State Unemployment Rate at Different Stages of Childhood					
U.E. Rate at Age -1	0.0001 (0.0001)	0.0009*** (0.0003)	0.0007*** (0.0002)	0.0002 (0.0002)	0.0001 (0.0002)	-0.0001 (0.0002)	-0.0000 (0.0003)	-0.0002 (0.0002)	-0.0001 (0.0002)
U.E. Rate at Age 0	0.0003 (0.0002)	0.0000 (0.0003)	0.0003 (0.0002)	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0000 (0.0002)	-0.0000 (0.0003)	0.0001 (0.0002)	-0.0003 (0.0002)
U.E. Rate btw. Ages 1 and 5	-0.0009* (0.0005)	-0.0007 (0.0012)	-0.0006 (0.0007)	-0.0010** (0.0004)	-0.0013*** (0.0004)	-0.0015*** (0.0005)	-0.0014* (0.0007)	0.0008 (0.0005)	0.0017*** (0.0005)
U.E. Rate btw. Ages 6 and 10	-0.0007* (0.0004)	-0.0023*** (0.0009)	-0.0006 (0.0005)	-0.0022*** (0.0004)	-0.0026*** (0.0005)	-0.0028*** (0.0005)	-0.0029*** (0.0005)	-0.0008 (0.0006)	0.0010** (0.0004)
U.E. Rate btw. Ages 11 and 15	-0.0001 (0.0003)	-0.0023*** (0.0006)	-0.0022*** (0.0005)	-0.0019*** (0.0004)	-0.0020*** (0.0004)	-0.0023*** (0.0004)	-0.0024*** (0.0006)	-0.0002 (0.0005)	0.0007*** (0.0002)
Sample Size	51 Birth States / 8,491,751 Observations								

Note: The main estimation sample for the ACS is used. The specifications control for race, gender, fixed effects for age, dummy variables for birth state, dummy variables for survey year, interactions between the dummy variables for birth state and survey year, indicator variables for year born, and a linear trend in year born specific to each birth state. Huber-White standard errors, clustered by birth state, are reported in parentheses. Single, double, and triple asterisks respectively denote statistical significance at the 10 percent, 5 percent, and 1 percent levels.

Table 4: Effect of Controlling for State Unemployment Rate at School Graduation on Relationship of Average State Unemployment Rate in Childhood to Adult Outcomes for ACS Sample

	H.S. Diploma	College Degree	Grad. School	Worked Last Yr.	In Labor Force	Currently Employed	Worked & Y ≥ $10K	Worked & Y ≥ $20K	Worked & Y ≥ $30K
				With State Unemployment Rate at Age 18					
U.E. Rate btw. Ages -1 and 15	-0.0014	-0.0084***	-0.0067***	-0.0084***	-0.0089***	-0.0096***	-0.0098***	-0.0007	0.0046***
	(0.0012)	(0.0026)	(0.0021)	(0.0013)	(0.0015)	(0.0015)	(0.0022)	(0.0017)	(0.0009)
U.E. Rate at Age 18	0.0002	-0.0005	-0.0012***	-0.0009***	-0.0007***	-0.0007***	-0.0007**	0.0003	0.0006***
	(0.0001)	(0.0004)	(0.0003)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)
				With State Unemployment Rate at Ages 18 and 22					
U.E. Rate btw. Ages -1 and 15	-0.0023*	-0.0073**	-0.0050***	-0.0073***	-0.0080***	-0.0085***	-0.0089***	0.0005	0.0059***
	(0.0014)	(0.0028)	(0.0017)	(0.0013)	(0.0016)	(0.0015)	(0.0022)	(0.0017)	(0.0013)
U.E. Rate at Age 18	0.0001	-0.0004	-0.0011***	-0.0009***	-0.0007**	-0.0006**	-0.0006*	0.0003	0.0007***
	(0.0001)	(0.0004)	(0.0003)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)
U.E. Rate at Age 22	-0.0003	0.0004	0.0007**	0.0004	0.0004	0.0004	0.0003	0.0004	0.0005**
	(0.0002)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0002)
				With State Unemployment Rate in Imputed Year of Graduation					
U.E. Rate btw. Ages -1 and 15	-0.0028*	0.0145**	0.0062	-0.0029**	-0.0042***	-0.0055***	-0.0066***	0.0042*	0.0097***
	(0.0017)	(0.0055)	(0.0038)	(0.0014)	(0.0015)	(0.0015)	(0.0024)	(0.0024)	(0.0017)
U.E. Rate in Grad. Year	-0.0007	0.0159***	0.0077***	0.0027***	0.0024***	0.0021***	0.0014	0.0039***	0.0045***
	(0.0012)	(0.0033)	(0.0021)	(0.0006)	(0.0006)	(0.0006)	(0.0009)	(0.0012)	(0.0011)
Sample Size	51 Birth States / 8,491,751 Observations								

Note: The main estimation sample for the ACS is used. The specifications control for race, gender, fixed effects for age, dummy variables for birth state, dummy variables for survey year, interactions between the dummy variables for birth state and survey year, indicator variables for year born, and a linear trend in year born specific to each birth state. The year in which an individual leaves school is imputed based on the formula: year of graduation = year of birth + 6 + years of schooling. Huber-White standard errors, clustered by birth state, are reported in parentheses. Single, double, and triple asterisks respectively denote statistical significance at the 10 percent, 5 percent, and 1 percent levels.

Table 5: Effect of Controlling for State Unemployment Rate and Labor Force Participation Rate in Early Adulthood on Relationship of Average State Unemployment Rate in Childhood to Adult Outcomes for ACS Sample

	H.S. Diploma	College Degree	Grad. School	Worked Last Yr.	In Labor Force	Currently Employed	Worked & Y $\geq$ \$10K	Worked & Y $\geq$ \$20K	Worked & Y $\geq$ \$30K
				With Average State Unemployment Rate in Early Adulthood					
U.E. Rate btw. Ages -1 and 15	-0.0030**	-0.0085**	-0.0027	-0.0039***	-0.0032**	-0.0043***	-0.0033*	0.0037**	0.0058***
	(0.0014)	(0.0035)	(0.0025)	(0.0014)	(0.0015)	(0.0013)	(0.0019)	(0.0016)	(0.0015)
U.E. Rate btw. Ages 16 and 29	-0.0009	-0.0008	0.0013	0.0020	0.0032**	0.0030**	0.0040***	0.0036***	0.0017*
	(0.0007)	(0.0021)	(0.0024)	(0.0013)	(0.0013)	(0.0012)	(0.0014)	(0.0009)	(0.0010)
				With State Unemployment Rate at Each Age in Early Adulthood					
U.E. Rate btw. Ages -1 and 15	-0.0038**	-0.0083**	-0.0028	-0.0051***	-0.0044**	-0.0052***	-0.0045*	0.0041**	0.0071***
	(0.0017)	(0.0041)	(0.0024)	(0.0017)	(0.0020)	(0.0018)	(0.0024)	(0.0019)	(0.0016)
U.E. Rate at Each Age btw. 16 and 29	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
				With Average State Unemployment Rate and Labor Force Participation Rate in Early Adulthood					
U.E. Rate btw. Ages -1 and 15	-0.0025*	-0.0077**	-0.0031	-0.0041***	-0.0035**	-0.0045***	-0.0036**	0.0033**	0.0055***
	(0.0013)	(0.0034)	(0.0022)	(0.0013)	(0.0015)	(0.0013)	(0.0018)	(0.0016)	(0.0014)
U.E. Rate btw. Ages 16 and 29	-0.0009	-0.0008	0.0013	0.0020	0.0032**	0.0030**	0.0040***	0.0036***	0.0017*
	(0.0008)	(0.0022)	(0.0023)	(0.0013)	(0.0013)	(0.0011)	(0.0013)	(0.0009)	(0.0010)
L.F.P. Rate btw. Ages 16 and 29	-0.0025**	-0.0035	0.0020	0.0006	0.0011	0.0009	0.0018	0.0016	0.0011
	(0.0010)	(0.0027)	(0.0016)	(0.0011)	(0.0011)	(0.0012)	(0.0016)	(0.0012)	(0.0012)
				With State Unemployment Rate and Labor Force Participation Rate at Each Age in Early Adulthood					
U.E. Rate btw. Ages -1 and 15	-0.0032**	-0.0068*	-0.0027	-0.0046**	-0.0043**	-0.0050**	-0.0044*	0.0039*	0.0063***
	(0.0015)	(0.0039)	(0.0023)	(0.0018)	(0.0021)	(0.0019)	(0.0024)	(0.0020)	(0.0014)
U.E. Rate at Each Age btw. 16 and 29	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
L.F.P. Rate at Each Age btw. 16 and 29	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample Size	51 Birth States / 8,491,751 Observations								

Note: The main estimation sample for the ACS is used. The specifications control for race, gender, fixed effects for age, dummy variables for birth state, dummy variables for survey year, interactions between the dummy variables for birth state and survey year, indicator variables for year born, and a linear trend in year born specific to each birth state. Huber-White standard errors, clustered by birth state, are reported in parentheses. Single, double, and triple asterisks respectively denote statistical significance at the 10 percent, 5 percent, and 1 percent levels.

Table 6: Effect of Controlling for Parental Background Variables on Relationship of Average State Unemployment Rate in Childhood to Adult Outcomes for PSID Sample

	H.S. Diploma	College Degree	Grad. School	Worked Last Yr.	In Labor Force	Currently Employed	Worked & Y ≥ $10K	Worked & Y ≥ $20K	Worked & Y ≥ $30K
				Without Parental Background Variables					
U.E. Rate btw. Ages -1 and 15	-0.0013 (0.0157)	-0.0189 (0.0172)	-0.0142 (0.0149)	-0.0011 (0.0085)	-0.0094 (0.0098)	0.0074 (0.0107)	-0.0002 (0.0170)	-0.0008 (0.0200)	0.0098 (0.0117)
				With Parental Background Variables					
U.E. Rate btw. Ages -1 and 15	-0.0109 (0.0150)	-0.0443*** (0.0157)	-0.0256** (0.0126)	-0.0054 (0.0076)	-0.0144 (0.0091)	0.0028 (0.0100)	-0.0106 (0.0143)	-0.0179 (0.0167)	-0.0059 (0.0124)
Sample Size	49 Childhood States / 6,439 Individuals / 58,642 Observations								

Note: The main estimation sample for the PSID is used. Parental background variables are indicators for mother's and father's first occupation, educational attainment, and birth year. The categories for occupation at first regular job are: professional and technical workers; managers, officials, and proprietors; self-employed businessmen; clerical and sales workers; craftsmen and foremen; operatives; laborers and service workers; and armed services and protective workers. The categories for educational attainment are: less than high school graduate, high school diploma, some college, college degree, and some post-graduate training. The specifications control for race, gender, fixed effects for age, dummy variables for childhood state, dummy variables for survey year, interactions between the dummy variables for childhood state and survey year, indicator variables for year born, and a linear trend in year born specific to each childhood state. Huber-White standard errors, clustered by childhood state, are reported in parentheses. Single, double, and triple asterisks respectively denote statistical significance at the 10 percent, 5 percent, and 1 percent levels.

Table 7: Relationship of Unemployment Rate in Childhood to Parental Characteristics for PSID Sample

	H.S. Diploma	College Degree	Grad. School	Worked Last Yr.	In Labor Force	Currently Employed	Worked & Y ≥ $10K	Worked & Y ≥ $20K	Worked & Y ≥ $30K
				Mother's Characteristics in Mother's Adult Lifetime					
				Average State Unemployment Rate in Youth's Childhood					
U.E. Rate btw. Ages -1 and 15	0.0656*** (0.0201)	0.0142 (0.0120)	0.0126* (0.0072)	0.0181 (0.0121)	0.0159 (0.0120)	0.0204 (0.0138)	0.0014 (0.0166)	-0.0046 (0.0105)	-0.0061 (0.0058)
Sample Size	48 Childhood States for Youth / 104,015 Observations on Mother								
				Father's Characteristics in Father's Adult Lifetime					
				Average State Unemployment Rate in Youth's Childhood					
U.E. Rate btw. Ages -1 and 15	0.0646** (0.0296)	0.0201 (0.0261)	0.0202 (0.0214)	0.0095 (0.0112)	0.0059 (0.0111)	0.0052 (0.0138)	0.0465** (0.0187)	0.0073 (0.0293)	0.0065 (0.0326)
Sample Size	46 Childhood States for Youth / 89,350 Observations on Father								

Note: The dataset contains an observation for every survey year in which the parent of an individual in the main estimation sample for the PSID has valid data on years of schooling, total hours worked, total labor income, and employment status. The specifications control for parent's race, fixed effects for parent's age, dummy variables for youth's childhood state, dummy variables for parent's survey year, interactions between the dummy variables for youth's childhood state and parent's survey year, indicator variables for youth's birth year, and a linear trend in the youth's birth year specific to the youth's childhood state. Huber-White standard errors, clustered by youth's childhood state, are reported in parentheses. Single, double, and triple asterisks respectively denote statistical significance at the 10 percent, 5 percent, and 1 percent levels.

Table 8: Relationship of Current State Unemployment Rate to HOME-SF Inventory Scores for NLSY79-CH Sample

	Standardized Total Score		Standardized Cognitive Score		Standardized Emotional Score	
			Part A: Infant/Toddler			
U.E. Rate	-.0048 (.0164)	-.0041 (.0154)	-.0035 (.0154)	-.0031 (.0148)	-.0057 (.0180)	-.0052 (.0178)
Maternal Background	No	Yes	No	Yes	No	Yes
Sample Size	50 States / 5,410 Individuals / 6,723 Observations					
			Part B: Early Childhood			
U.E. Rate	-.0106 (.0119)	.0012 (.0115)	-.0178 (.0150)	-.0051 (.0126)	.0011 (.0117)	.0081 (.0128)
Maternal Background	No	Yes	No	Yes	No	Yes
Sample Size	50 States / 6,600 Individuals / 8,593 Observations					
			Part C: Middle Childhood			
U.E. Rate	-.0300*** (.0104)	-.0215** (.0095)	-.0117 (.0126)	-.0021 (.0099)	-.0412*** (.0143)	-.0371** (.0145)
Maternal Background	No	Yes	No	Yes	No	Yes
Sample Size	50 States / 7,659 Individuals / 12,323 Observations					
			Part D: Early Adolescence			
U.E. Rate	-.0479** (.0205)	-.0544** (.0205)	-.0185 (.0164)	-.0253 (.0153)	-.0630** (.0286)	-.0668** (.0285)
Maternal Background	No	Yes	No	Yes	No	Yes
Sample Size	50 States / 6,734 Individuals / 11,999 Observations					

Note: The main estimation sample for the NLSY79-CH is used. The scores for each part of the HOME-SF inventory are standardized among individuals at the same age level. Maternal background variables are indicators for mother's first occupation, educational attainment, AFQT quartile, and birth year. The quartiles for the AFQT score are computed by comparing each mother's AFQT score to the AFQT scores of all female respondents in the NLSY79 with the same year of birth. The categories for occupation after first leaving school are the 23 major occupational groups in the 2000 SOC. The categories for educational attainment are: less than high school graduate, high school diploma, some college, college degree, and some post-graduate training. The estimates control for race, gender, state of residence, indicator variables for survey year, fixed effects for age at the end of the survey year, and a linear trend in survey year specific to each state of residence. Huber-White standard errors, clustered by state of residence, are reported in parentheses. Single, double, and triple asterisks respectively denote statistical significance at the 10 percent, 5 percent, and 1 percent levels.