"The Long-Run Effects of Recessions on Education and Income"
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Online Appendix

A Matching NUMIDENT Data to Counties

This section describes the procedure used to match the Social Security Administration NUMIDENT file to FIPS county codes. The procedure described here was developed alongside Martha Bailey, Evan Taylor, and Reed Walker. Researchers with access to confidential Census data can read a technical memo with more information on this procedure and will be able to access the code and output from this procedure (Taylor, Stuart and Bailey, 2016).

We seek to match information on individuals' place of birth to county FIPS codes. The NUMIDENT file, which draws on Social Security card applications, contains a 12-character string identifying the place of birth (city and/or county) and a 2-character string identifying the state of birth postal code. We identify a set of target locations using U.S. Geological Survey data on current and historical locations from the Geographic Names Information System (GNIS).[1] GNIS data contain place names and county FIPS codes.

Several challenges prevent exact, unique matching of the NUMIDENT 12-character strings to GNIS counties. First, some place names in a state are indistinguishable with only 12 characters.[2] Second, place names are frequently misspelled. Third, the place of birth string sometimes contains acronyms and abbreviations, such as "Mnpls" for Minneapolis. Fourth, some NUMIDENT records contain the wrong postal code for their state of birth (e.g., "Anchorage, AL").

Our algorithm yields four broad categories of matches. Each step proceeds sequentially and only applies to NUMIDENT strings not previously matched. In a preliminary processing step, we correct for common acronyms and abbreviations by hand for any string that occurs more than 50 times in the NUMIDENT data for the 1950–1985 birth cohorts. First, we obtain exact matches for correctly spelled place names that can be uniquely identified in a birth state with 12 characters. Second, we obtain "duplicate" matches for correctly spelled place names that can, in principle, be identified uniquely in 12 characters. We assign individuals to a single birth county if at least 75 percent of the exact matches are to a single county, and we assign multiple birth counties otherwise.[3] Third, we use hand matches from Isen, Rossin-Slater and Walker (2017), described in their Appendix C. Fourth, we use probabilistic matching algorithms.[4] Finally, we hand check

[1] We restrict attention to geographic features that are plausibly populated (those with a Populated Place, Census, or Civil feature class) or have a federal location code.

[2] For example, there are three different Populated Places in North Carolina beginning with "Bells Crossroads" located in different counties. Repeated place names pose less of a problem if the place name has less than 12 characters. For example, there are two places named Arcadia in North Carolina: one in Davidson County and the other in Forsyth County. These can be distinguished if "Arcadia Davi" or "Arcadia Fors" appear in the NUMIDENT.

[3] For example, a person born in North Carolina who writes "Arcadia Fors" or "Arcadia Davi" is matched to the correct Arcadia (in Forsyth or Davidson county) in the exact matching step. However, if an individual writes "Arcadia," we do not know in which Arcadia they were born. If at least 75 percent of the exact Arcadia matches are attributed to one county, then we match "Arcadia" to that county.

[4] In the probabilistic matching step, we only match NUMIDENT strings to GNIS places that have census codes to control the number of false positive matches. We first use the Stata command reclink2 (Wasi and Flaaen, 2015), with the tolerance set to 0.1, to obtain a set of potential matches for each NUMIDENT string. We then use the Stata command jarowinkler (Feigenbaum, 2015) to select the best match as the one with the highest Jaro-Winkler score

all strings that are matched in the probabilistic step, disagree with the match found in the Isen, Rossin-Slater and Walker (2017) algorithm but were not hand checked by them, and have at least 50 occurrences in the NUMIDENT file for the 1950–1985 cohorts.

Appendix Table A.1 summarizes match rates for individuals observed in the 2000 Census and 2001–2013 ACS. I limit the sample to individuals who were born from 1950–1980 and were age 25–64 at the time of the survey. I also limit the sample to individuals with non-allocated values of gender, age, race, and state of birth, and who report being born in the U.S on the census survey. 95.9 percent of the sample has a non-missing protected identification key (PIK), which is the anonymous identifier used to link Census/ACS and SSA data. Of these individuals, 99.6 percent have a PIK that is not duplicated within a survey year. We identify a unique birth county for 93.6 percent of the individuals with non-duplicated PIKs. Ultimately, these restrictions leave 89.4 percent of the initial sample. The majority of matches, 80.4 percent, are exact matches, while 11.0 percent are duplicates, 5.1 percent are matched probabilistically, and 3.5 percent are hand matches.

B Recession Severity and the Evolution of Median Family Income from 1950-2010

The BEA earnings data used in Figure 2 are only available starting in 1969. In this section, I examine the relationship between the evolution of median family income from 1950–2010 and the severity of the recession predicted by pre-existing industrial specialization.

I examine the evolution of median family income from 1950–2010 by estimating the regression

$$y_{c,t} = R_c^{79-82}\alpha_t + x_{c,t}\beta + \gamma_c + \theta_{s(c),t} + \epsilon_{c,t}, \tag{A.1}$$

where $y_{c,t}$ is log real median family income in county c and year t.[5] The key explanatory variable is the 1979–1982 decrease in log real earnings per capita, R_c^{79-82}. In some specifications, $x_{c,t}$ contains time-varying covariates described below. The regression includes county fixed effects, γ_c, to absorb time-invariant differences across counties and state by year fixed effects, $\theta_{s(c),t}$, which I include in equation (1) when estimating long-run effects on individuals. I normalize $\alpha_{1980} = 0$, so that $(\alpha_{1950}, \alpha_{1960}, \alpha_{1970})$ describe how the pre-recession evolution of log median family income is correlated with the severity of the 1980–1982 recession, and $(\alpha_{1990}, \alpha_{2000}, \alpha_{2010})$ describe the post-recession evolution. I estimate equation (A.1) with two-stage least squares (2SLS), where the instrument for R_c^{79-82} is the predicted log employment change, D_c^{79-82}. I cluster standard errors by state, and I initially exclude the 526 counties with at least 5 percent of 1976 employment in the mining sector, which includes oil and gas extraction, to minimize the countercyclical boom-bust cycle in this sector. These high-mining counties account for only 6 percent of U.S. population, but receive considerably more weight in 2SLS estimates of equation (A.1) because pre-existing industrial specialization strongly influences their earnings per capita.

The estimates of α_t in Appendix Figure A.2 characterize the 1980–1982 recession as a reversal of post-war fortune: counties with a more severe recession saw greater median family income

among the potential matches. If no potential match has a Jaro-Winkler score of at least 0.8, then the string remains unmatched. If multiple places have the same Jaro-Winkler score, then this step matches to each place.

[5] I use median family income because it is available at the county-level from decennial Censuses for 1950–2000 (and the ACS for 2010) and is an important measure of local economic conditions. County-level Census data do not consistently report other quantiles of the family income distribution from 1950–2010.

growth from 1950–1970. This pattern arises from estimates of model 1, which contains county and state-by-year fixed effects but no other covariates. Model 2, which adds interactions between year and the 1950–1970 log median family income change and the other county-level covariates included in equation (1) (see also the figure notes), eliminates this pre-trend. County-level controls have no effect on the 1990 coefficient, but lower the 2000 and 2010 coefficients somewhat, indicating that counties with a more severe recession have other covariates associated with higher earnings in these years. Finally, model 3 controls for the 1950–1960, 1960–1970, and 1970–1980 change in log median family income, mechanically eliminating any pre-trend; this model includes the same covariates as my main specification of equation (1). The estimated coefficients and confidence intervals for 1990, 2000, and 2010 are essentially identical. The model 3 estimates imply that a 10 percent decrease in earnings per capita from 1979–1982 led to an 8.8 percent decrease in real median family income in 1990, a 13.3 percent decrease in 2000, and a 22.9 percent decrease in 2010.[6]

C Imputing Employment in County Business Patterns Data

This section describes how I impute employment in Census CBP data. CBP data always report establishment counts by county, industry, and establishment size, but frequently suppress employment at the county by industry level. From 1974-forward, the establishment size groups are 1–4, 5–9, 10–19, 20–49, 50–99, 100–249, 250–499, 500–999, 1000–1499, 1500–2499, 2500–4999, and 5000 or more employees.

I impute employment at the county-by-industry level using establishment counts and nationwide information on employment by establishment size. For establishments with fewer than 1000 employees, I impute employment as the number of establishments times average 1977 employment in the establishment size group, where the average comes from nationwide data across all industries.

Nationwide CBP data report total employment among establishments with at least 1000 employees, but not by establishment size group. To impute employment for these large establishments, I assume that employment follows a log normal distribution, with mean μ and standard deviation σ, and estimate (μ, σ) using the generalized method of moments (GMM), as in Holmes and Stevens (2002). I estimate (μ, σ) using the following four moments:

$$p_1 = \Phi\left(\frac{\ln(1499) - \mu}{\sigma}\right) - \Phi\left(\frac{\ln(1000) - \mu}{\sigma}\right) \tag{A.2}$$

$$p_2 = \Phi\left(\frac{\ln(2499) - \mu}{\sigma}\right) - \Phi\left(\frac{\ln(1500) - \mu}{\sigma}\right) \tag{A.3}$$

$$p_3 = \Phi\left(\frac{\ln(4999) - \mu}{\sigma}\right) - \Phi\left(\frac{\ln(2500) - \mu}{\sigma}\right) \tag{A.4}$$

$$E[y] = \exp(\mu + \sigma^2/2), \tag{A.5}$$

[6]When including the 526 counties with at least 5 percent of 1976 employment in mining, log median family income evolves similarly from 1950–1970, but declines by less after 1980. Because relatively few people live in high mining counties, my estimates of long-run effects on children more closely reflect the persistence seen in Figure A.2, which excludes high mining counties.

where p_1 is the share of establishments (with at least 1000 employees) with 1000–1499 employees, p_2 is the share with 1500–2499 employees, p_3 is the share with 2500–4999 employees, $\Phi(\cdot)$ is the standard normal CDF, and $E[y]$ is average employment among establishments with at least 1000 employees.

I use equations (A.2)–(A.5) to estimate (μ, σ) with GMM, using the identity matrix as the weighting matrix. Using 1977 data across all industries in the U.S., there are 1947 establishments with 1000–1499 employees, 1202 with 1500–2499 employees, 678 with 2500–4999 employees, and 275 with 5000 or more employees. Total employment among these establishments is 9,442,953. Consequently, $\hat{p}_1 = 1947/4102 \approx 0.475, \hat{p}_2 \approx 0.293, \hat{p}_3 \approx 0.165$ and $\hat{E}[y] \approx 2302$. The GMM estimates are $\hat{\mu} = 7.506$ and $\hat{\sigma} = 0.686$. Standard facts about the log-normal distribution imply that the imputed means for the four establishment size groups are 1247, 1952, 3414, and 7055.[7]

D Addressing Measurement Error in Recession Exposure

This section describes measurement error that arises because some individuals' county of residence in 1979, which is the ideal variable for measuring recession exposure, differs from their county of birth, which is all I observe. I show that this measurement error attenuates estimates of π_a in equation (1), and I quantify the size of this attenuation.

For reference, I repeat equation (1), which is the feasible regression of interest:

$$y_{i,a,c,t} = R_c^{79-82}\pi_a + x_{i,a,c,t}\beta + \gamma_c + \theta_{a,s(c)} + \delta_t + \varepsilon_{i,a,c,t}. \tag{A.6}$$

The explanatory variable of interest in equation (A.6) is R_c^{79-82}, the change in log earnings per capita from 1979–1982 in birth county c. Let $R_{i,a,c,t}^{79-82*}$ be the change in log earnings per capita from 1979–1982 in the county where individual i resided in 1979. This variable more accurately measures exposure to the recession, but is unobserved. If I observed county of residence in 1979, the regression of interest would be

$$y_{i,a,c,t} = R_{i,a,c,t}^{79-82*}\pi_a^* + x_{i,a,c,t}\beta^* + \gamma_c^* + \theta_{a,s(c)}^* + \delta_t^* + \varepsilon_{i,a,c,t}^*. \tag{A.7}$$

True recession exposure, $R_{i,a,c,t}^{79-82*}$, and observed recession exposure, R_c^{79-82}, are connected through an auxiliary measurement error equation,

$$R_{i,a,c,t}^{79-82*} = R_c^{79-82}\lambda_a + x_{i,a,c,t}\tilde{\beta} + \tilde{\theta}_{a,s(c)} + \tilde{\delta}_t + v_{i,a,c,t}. \tag{A.8}$$

Equation (A.8) does not contain birth county fixed effects because the attenuation bias arises from cross-county variation for each cohort. By definition, $v_{i,a,c,t}$ is uncorrelated with the variables in

[7] In particular, if $\ln(y) \sim \mathcal{N}(\mu, \sigma^2)$, then

$$E(y|a < y \leq b) = E(y)\frac{\Phi(\sigma - a_0) - \Phi(\sigma - b_0)}{\Phi(b_0) - \Phi(a_0)}, \quad a_0 \equiv (\ln a - \mu)/\sigma, \quad b_0 \equiv (\ln b - \mu)/\sigma$$

$$E(y|y > a) = E(y)\frac{\Phi(\sigma - a_0)}{\Phi(-a_0)}$$

equation (A.8).

To analyze the consequences of measurement error, I use the Frisch-Waugh-Lovell theorem (Frisch and Waugh, 1933; Lovell, 1963). I first partial out $x_{i,a,c,t}$, age in 1979-by-birth state fixed effects, and survey year fixed effects from equations (A.6)–(A.8). Let $M^1 z$ represent the resulting residual for some vector z, where M^1 is the "annihilator matrix." Equations (A.6)–(A.8) can then be written:

$$M^1 y_{i,a,c,t} = M^1 R_c^{79-82} \pi_a + M^1 \gamma_c + M^1 \varepsilon_{i,a,c,t} \tag{A.9}$$

$$M^1 y_{i,a,c,t} = M^1 R_{i,a,c,t}^{79-82*} \pi_a^* + M^1 \gamma_c^* + M^1 \varepsilon_{i,a,c,t}^* \tag{A.10}$$

$$M^1 R_{i,a,c,t}^{79-82*} = M^1 R_c^{79-82} \lambda_a + M^1 v_{i,a,c,t}. \tag{A.11}$$

Plugging equation (A.11) into (A.10) leads to:

$$M^1 y_{i,a,c,t} = M^1 R_c^{79-82} \lambda_a \pi_a^* + M^1 \gamma_c^* + (M^1 \varepsilon_{i,a,c,t}^* + M^1 v_{i,a,c,t} \pi_a^*). \tag{A.12}$$

If $\varepsilon_{i,a,c,t}^*$ is orthogonal to both $R_{i,a,c,t}^{79-82*}$, conditional on the covariates in equation (A.7), and the measurement error, $v_{i,a,c,t}$, then equations (A.9) and (A.12) imply that plim $\hat{\pi}_a = \lambda_a \pi_a^*$, where $\hat{\pi}_a$ is the OLS estimate from equation (A.6).[8] Analogous conditions hold for 2SLS estimates. Consequently, the estimated effects of the recession will be attenuated if $\lambda_a \in (0, 1)$, and I can eliminate this attenuation bias with an estimate of λ_a.[9]

To quantify the extent of attenuation, the ideal data set is the 1980 Census linked to the NUMIDENT. Unfortunately, these files are not currently linked. Instead, I estimate λ_a using two data sets that provide valuable, but imperfect, information. First, I use 2000–2013 Census/ACS data for individuals born from 1970–2013 who are ages 0 to 29 at the time of the survey. These data contain county of birth from the NUMIDENT, like the data I use to estimate the long-run effects of the 1980–1982 recession, and county of residence at the time of the survey. Because they measure the relationship between county of birth and county of residence after the 1980–1982 recession, they might not accurately characterize measurement error if migration patterns have changed over time. To address this concern, I use confidential Panel Study of Income Dynamics (PSID) data. PSID data allow me to estimate λ_a for individuals born from 1968–1979 and observed in 1979, but they only contain information on county of residence. I limit the PSID sample to individuals who are first observed before age 3 to make early life county of residence a better proxy for county of birth.

As seen in Appendix Figure A.4, point estimates of λ_a from Census/ACS data range from 0.75 for 0 year olds to 0.40 for 29 year olds. Point estimates from PSID data display a similar age profile, but are larger because county of residence is more strongly related to county of residence in early

[8] These orthogonality conditions imply that $\varepsilon_{i,a,c,t}^*$ is orthogonal to R_c^{79-82}, and hence that $\varepsilon_{i,a,c,t}$ is orthogonal to R_c^{79-82}. Alternatively, I could assume that $\varepsilon_{i,a,c,t}$ is orthogonal to R_c^{79-82}, which would imply that $\varepsilon_{i,a,c,t}^*$ is orthogonal to R_c^{79-82}, and hence that $\varepsilon_{i,a,c,t}^*$ is orthogonal to $R_{i,a,c,t}^{79-82*}$.

[9] An alternative approach is to define $R_{a,c}^{79-82*}$ as the average change in log earnings per capita for individuals who were age a in 1979 and born in county c, and note that $R_{a,c}^{79-82*} = \sum_k p_{a,c,k} R_k^{79-82}$, where $p_{a,c,k}$ is the share of individuals age a in 1979 who were born in county c and resided in county k in 1979. Estimates of $p_{a,c,k}$ would allow me to construct $R_{a,c}^{79-82*}$ directly. I do not pursue this approach because the measurement error correction for each cohort depends on nearly 9.5 million parameters ($\approx 3076^2$), and adequate data on county-to-county migration flows are not available.

life than county of birth. Appendix Figure A.4 clearly suggests attenuation due to measurement error.

To adjust for attenuation, I use the Census/ACS data because they contain more comparable information on place of birth. The validity of this adjustment depends on two assumptions. First, I assume that unobserved measurement error, $v_{i,a,c,t}$, is uncorrelated with unobserved determinants of long-run outcomes, $\varepsilon^*_{i,a,c,t}$, conditional on the covariates in equation (A.6). For example, this rules out the possibility that parents of young children with high $\varepsilon^*_{i,a,c,t}$ anticipated the recession and moved to less severe recession counties before 1980. The suddenness of the changes in local economic activity that emerged during the recession support this assumption. In addition, there is no significant relationship between the severity of the 1980–1982 recession and migration from 1975 to 1980 in publicly available Census data. Second, I assume that estimates of λ_a for individuals born from 1970–2013 accurately characterize the measurement error relationship for individuals born from 1950–1979. Support for this assumption comes from the fact that estimates of λ_a are stable across the 1968–2013 birth cohorts in the PSID, as shown in Appendix Table A.2. Appendix Figure A.5 shows that migration rates are remarkably stable across the 1968–2013 birth cohorts in the PSID.

Appendix Figure A.6 shows the consequences of adjusting the effects of the recession on four-year college degree attainment for attenuation bias. The adjusted effects are larger in magnitude, but they lie within the 95 percent confidence interval of the unadjusted estimates. Appendix Figures A.7–A.11 present the measurement error adjustments for other educational outcomes.

For the tables, I construct equally-weighted averages of the λ_a coefficients across ages. The resulting averages are 0.673 (standard error: 0.021) for 0–10 year olds and 0.573 (0.016) for 11–19 year olds. Not surprisingly, they are even more precisely estimated than the results in Appendix Figure A.4, which are already quite precise.

To account for uncertainty due to estimation of the measurement error coefficients, I construct standard errors of the adjusted estimates using the delta method. In particular, the variance of the measurement error adjusted estimate is

$$\text{Var}\left(\frac{\hat{\pi}_a}{\hat{\lambda}_a}\right) = \frac{\text{Var}(\hat{\pi}_a)}{\hat{\lambda}_a^2} + \frac{\hat{\pi}_a^2}{\hat{\lambda}_a^2} \times \frac{\text{Var}(\hat{\lambda}_a)}{\hat{\lambda}_a^2} \tag{A.13}$$

The first part of this variance is the mechanical effect that arises from rescaling the estimates by the measurement error coefficient, $\hat{\lambda}_a$. The second part is the additional variance that arises from estimating the measurement error model. It is instructive to calculate these components separately. For the effect of the recession on four-year college degree attainment of individuals who were age 0–10 in 1979, the adjusted standard error in column 4 of Table 2 is 0.179. The variance is:

$$\text{Var}\left(\frac{\hat{\pi}_{0-10}}{\hat{\lambda}_{0-10}}\right) = \frac{0.014}{0.453} + \frac{0.100}{0.453} \times \frac{0.0004}{0.453} = 0.032 + 0.0002 \approx 0.032. \tag{A.14}$$

Uncertainty due to estimation of the measurement error model has a negligible effect on the variance of the adjusted estimate. The variance of the adjusted estimate exceeds that of the unadjusted estimate, but this is almost entirely due to the first term, which rescales the unadjusted variance by $\hat{\lambda}_a$. This is because the measurement error parameters are estimated very precisely.

E The Long-Run Effects of the 1980-1982 Recession: First Stage, Reduced-Form, and OLS Estimates

Appendix Table A.3 reports first stage estimates. Column 1 shows results from a simplified first stage, where I do not interact the log earnings or predicted log employment changes with indicators for age or include birth county fixed effects. The point estimate of 0.455 (standard error: 0.059) implies that a 10 percent decrease in predicted employment from 1979–1982 leads to a 4.55 percent decrease in real earnings per capita. In column 2, the dependent variable is the interaction between the 1979–1982 decrease in log real earnings per capita and an indicator for individuals being age 0–10 in 1979. The most relevant first stage parameter is the interaction between the predicted log employment decrease and an indicator for age 0–10 in 1979. The point estimate of 0.477 is very similar to column 1. The instrument for individuals age 11–19 in 1979 is included in the model, as is standard when there are multiple endogenous variables and multiple instruments, but the coefficient is close to zero. The coefficient is not exactly zero because the data are not balanced: some counties do not contain observations in all cohorts. Results are similar in column 3, where the dependent variable is the interaction between the 1979–1982 decrease in log real earnings per capita and an indicator for age 11–19 in 1979. The first stage F-statistics range from 43 to 54.

Appendix Table A.4 presents the reduced-form and OLS estimates for education. As expected, the reduced-form estimates in Panel A follow the same pattern as the 2SLS estimates, and are approximately half as large (reflecting the first stage coefficient being approximately 0.5). Panel B shows the OLS estimates using the change in log earnings per capita from 1979–1982 as the key explanatory variable. The point estimates display a similar pattern as the 2SLS results, but they are substantially attenuated. One likely explanation is that the change in earnings per capita is measured with error; this measurement error could arise because the Bureau of Economic Analysis combines several different earnings sources and uses decadal Census commuting patterns to convert data on earnings by place of work to earnings by place of residence. To examine this possibility, Panel C shows OLS estimates where the key explanatory variable is the change in log employment from 1979–1982, which is subject to less measurement error (both because employment is easier to measure than earnings and because there is no place of residence adjustment). Consistent with an important role for measurement error in Panel B, there is less attenuation in the OLS estimates in Panel C.

Appendix Table A.5 presents reduced-form and OLS estimates for labor market outcomes. The patterns are extremely similar.

F Additional Support for the Empirical Strategy from Birth Certificate Data

To provide evidence on the validity of my empirical strategy, I examine whether the pre-recession evolution of infant mortality, parental characteristics, and infant health are correlated with the severity of the 1980–1982 recession. I do not find any evidence that my estimates of the long-run effects of the recession are driven by pre-recession trends in infant health or parental characteristics.

I examine the evolution of the infant mortality rate (deaths per 1,000 births) by estimating 2SLS regressions similar to equation (A.1). The regression includes county of residence and state of residence-by-birth year fixed effects, the share of births that are nonwhite, and the pre-recession

county covariates. My sample contains individuals born from 1950–1979. I normalize the interaction between the severity of the recession and birth year to equal 0 for individuals born in 1950, and I aggregate the remaining interactions into three-year bins. I use the predicted log employment change as an instrumental variable and initially exclude the 526 counties with at least 5 percent of 1976 employment in the mining sector.

Appendix Figure A.18 shows that there is no evidence of a relationship between the evolution of infant mortality from 1950–1979 and the severity of the 1980–1982 recession. The point estimates are generally small in magnitude and indistinguishable from zero ($p = 0.96$). When including counties with a high mining employment share, there is also no evidence of a significant relationship ($p = 0.89$). This rules out changes in infant health as an explanation for the long-run effects of the 1980–1982 recession.

Information on parental characteristics (such as education) and infant birth weight are not available for the full 1950–1979 period, but are available from 1970–1979.[10] This is a major limitation, as the key concern for my empirical strategy is differential selection throughout the 1950–1979 period. Nonetheless, I examine these outcomes by estimating similar regressions, normalizing the interaction between the severity of the recession and birth year to equal 0 for individuals born in 1970. The control variables are the same, and I continue to exclude counties with a high share of employment in mining.[11]

Appendix Table A.11 presents results for eight dependent variables: average mothers' years of schooling; the share of births classified as low birth weight (no more than 2,500 grams), very low birth weight (1,500 grams), and extremely low birth weight (1,000 grams); average birth weight; and the 50th, 25th, and 10th percentiles of the birth weight distribution. Column 1 provides some evidence that mothers of children born from 1977–1979 have less education on average than mothers of children born earlier in the 1970s. This would raise concerns about my results if the long-run effects of the recession were concentrated only among this group. However, as seen in Figures 3 and 4, the long-run effects of the recession are similar for individuals born from 1966–1979 (age 0–13 in 1979); if anything, the impacts on schooling are weaker for individuals who were born from 1978–1979. Consequently, there is no reason to believe that changes in maternal education account for the negative long-run effects of the recession. The remaining columns display little relationship between the severity of the recession and infant birth weight. While the value of the results in Table A.11 is limited by my inability to consider cohorts born before 1970, there is no evidence that my results are driven by changes in maternal education or infant birth weight.

G The Long-Run Effects of the 1980–1982 Recession: Robustness Tests

Appendix Table A.12 presents results from several different specifications. In column 1, the only county-level covariate interacted with age in 1979 is the 1950–1970 change in log median family income. Column 2 controls for pre-recession income growth more flexibly by including changes in log median family income from 1950–1960, 1960–1970, and 1970–1980. Column 3 adds log

[10] Data on infant birth weight are available starting in 1968, and data on maternal education are available starting in 1969. I focus on 1970-forward because the 1969 data handle births to nonresident aliens differently than the 1970-forward data.

[11] For results on maternal education, I restrict the sample to states that reported education throughout the 1970–1979 period. This results in the exclusion of 13 states (Alabama, Arkansas, California, Connecticut, Delaware, the District of Columbia, Georgia, Idaho, Maryland, New Mexico, Pennsylvania, Texas, and Washington).

population changes from 1950–1960, 1960–1970, and 1970–1980, and column 4—my baseline specification—adds the 1960 level of log population, log population density, percent urban, percent black, percent foreign, percent with a high school degree, and percent of families with income below $3,000. Column 5 expands on this specification by including analogous covariates from 1950 and 1970 as well. Column 6 controls for the interaction between age in 1979, race, gender, and 1960 covariates, allowing the covariates' impact to differ by race and gender. Column 7 controls for the county-level severity of post-1982 recessions, and column 8 controls for the commuting zone-level change in Japanese import competition from 1970–1990 as constructed by Batistich and Bond (2019). Column 9 returns to the baseline specification, but replaces birth state-by-age in 1979 fixed effects with birth region-by-age in 1979 fixed effects. Column 10 adds to the baseline specification controls for the log number of births in a county; I include this specification because Appendix Figure A.19 displays an increase in birth rates from 1960–1972 followed by a decline, and this fluctuation in birth rates could threaten my empirical strategy if different types of children were born at different times.

Overall, these specifications yield quite similar results, especially for high school/GED and four-year college degree attainment. For other outcomes, the most important covariates are the 1960 variables added in column 4. These covariates lead to larger negative impacts on college attendance and attenuate the positive impacts on two-year degree attainment, especially for individuals age 0–10 in 1979. In turn, the attenuated impact on two-year degree attainment leads to more negative impacts on any college degree attainment and years of education. Results are quite similar from the other specifications in the table.

Appendix Table A.13 presents similar results for labor market outcomes. The results are again quite robust, with the 1960 covariates having the largest impact. The robustness of the labor market outcomes to controls for subsequent recession severity is particularly notable, as later recessions could have directly impacted income and wages; the insensitivity to these controls is consistent with the small correlations shown in Appendix Table A.10.

Appendix Table A.14 shows that results are similar when replacing the 1979–1982 decrease in log earnings per capita with other measures of recession severity: the decrease in log earnings, the decrease in log income per capita, the decrease in log employment, and the decrease in earnings per capita. The magnitude of estimates are similar when measuring the change in earnings per capita in logs or levels.[12]

Appendix Table A.15 compares regressions in which the dependent variable is the logarithm or inverse hyperbolic sine of income. For personal income and family income, the qualitative conclusions are similar when using either transformation. However, the coefficients are positive for the inverse hyperbolic sine of earned income. To examine this issue more closely, Appendix Figure A.20 displays histograms of the inverse hyperbolic sine of the income measures from 2000–2013. Over 15 percent of individuals report no earned income, which results in a large mass point at 1 in Panel B. Mass points are smaller, but still apparent for personal income (Panel A) and family income (Panel C). In all cases, there are very few observations just to the right of the mass point. The bimodal distributions raise doubts about whether it is appropriate to model the recession as

[12]Mean real earnings per capita in 1979 is $21,822, so a 10 percent decrease in earnings per capita at the mean amounts to $2,182. The estimates using the decrease in earnings per capita in Appendix Table A.14 imply that a $2,182 decrease in earnings per capita leads to a 4.9 percentage point ($= 0.223 \times 0.2182$) decrease in four-year degree attainment for 0–10 year olds and a 3.0 percentage point decrease for 11–19 year olds. These estimates are similar to those which use the change in log real earnings per capita, which imply a 4.7 and 2.9 percentage point decrease.

having a continuous impact on the inverse hyperbolic sine. When using the inverse hyperbolic sine, the coefficients reflect a combination of impacts on having positive income and impacts on log income. This can be hard to interpret, especially for dependent variables with a large mass point at zero income. My preferred approach for including individuals with zero income is to estimate regressions where the dependent variable is an indicator for income exceeding certain thresholds (see Figure 5). The advantage of this approach is that it does not require assumptions about the effects of recessions being continuous on the inverse hyperbolic sine or logarithm of income.

H Effects on Local Government Expenditures and Revenues

This section examines the effects of the 1980–1982 recession on local government expenditures and revenues, which could affect human capital development in childhood. I find that expenditures per capita fell starting in 1992 in counties that experienced a more severe recession, but there is little evidence of a decrease before then, likely due to higher federal transfers. The decline in expenditures is driven by spending on welfare and health, and not education.

To examine the effect of the recession on local government expenditures and revenues, I estimate event study regressions similar to equation (A.1), where the dependent variable is log real expenditures or revenues.[13] I use data from the Census of Governments, which contains information on expenditures and revenues for all government units in years that end in a "2" or "7."[14] I collapse all government units to the county level for years 1972, 1977, 1982, 1987, 1992, and 1997. I normalize the interaction between year 1977 and the severity of the recession to equal zero. I estimate the model by 2SLS, using the predicted log employment change from 1979–1982 in all industries as the IV. To remove the countercyclical boom-bust cycle experienced by the mining sector, I exclude the 526 counties with at least 5 percent of 1976 employment in the mining sector. I additionally control for log population and the share of the population age 0–4, 5–19, and 20–64, which could affect the amount and composition of expenditures and revenues.

Appendix Table A.16 shows that the recession had little effect on expenditures in the short-run, but is associated with reductions from 1992-forward. I focus on general direct expenditures, which represent all expenditures besides those for liquor stores, utilities, insurance trusts, or intergovernmental transfers, and amount to 89 percent of total expenditures in 1977.[15] The results in column 1 provide little evidence that the recession reduced expenditures per capita in 1982 or 1987, but there is a significant decrease in expenditures in 1992 and 1997. A 10 percent decrease in earnings per capita from 1979–1982 is associated with a 12.4 percent reduction in expenditures in 1992 and a 10.9 percent reduction in 1997. Columns 2–6 demonstrate that the long-run reduction is not driven by education, which accounts for 53 percent of spending in 1977, but instead

[13] In a very small number of instances, a county reports 0 expenditures or revenues for the outcomes I examine. To maintain a constant sample, I use the inverse hyperbolic sine, $\ln(y+\sqrt{1+y^2})$, instead of $\ln(y)$ throughout (Burbridge, Magee and Robb, 1988). The log and inverse hyperbolic sine yield very similar coefficients in linear regression models when y is sufficiently large.

[14] I downloaded these data from the NBER website, with thanks to Michael Greenstone for making them available. I exclude the five New York City counties from the analysis because they are combined into a single geographic unit.

[15] I exclude liquor stores, utilities (water supply, electric power, gas supply, and mass transit), and insurance trusts to focus on government activities most likely to affect children, but results are similar when including these categories. I exclude intergovernmental expenditures to avoid double counting, which could arise when a county government gives money to a school district, which then spends the money on teachers' salaries. The grouping of expenditures and revenues in Appendix Tables A.16 and A.17 is similar to that used by Bartik et al. (2019).

other purposes, especially welfare and health.[16] Columns 7–8 show that both current and capital expenditures decreased in the 1990s; the point estimates indicate an earlier and larger proportional decrease in capital spending.

Appendix Table A.17 provides suggestive evidence that intergovernmental transfers initially offset the decrease in tax revenues after the recession. As seen in column 1, there is a significant decrease in general direct revenues from 1992-forward.[17] Underlying this is an immediate decrease in tax revenue (column 2), possibly offset by an increase in intergovernmental transfers in 1982 and 1987 (column 4). Column 5 shows that property taxes, which account for 33 percent of general direct revenue and 89 percent of tax revenue, drive the decrease in total tax revenues. Columns 6–8 suggest that offsetting intergovernmental transfers came from federal and local, as opposed to state, governments.

[16]Education expenditure purposes include elementary and secondary education, higher education, and libraries. Public safety expenditure purposes include police, correctional facilities, fire, judicial and legal, and protective inspection and regulation. Welfare and health expenditure purposes include welfare, health and hospital, transit subsidies, and housing and community development. Infrastructure expenditure purposes include airport, total highway, parking, sewerage, solid wage management, and water transport and terminals. Examples of other expenditure purposes are financial administration, central staffing, and parks and recreation.

[17]As expected given balanced budget requirements, the change in expenditures in Appendix Table A.16 approximately mirror the change in revenues in Appendix Table A.17.

Table A.1: Sample Construction and Match Statistics

Panel A. Number of individuals satisfying sample criteria	
Meet baseline demographic criteria	27,374,000
and have non-missing PIK	26,253,000
and have unique PIK	26,147,000
and have unique birth county	24,462,000
Panel B. Birth county match type, as percent of total	
Exact	76.85
Exact-abbreviation	3.57
Duplicate	10.95
Probabilistic	5.11
Hand check	3.52

Notes: The baseline demographic criteria are having non-allocated values for state of birth, birth year, gender, and race, plus being born in the U.S. according to the Census/ACS survey. A unique PIK is one that does not appear more than once in a survey year. Sample contains individuals born from 1950–1980 who are age 25–64 at the time of the survey.
Source: Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.2: Stability of the Relationship between Severity of 1980–1982 Recession in County of Residence and County of Birth Across Cohorts, PSID Data

	Dependent variable: 1979–1982 decrease in log real earnings per capita in county of residence in year			
	1979	1991	2003	2013
	(1)	(2)	(3)	(4)
Interaction between 1979–1982 decrease in log real earnings per capita in county of birth and age				
0–1	0.963	1.008	1.000	1.001
	(0.032)	(0.019)	(0.001)	(0.001)
2–4	0.844	0.870	0.901	0.865
	(0.035)	(0.037)	(0.037)	(0.032)
5–7	0.801	0.795	0.745	0.806
	(0.061)	(0.067)	(0.041)	(0.043)
8–10	0.737	0.647	0.688	0.859
	(0.049)	(0.082)	(0.091)	(0.058)
11–13	0.707	0.663	0.677	
	(0.103)	(0.137)	(0.087)	
Observations	3,684	4,028	3,336	3,358
p-value, coefficients equal to column 1	–	0.586	0.211	0.168
Sample: Individuals born in years	1968–1979	1980–1991	1992–2003	2004–2013

Notes: Table reports estimates of OLS regressions where the dependent variable is the 1979–1982 decrease in log real earnings per capita in individuals' county of residence in the indicated year. Regressions include fixed effects for gender, race, and birth year-by-birth state, plus birth year interacted with the following birth county covariates: 1950–1960, 1960–1970, and 1970–1980 change in log real median family income and log population, and the 1960 level of log population, log population density, percent urban, percent black, percent foreign, percent with a high school degree, and percent of families with income below $3,000. The coefficients in column 1 are plotted in Appendix Figure A.4.

Sources: BEA Regional Economic Accounts, Confidential PSID data

Table A.3: First Stage Estimates

	Decrease in log real earnings per capita, 1979–1982	Decrease in log real earnings per capita, 1979–1982, by age 0–10 in 1979	Decrease in log real earnings per capita, 1979–1982, by age 11–19 in 1979
	(1)	(2)	(3)
Predicted log employment decrease, 1979–1982	0.455		
	(0.059)		
Interaction between predicted log employment decrease, 1979–1982, and age in 1979			
0–10		0.477	-0.014
		(0.055)	(0.006)
11–19		-0.001	0.449
		(0.003)	(0.059)
F-statistic	60.20	43.09	53.66

Notes: Table reports first stage estimates of the 2SLS system. The predicted log employment change from 1979–1982 is constructed using a county's 1976 industrial structure and the industry-level log employment change from 1979–1982 in other states within the same region, as defined in equation (2). See notes to Table 2 for details on additional covariates and sample.

Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.4: The Long-Run Effects of the 1980–1982 Recession on Education, Reduced-Form and OLS Estimates

	Dependent variable:					
	HS/GED attainment (1)	Any college attendance (2)	Any college degree attainment (3)	Four-year college degree attainment (4)	Two-year college degree attainment (5)	Years of schooling (6)
Panel A. Reduced-Form Estimates						
Interaction between 1979–1982 predicted log employment decrease and age in 1979						
0–10	-0.010	-0.127	-0.208	-0.220	0.012	-0.926
	(0.022)	(0.075)	(0.080)	(0.080)	(0.027)	(0.398)
11–19	0.025	-0.063	-0.132	-0.128	-0.005	-0.475
	(0.020)	(0.055)	(0.044)	(0.042)	(0.020)	(0.245)
Panel B. OLS Estimates						
Interaction between 1979–1982 log real earnings per capita decrease and age in 1979						
0–10	0.005	-0.007	-0.039	-0.042	0.004	-0.166
	(0.013)	(0.026)	(0.027)	(0.025)	(0.014)	(0.140)
11–19	0.001	0.035	-0.001	-0.001	-0.0002	-0.008
	(0.008)	(0.019)	(0.018)	(0.015)	(0.008)	(0.097)
Panel C. OLS Estimates						
Interaction between 1979–1982 log employment decrease and age in 1979						
0–10	0.005	-0.058	-0.118	-0.121	0.003	-0.465
	(0.011)	(0.028)	(0.027)	(0.024)	(0.014)	(0.125)
11–19	0.018	0.015	-0.029	-0.042	0.013	-0.110
	(0.008)	(0.019)	(0.015)	(0.014)	(0.010)	(0.081)

Notes: See notes to Table 2 for details on specification and sample.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.5: The Long-Run Effects of the 1980–1982 Recession on Income, Wages, and Poverty, OLS and Reduced-Form Estimates

	Dependent variable:				
	Log personal income (1)	Log earned income (2)	Log hourly wage (3)	Log family income (4)	In poverty (5)
Panel A. Reduced-Form Estimates					
Interaction between 1979–1982 predicted log employment decrease and age in 1979					
0–10	-0.213	-0.248	-0.143	-0.199	0.075
	(0.072)	(0.074)	(0.058)	(0.079)	(0.029)
11–19	-0.134	-0.152	-0.148	-0.151	0.032
	(0.052)	(0.050)	(0.044)	(0.051)	(0.017)
Panel B. OLS Estimates					
Interaction between 1979–1982 log real earnings per capita decrease and age in 1979					
0–10	-0.084	-0.105	-0.049	-0.090	0.045
	(0.040)	(0.043)	(0.031)	(0.041)	(0.014)
11–19	-0.030	-0.041	-0.028	-0.052	0.019
	(0.022)	(0.022)	(0.019)	(0.018)	(0.008)
Panel C. OLS Estimates					
Interaction between 1979–1982 log employment decrease and age in 1979					
0–10	-0.143	-0.161	-0.112	-0.169	0.058
	(0.038)	(0.041)	(0.029)	(0.046)	(0.014)
11–19	-0.068	-0.069	-0.081	-0.083	0.011
	(0.025)	(0.026)	(0.024)	(0.024)	(0.009)

Notes: See notes to Table 3 for details on specification and sample.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.6: The Long-Run Effects of the 1980–1982 Recession on Education, First Difference Estimates

	Dependent variable:					
	HS/GED attainment (1)	Any college attendance (2)	Any college degree attainment (3)	Four-year college degree attainment (4)	Two-year college degree attainment (5)	Years of schooling (6)
Interaction between 1979–1982 decrease in log real earnings per capita and age in 1979						
0–10	-0.220	-0.930	-0.993	-0.994	0.002	-5.146
	(0.107)	(0.253)	(0.257)	(0.260)	(0.094)	(1.350)
11–19	-0.230	-1.037	-1.037	-0.984	-0.053	-5.354
	(0.160)	(0.279)	(0.232)	(0.232)	(0.092)	(1.350)
20–29	-0.396	-1.234	-0.986	-0.909	-0.075	-5.704
	(0.201)	(0.282)	(0.213)	(0.207)	(0.095)	(1.260)

Notes: See notes to Table 2 for details on specification and sample. In this table, I do not include birth county fixed effects.

Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.7: The Long-Run Effects of the 1980–1982 Recession on Education, Heterogeneity by Gender and Race

	Dependent variable:					
	HS/GED attainment (1)	Any college attendance (2)	Any college degree attainment (3)	Four-year college degree attainment (4)	Two-year college degree attainment (5)	Years of schooling (6)
Panel A. Interaction between 1979–1982 decrease in log earnings per capita and indicator for gender by age in 1979						
Men, 0–10	-0.072	-0.394	-0.453	-0.409	-0.045	-1.990
	(0.060)	(0.183)	(0.189)	(0.167)	(0.053)	(0.885)
Men, 11–19	0.019	-0.204	-0.321	-0.253	-0.068	-1.161
	(0.046)	(0.134)	(0.117)	(0.106)	(0.052)	(0.570)
Women, 0–10	0.029	-0.150	-0.440	-0.529	0.090	-1.954
	(0.041)	(0.140)	(0.170)	(0.195)	(0.086)	(0.874)
Women, 11–19	0.088	-0.080	-0.272	-0.318	0.045	-0.969
	(0.054)	(0.119)	(0.105)	(0.117)	(0.062)	(0.613)
p-value, men/women coefficients equal	0.018	0.008	0.724	0.268	0.264	0.855
Panel B. Interaction between 1979–1982 decrease in log earnings per capita and indicator for race by age in 1979						
Nonwhites, 0–10	0.163	0.571	0.317	0.113	0.204	1.368
	(0.230)	(0.317)	(0.234)	(0.171)	(0.118)	(1.577)
Nonwhites, 11–19	0.230	0.436	0.054	0.003	0.051	1.154
	(0.133)	(0.246)	(0.141)	(0.135)	(0.073)	(0.817)
Whites, 0–10	-0.080	-0.409	-0.575	-0.594	0.018	-2.690
	(0.052)	(0.161)	(0.185)	(0.194)	(0.056)	(0.962)
Whites, 11–19	-0.010	-0.223	-0.363	-0.349	-0.013	-1.565
	(0.041)	(0.113)	(0.109)	(0.112)	(0.042)	(0.595)
p-value, nonwhite/white coefficients equal	0.229	0.011	0.018	0.031	0.232	0.031

Notes: Table reports results of estimating separate regressions by gender (Panel A) and race (Panel B). See notes to Table 2 for details on specification and sample.

Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.8: The Long-Run Effects of the 1980–1982 Recession on Income, Wages, and Poverty, First Difference Estimates

	Dependent variable:				
	Log personal income (1)	Log earned income (2)	Log hourly wage (3)	Log family income (4)	In poverty (5)
Interaction between 1979–1982 decrease in log real earnings per capita and age in 1979					
0–10	-1.328	-1.366	-0.908	-1.321	0.264
	(0.315)	(0.322)	(0.266)	(0.309)	(0.081)
11–19	-1.459	-1.452	-1.140	-1.525	0.236
	(0.336)	(0.334)	(0.309)	(0.332)	(0.083)
20–29	-1.573	-1.506	-1.057	-1.625	0.235
	(0.397)	(0.382)	(0.354)	(0.386)	(0.085)

Notes: See notes to Table 3 for details on specification and sample. In this table, I do not include birth county fixed effects.

Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.9: The Long-Run Effects of the 1980–1982 Recession on Income, Wages, and Poverty, Heterogeneity by Gender and Race

	Dependent variable:				
	Log personal income (1)	Log earned income (2)	Log hourly wage (3)	Log family income (4)	In poverty (5)
Panel A. Interaction between 1979–1982 decrease in log earnings per capita and indicator for gender by age in 1979					
Men, 0–10	-0.297	-0.333	-0.168	-0.317	0.099
	(0.145)	(0.142)	(0.108)	(0.136)	(0.049)
Men, 11–19	-0.187	-0.225	-0.182	-0.189	0.016
	(0.119)	(0.111)	(0.097)	(0.096)	(0.039)
Women, 0–10	-0.578	-0.687	-0.424	-0.535	0.213
	(0.218)	(0.233)	(0.174)	(0.238)	(0.087)
Women, 11–19	-0.408	-0.443	-0.476	-0.487	0.120
	(0.185)	(0.187)	(0.168)	(0.178)	(0.053)
p-value, men/women coefficients equal	0.296	0.196	0.142	0.140	0.095
Panel B. Interaction between 1979–1982 decrease in log earnings per capita and indicator for race by age in 1979					
Nonwhites, 0–10	-0.183	-0.317	0.340	0.102	0.030
	(0.440)	(0.461)	(0.335)	(0.484)	(0.218)
Nonwhites, 11–19	0.174	0.174	0.632	0.541	0.003
	(0.494)	(0.483)	(0.409)	(0.421)	(0.164)
Whites, 0–10	-0.487	-0.548	-0.343	-0.443	0.161
	(0.154)	(0.166)	(0.126)	(0.174)	(0.056)
Whites, 11–19	-0.363	-0.405	-0.407	-0.419	0.082
	(0.116)	(0.118)	(0.108)	(0.117)	(0.033)
p-value, nonwhite/white coefficients equal	0.550	0.463	0.053	0.084	0.811

Notes: Table reports results of estimating separate regressions by gender (Panel A) and race (Panel B). See notes to Table 3 for details on specification and sample.

Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.10: Correlation of County-Level Severity of Recession Shocks

	Log earnings per capita change, 1973–75 (1)	Log earnings per capita change, 1979–82 (2)	Log earnings per capita change, 1989–91 (3)	Log earnings per capita change, 2000–02 (4)	Log earnings per capita change, 2007–10 (5)	Predicted log employment change, 1979–82 (6)
Panel A: Raw correlations						
Log earnings per capita change, 1973–75	1.000					
Log earnings per capita change, 1979–82	0.037	1.000				
Log earnings per capita change, 1989–91	-0.023	0.032	1.000			
Log earnings per capita change, 2000–02	0.132	0.034	-0.010	1.000		
Log earnings per capita change, 2007–10	-0.171	0.054	0.107	-0.104	1.000	
Predicted log employment change, 1979–82	-0.002	0.267	0.190	0.141	0.021	1.000
Panel B: Conditional on state fixed effects						
Log earnings per capita change, 1973–75	1.000					
Log earnings per capita change, 1979–82	0.072	1.000				
Log earnings per capita change, 1989–91	0.026	0.003	1.000			
Log earnings per capita change, 2000–02	0.077	-0.011	0.004	1.000		
Log earnings per capita change, 2007–10	-0.072	-0.007	0.013	-0.090	1.000	
Predicted log employment change, 1979–82	-0.099	0.125	0.080	0.024	0.040	1.000
Panel C: Conditional on state fixed effects, low mining counties						
Log earnings per capita change, 1973–75	1.000					
Log earnings per capita change, 1979–82	0.070	1.000				
Log earnings per capita change, 1989–91	0.050	-0.002	1.000			
Log earnings per capita change, 2000–02	0.096	0.046	0.034	1.000		
Log earnings per capita change, 2007–10	-0.133	-0.028	0.027	-0.130	1.000	
Predicted log employment change, 1979–82	0.011	0.164	0.076	0.008	0.055	1.000

Notes: Table reports unweighted correlations. In panels A and B, the sample contains 3,076 counties in the continental U.S. In Panel C, sample contains 2,550 counties with less than 5 percent of 1976 employment in the mining sector.
Sources: BEA Regional Economic Accounts, County Business Patterns

Table A.11: Maternal Education and Infant Health From 1970–1979

	Dependent variable:							
	Average mothers' years of schooling (1)	Share low birth weight (2)	Share very low birth weight (3)	Share extremely low birth weight (4)	Average birth weight, grams (5)	Median birth weight, grams (6)	25th percentile birth weight, grams (7)	10th percentile birth weight, grams (8)
Interaction between 1979–1982 decrease in log real earnings per capita and birth year								
1971–1973	0.095	0.019	-0.008	0.005	97.90	250.8	55.26	114.6
	(0.746)	(0.071)	(0.028)	(0.019)	(170.9)	(203.3)	(202.3)	(282.6)
1974–1976	-0.701	0.090	0.012	0.022	-54.40	68.46	-67.04	-251.5
	(0.628)	(0.065)	(0.020)	(0.018)	(168.7)	(164.9)	(211.1)	(307.0)
1977–1979	-1.403	0.034	0.018	0.024	-41.84	122.5	-84.61	-30.63
	(0.825)	(0.055)	(0.026)	(0.018)	(141.4)	(163.7)	(149.5)	(257.3)
Observations	18,799	25,497	25,497	25,497	25,497	25,497	25,497	25,497
p-value, all coefs. equal 0	0.230	0.275	0.681	0.131	0.461	0.411	0.750	0.547
Dep. var. mean, 1970–1979	11.91	0.069	0.010	0.005	3,336	3,361	3,018	2,660

Notes: The interaction between the 1979–1982 decrease in log real earnings per capita and birth year 1970 is normalized to equal zero. Regressions are estimated by 2SLS, using the predicted log employment change from 1979–1982 as an IV. Regressions include the share of births to nonwhite mothers and fixed effects for county and state by year, plus year interacted with the 1950–1960, 1960–1970, and 1970–1980 change in log real median family income and log population, and the 1960 level of log population, log population density, percent urban, percent black, percent foreign, percent with a high school degree, and percent of families with income below $3,000. Sample contains 2,550 counties with less than 5 percent of 1976 employment in the mining sector. Low birth weight is defined as no more than 2,500 grams, very low birth weight is no more than 1,500 grams, and extremely low birth weight is no more than 1,000 grams. Standard errors in parentheses are clustered by state.

Sources: National Center for Health Statistics (1970–1979), BEA Regional Economic Accounts, County Business Patterns, Census County Data Books, Minnesota Population Center (2011)

Table A.12: The Long-Run Effect of the 1980–1982 Recession on Education, Robustness to Specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Interaction between 1979–1982 decrease in log real earnings per capita and age in 1979										
Panel A. Dependent variable: HS/GED attainment										
0–10	0.065	0.023	0.020	-0.020	0.002	-0.043	-0.003	-0.020	-0.052	-0.012
	(0.046)	(0.044)	(0.043)	(0.047)	(0.045)	(0.051)	(0.052)	(0.048)	(0.039)	(0.047)
11–19	0.041	0.024	0.033	0.055	0.069	0.026	0.073	0.053	0.072	0.060
	(0.032)	(0.036)	(0.036)	(0.046)	(0.041)	(0.047)	(0.050)	(0.047)	(0.049)	(0.046)
Panel B. Dependent variable: Any college attendance										
0–10	0.085	-0.027	0.003	-0.269	-0.192	-0.287	-0.259	-0.263	-0.334	-0.254
	(0.091)	(0.095)	(0.105)	(0.158)	(0.153)	(0.159)	(0.176)	(0.161)	(0.143)	(0.153)
11–19	-0.060	-0.106	-0.081	-0.141	-0.077	-0.156	-0.126	-0.146	-0.134	-0.133
	(0.066)	(0.077)	(0.082)	(0.122)	(0.108)	(0.119)	(0.136)	(0.126)	(0.110)	(0.119)
Panel C. Dependent variable: Any college degree attainment										
0–10	-0.253	-0.358	-0.284	-0.444	-0.376	-0.459	-0.474	-0.443	-0.566	-0.425
	(0.091)	(0.106)	(0.118)	(0.174)	(0.171)	(0.174)	(0.207)	(0.180)	(0.172)	(0.167)
11–19	-0.220	-0.276	-0.241	-0.297	-0.236	-0.311	-0.314	-0.309	-0.279	-0.291
	(0.071)	(0.077)	(0.082)	(0.107)	(0.094)	(0.106)	(0.126)	(0.113)	(0.101)	(0.105)
Panel D. Dependent variable: Four-year college degree attainment										
0–10	-0.465	-0.532	-0.423	-0.470	-0.400	-0.490	-0.511	-0.475	-0.510	-0.450
	(0.118)	(0.139)	(0.145)	(0.179)	(0.182)	(0.182)	(0.216)	(0.188)	(0.147)	(0.173)
11–19	-0.297	-0.335	-0.291	-0.286	-0.229	-0.300	-0.319	-0.302	-0.251	-0.283
	(0.082)	(0.093)	(0.098)	(0.107)	(0.099)	(0.107)	(0.132)	(0.113)	(0.091)	(0.107)
Panel E. Dependent variable: Two-year college degree attainment										
0–10	0.212	0.175	0.140	0.025	0.024	0.031	0.038	0.033	-0.056	0.025
	(0.069)	(0.062)	(0.063)	(0.059)	(0.055)	(0.056)	(0.059)	(0.059)	(0.066)	(0.058)
11–19	0.077	0.060	0.052	-0.010	-0.007	-0.010	0.005	-0.007	-0.027	-0.008
	(0.047)	(0.046)	(0.048)	(0.043)	(0.040)	(0.040)	(0.045)	(0.042)	(0.042)	(0.043)

Table A.12: The Long-Run Effect of the 1980–1982 Recession on Education, Robustness to Specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel F. Dependent variable: Years of schooling										
0–10	-0.743	-1.315	-0.985	-1.967	-1.658	-2.103	-1.982	-1.993	-2.311	-1.859
	(0.476)	(0.581)	(0.634)	(0.868)	(0.859)	(0.900)	(1.045)	(0.913)	(0.823)	(0.837)
11–19	-0.532	-0.864	-0.743	-1.065	-0.803	-1.206	-1.038	-1.150	-0.871	-1.030
	(0.377)	(0.435)	(0.442)	(0.573)	(0.505)	(0.584)	(0.693)	(0.610)	(0.538)	(0.570)
Birth state-by-age in 1979 fixed effects	X	X	X	X	X	X	X	X		X
Birth region-by-age in 1979 fixed effects									X	
Interaction between age in 1979 and										
1950–70 log median family income growth	X									
1950–60, 1960–70, 1970–80 log median family income growth		X	X	X	X	X	X	X	X	X
1950–60, 1960–70, 1970–80 log population growth			X	X	X	X	X	X	X	X
1960 covariates				X		X	X	X	X	X
1950, 1960, 1970 covariates					X					
Full interaction between age in 1979, race, gender, and 1960 covariates						X				
Recession severity for 1990–91, 2001, and 2007–09							X			
Japanese import competition, 1970–90								X		
Log births										X

Notes: The dependent variable is indicated in the panel title. All regressions include fixed effects for age at time of survey-by-gender, race, birth county, and survey year. The 1960 covariates are log population, log population density, percent urban, percent black, percent foreign, percent with a high school degree, and percent of families with income below $3,000. The 1950 and 1970 covariates are defined similarly, except for 1950 the percent of families with income below $2,000 is available. To control for log births, I include the log number of births of a county's residents and the log number of births that take place in that county. Recession severity measures are the change in log earnings per capita and change in log employment for 1989–1991, 2000–2002, and 2007–2010. The commuting zone-level change in Japanese import competition comes from Batistich and Bond (2019). Column 4 is the baseline specification reported in Table 2. See notes to Table 2 for details on sample.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.13: The Long-Run Effect of the 1980–1982 Recession on Income, Wages, and Poverty, Robustness to Specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Interaction between 1979–1982 decrease in log real earnings per capita and age in 1979										
Panel A. Dependent variable: Log personal income										
0–10	-0.229	-0.328	-0.253	-0.447	-0.458	-0.452	-0.582	-0.437	-0.658	-0.434
	(0.118)	(0.123)	(0.133)	(0.158)	(0.164)	(0.155)	(0.201)	(0.155)	(0.157)	(0.154)
11–19	-0.314	-0.349	-0.318	-0.295	-0.267	-0.314	-0.372	-0.297	-0.405	-0.284
	(0.121)	(0.119)	(0.126)	(0.120)	(0.126)	(0.122)	(0.145)	(0.123)	(0.114)	(0.119)
Panel B. Dependent variable: Log earned income										
0–10	-0.403	-0.502	-0.403	-0.519	-0.526	-0.523	-0.654	-0.510	-0.737	-0.504
	(0.138)	(0.144)	(0.151)	(0.166)	(0.170)	(0.163)	(0.210)	(0.164)	(0.166)	(0.163)
11–19	-0.412	-0.445	-0.401	-0.333	-0.304	-0.356	-0.410	-0.337	-0.426	-0.321
	(0.129)	(0.127)	(0.134)	(0.119)	(0.123)	(0.121)	(0.144)	(0.122)	(0.115)	(0.118)
Panel C. Dependent variable: Log hourly wage										
0–10	-0.109	-0.186	-0.126	-0.303	-0.293	-0.290	-0.400	-0.300	-0.461	-0.294
	(0.085)	(0.089)	(0.096)	(0.125)	(0.134)	(0.125)	(0.164)	(0.127)	(0.128)	(0.124)
11–19	-0.414	-0.421	-0.373	-0.326	-0.295	-0.332	-0.410	-0.328	-0.354	-0.316
	(0.115)	(0.116)	(0.117)	(0.105)	(0.113)	(0.107)	(0.128)	(0.107)	(0.093)	(0.105)
Panel D. Dependent variable: Log family income										
0–10	-0.371	-0.455	-0.360	-0.419	-0.426	-0.398	-0.533	-0.395	-0.637	-0.404
	(0.179)	(0.188)	(0.185)	(0.173)	(0.185)	(0.171)	(0.212)	(0.164)	(0.138)	(0.170)
11–19	-0.442	-0.461	-0.403	-0.332	-0.304	-0.335	-0.449	-0.333	-0.414	-0.319
	(0.136)	(0.138)	(0.138)	(0.118)	(0.119)	(0.115)	(0.141)	(0.122)	(0.107)	(0.117)
Panel E. Dependent variable: In Poverty										
0–10	0.256	0.251	0.195	0.158	0.139	0.147	0.184	0.150	0.220	0.153
	(0.065)	(0.068)	(0.074)	(0.062)	(0.066)	(0.059)	(0.073)	(0.059)	(0.055)	(0.061)
11–19	0.150	0.136	0.109	0.070	0.055	0.067	0.096	0.071	0.057	0.066
	(0.041)	(0.038)	(0.040)	(0.040)	(0.039)	(0.038)	(0.046)	(0.041)	(0.033)	(0.040)

Table A.13: The Long-Run Effect of the 1980–1982 Recession on Income, Wages, and Poverty, Robustness to Specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Birth state-by-age in 1979 fixed effects	X	X	X	X	X	X	X	X		X
Birth region-by-age in 1979 fixed effects									X	
Interaction between age in 1979 and										
1950–70 log median family income growth	X									
1950–60, 1960–70, 1970–80 log median family income growth		X	X	X	X	X	X	X	X	X
1950–60, 1960–70, 1970–80 log population growth			X	X	X	X	X	X	X	X
1960 covariates				X		X	X	X	X	X
1950, 1960, 1970 covariates					X					
Full interaction between age in 1979, race, gender, and 1960 covariates						X				
Recession severity for 1990–91, 2001, and 2007–09							X			
Japanese import competition, 1970–90								X		
Log births										X

Notes: See notes to Table A.12 for details on specifications and notes to Table 3 for details on sample.

Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.14: The Long-Run Effect of the 1980–1982 Recession on Four-Year College Degree Attainment, Robustness to Measure of Recession Severity

	Measure of recession severity: 1979–1982 change in				
	Log earnings per capita	Log earnings	Log income per capita	Log employment	Earnings per capita, $10k
	(1)	(2)	(3)	(4)	(5)
Interaction between measure of recession severity and age in 1979					
0–10	-0.470	-0.339	-0.675	-0.340	-0.223
	(0.179)	(0.134)	(0.262)	(0.122)	(0.086)
11–19	-0.286	-0.204	-0.419	-0.202	-0.137
	(0.107)	(0.078)	(0.164)	(0.069)	(0.054)

Notes: The dependent variable is an indicator for four-year college degree attainment. See notes to Table 2.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.15: The Long-Run Effects of the 1980–1982 Recession on Income, Comparison of Log versus Inverse Hyperbolic Sine

	Dependent variable:					
	Log personal income (1)	IHS personal income (2)	Log earned income (3)	IHS earned income (4)	Log family income (5)	IHS family income (6)
Interaction between 1979–1982 decrease in log real earnings per capita and age in 1979						
0–10	-0.447	-0.716	-0.519	0.676	-0.419	-0.559
	(0.158)	(0.427)	(0.166)	(0.590)	(0.173)	(0.296)
11–19	-0.295	-0.487	-0.333	1.119	-0.332	-0.501
	(0.120)	(0.320)	(0.119)	(0.460)	(0.118)	(0.248)

Notes: In columns 1, 3, and 5, the dependent variable is the logarithm of the indicated income measure. In columns 2, 4, and 6, the dependent variable is the inverse hyperbolic sine of the indicated income measure. See notes to Table 3.

Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Table A.16: The Effects of the 1980–1982 Recession on Local Government Expenditures

	Dependent variable: Log expenditure							
		By purpose					By type	
	General direct expenditures (1)	Education (2)	Public safety (3)	Welfare and health (4)	Infra-structure (5)	Other (6)	Current (7)	Capital (8)
Interaction between 1979–1982 decrease in log real earnings per capita and year								
1972	0.004	-0.010	0.091	-0.334	-0.742	-0.084	0.259	-1.553
	(0.393)	(0.781)	(0.674)	(1.930)	(0.758)	(0.700)	(0.363)	(1.806)
1982	-0.090	0.086	0.411	-0.844	0.317	-0.077	-0.073	-0.316
	(0.317)	(0.327)	(0.474)	(1.838)	(0.769)	(0.651)	(0.259)	(1.672)
1987	-0.316	0.245	-0.590	0.378	-1.329	-0.090	-0.267	-1.290
	(0.307)	(0.363)	(0.617)	(1.767)	(1.036)	(0.708)	(0.278)	(1.819)
1992	-1.244	-0.136	-0.952	-6.458	-1.019	-1.238	-1.101	-2.391
	(0.317)	(0.311)	(0.708)	(2.887)	(1.073)	(0.688)	(0.334)	(1.499)
1997	-1.088	-0.351	-0.412	-3.088	-1.761	-1.899	-0.912	-1.815
	(0.373)	(0.387)	(0.537)	(2.147)	(1.094)	(0.801)	(0.306)	(1.532)
Observations	15,270	15,270	15,270	15,270	15,270	15,270	15,270	15,270
Real per capita mean, 1977	2,444	1,287	137	293	328	400	2,109	335
Share of total, 1977	1.000	0.527	0.056	0.120	0.134	0.164	0.863	0.137

Notes: The interaction between the 1979–1982 decrease in log real earnings per capita and year 1977 is normalized to equal 0. Regressions are estimated by 2SLS, using the predicted log employment change from 1979–1982 as an IV. Regressions include log population, the share of the population age 0–4, 5–19, and 20–64, fixed effects for county and state-by-year, plus year interacted with the 1950–1960, 1960–1970, and 1970–1980 change in log real median family income and log population, and the 1960 level of log population, log population density, percent urban, percent black, percent foreign, percent with a high school degree, and percent of families with income below $3,000. I transform dependent variables using the inverse hyperbolic sine instead of the log because a small number of observations equal zero. Sample limited to counties with no more than 5 percent of 1976 employment in the mining sector, and sample excludes 5 counties in New York City. Standard errors in parentheses are clustered by state.

Sources: Census of Governments, BEA Regional Economic Accounts, Census County Business Patterns, Census County Data Books, Minnesota Population Center (2011)

Table A.17: The Effects of the 1980–1982 Recession on Local Government Revenues

	Dependent variable: Log revenue							
		By broad source			By selected detailed source			
	General direct revenue (1)	Taxes (2)	Charges (3)	Intergov't transfers (4)	Property taxes (5)	Federal transfers (6)	State transfers (7)	Local transfers (8)
Interaction between 1979–1982 decrease in log real earnings per capita and year								
1972	0.220	0.463	0.628	0.136	0.763	1.998	-0.678	2.038
	(0.345)	(0.472)	(1.072)	(0.445)	(0.519)	(3.971)	(0.481)	(2.669)
1982	-0.316	-0.956	0.059	0.122	-0.985	-1.032	0.122	3.366
	(0.293)	(0.428)	(0.826)	(0.401)	(0.453)	(1.316)	(0.324)	(1.987)
1987	-0.223	-1.389	0.209	0.568	-1.373	2.188	-0.215	4.549
	(0.326)	(0.689)	(0.878)	(0.710)	(0.716)	(1.484)	(0.696)	(3.097)
1992	-1.054	-1.854	-1.619	-0.153	-2.230	0.097	-0.908	3.962
	(0.300)	(0.859)	(0.994)	(0.561)	(0.933)	(2.926)	(0.581)	(3.180)
1997	-0.761	-0.677	-1.143	-0.245	-0.922	2.818	-1.194	3.153
	(0.392)	(0.652)	(1.112)	(0.627)	(0.646)	(2.116)	(0.727)	(2.146)
Observations	15,270	15,270	15,270	15,270	15,270	15,270	15,270	15,270
Real per capita mean, 1977	2,566	943	437	1,186	840	182	934	70
Share of total, 1977	1.000	0.367	0.170	0.462	0.327	0.071	0.364	0.027

Notes: See notes to Appendix Table A.16.

Sources: Census of Governments, BEA Regional Economic Accounts, Census County Business Patterns, Census County Data Books, Minnesota Population Center (2011)

Table A.18: Characterizing States' Potentially Mitigating Policies

State	State transfer generosity		State higher educ. funding		State transfer progressivity	
	More vs. less generous (1)	Residual (2)	More vs. less generous (3)	Residual (4)	More vs. less progressive (5)	Slope (6)
AL	Less	0.023	Less	-0.289	Less	-0.645
AZ	Less	-0.398	More	0.201	More	-1.470
AR	More	0.142	More	0.037	More	-1.197
CA	More	0.349	More	0.051	More	-0.902
CO	Less	0.008	More	0.141	Less	-0.713
CT	Less	-0.030	Less	-0.005	Less	0.148
DE	Less	-0.183	More	0.036	Less	0.633
DC	More	0.159	Less	-0.000	Less	-0.824
FL	Less	-0.741	More	0.096	Less	-0.563
GA	More	0.126	More	0.160	More	-1.071
ID	Less	-0.012	More	0.130	Less	0.984
IL	Less	-0.063	More	0.292	More	-1.287
IN	Less	-0.522	More	0.111	More	-1.334
IA	Less	-0.046	More	0.178	Less	-0.308
KS	More	0.108	Less	-0.027	Less	0.002
KY	More	0.395	More	0.146	More	-1.339
LA	More	0.364	Less	0.020	More	-1.073
ME	Less	-0.144	Less	-0.028	More	-1.627
MD	More	0.033	Less	-0.118	More	-0.838
MA	More	0.046	Less	-0.388	More	-1.849
MI	More	0.226	More	0.126	Less	-0.647
MN	More	0.292	More	0.027	Less	-0.531
MS	More	0.185	More	0.051	Less	-0.673
MO	More	0.118	Less	-0.060	More	-1.233
MT	Less	-0.069	Less	-0.081	Less	-0.650
NE	Less	-0.189	Less	-0.067	Less	-0.630
NV	Less	0.031	Less	-0.157	Less	-0.608
NH	Less	-0.476	Less	-0.675	More	-1.082
NJ	Less	-0.154	Less	-0.382	More	-0.981
NM	Less	-0.080	Less	-0.057	More	-1.514
NY	More	0.119	More	0.393	Less	0.034
NC	Less	-0.375	More	0.182	More	-0.957
ND	More	0.134	Less	-0.164	Less	-0.790
OH	Less	-0.186	Less	-0.227	More	-0.969
OK	More	0.260	Less	-0.195	More	-1.693
OR	More	0.050	More	0.243	Less	-0.705

Table A.18: Characterizing States' Potentially Mitigating Policies

	State transfer generosity		State higher educ. funding		State transfer progressivity	
State	More vs. less generous (1)	Residual (2)	More vs. less generous (3)	Residual (4)	More vs. less progressive (5)	Slope (6)
PA	More	0.205	Less	-0.060	More	-1.482
RI	More	0.384	More	0.069	More	-1.039
SC	Less	-0.225	Less	-0.095	More	-1.332
SD	Less	-0.247	Less	-0.247	Less	-0.711
TN	Less	-0.147	Less	-0.086	More	-1.000
TX	Less	-0.353	Less	-0.105	More	-1.347
UT	More	0.094	More	0.088	Less	-0.739
VT	More	0.294	More	0.110	Less	-0.560
VA	Less	-0.508	Less	-0.146	Less	-0.488
WA	More	0.542	More	0.321	Less	-0.216
WV	More	0.304	More	0.283	More	-1.131
WI	More	0.234	More	0.154	More	-1.326
WY	Less	-0.077	Less	0.011	Less	-0.098

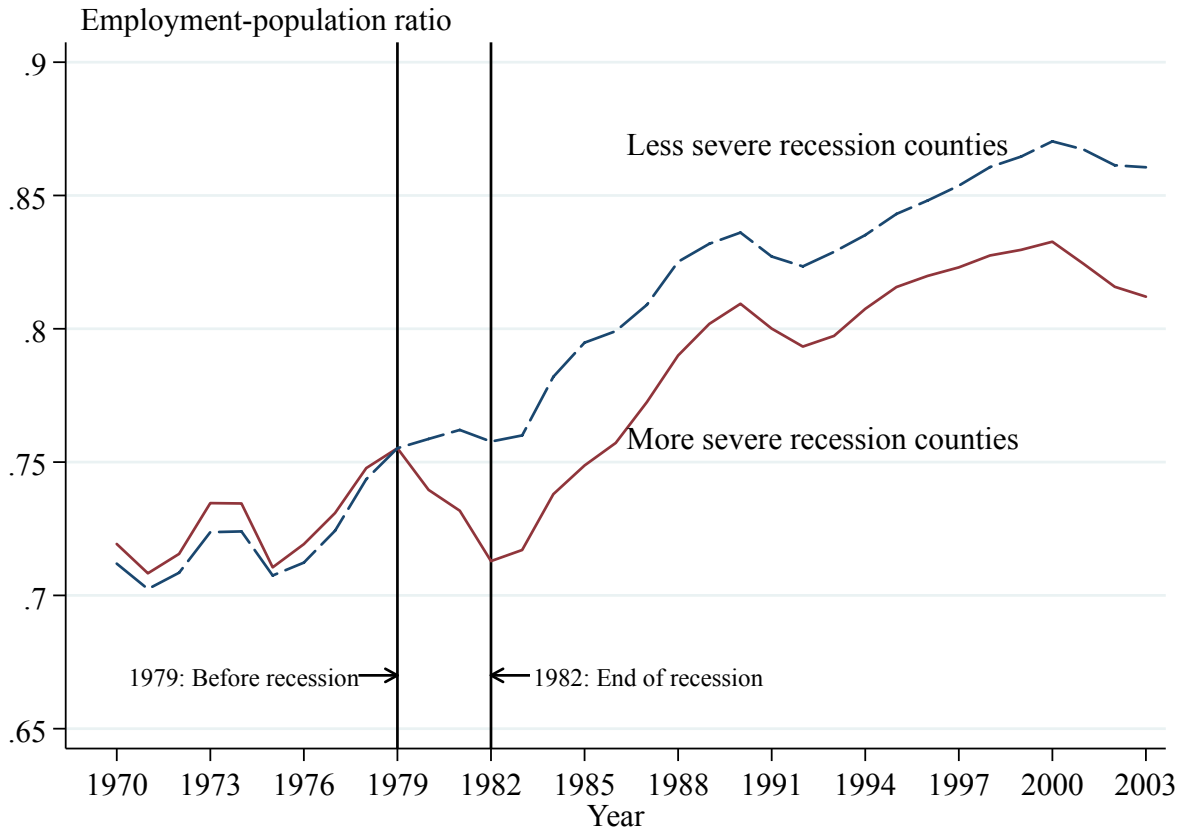
Notes: See notes to Table 5 for details. The mean (median) of column 2 is 0 (0.031). The mean (median) of column 4 is 0 (0.020). The mean (median) of column 6 is -0.824 (-0.838).
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Census County Data Book

Table A.19: The Long-Run Effects of the 1980–1982 Recession on Education, Separating the Temporary and Persistent Decline in Log Earnings per Capita

	Dependent variable:					
	HS/GED attainment (1)	Any college attendance (2)	Any college degree attainment (3)	Four-year college degree attainment (4)	Two-year college degree attainment (5)	Years of schooling (6)
Interaction between 1979–1982 decrease in log real earnings per capita and age in 1979						
0–10	-0.029	-0.328	-0.526	-0.566	0.040	-2.383
	(0.052)	(0.141)	(0.154)	(0.160)	(0.064)	(0.794)
11–19	0.044	-0.167	-0.325	-0.319	-0.005	-1.237
	(0.040)	(0.099)	(0.091)	(0.093)	(0.046)	(0.452)
Interaction between 1982–1992 decrease in log real earnings per capita and age in 1979						
0–10	-0.050	-0.311	-0.428	-0.507	0.079	-2.204
	(0.037)	(0.094)	(0.116)	(0.137)	(0.039)	(0.694)
11–19	-0.076	-0.161	-0.160	-0.187	0.028	-1.040
	(0.018)	(0.048)	(0.059)	(0.075)	(0.030)	(0.343)

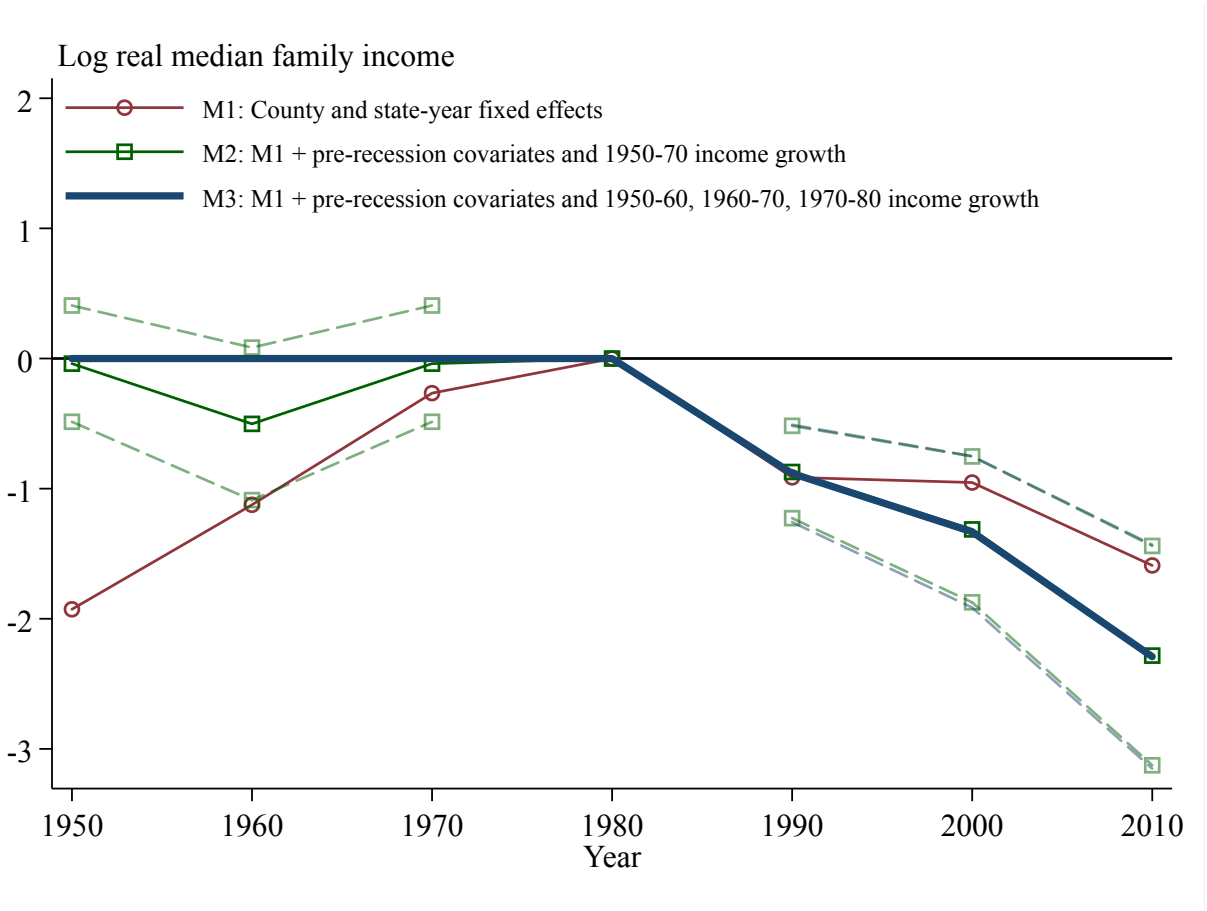
Notes: Table reports estimates of the interaction between the 1979–1982 and 1982–1992 decrease in log real earnings per capita in individuals' birth county and indicators for age in 1979. Regressions are estimated by 2SLS, using the predicted log employment change from 1979–1982 and 1982–1992 as instrumental variables. Both instrumental variables use county-by-industry employment shares from 1976. See notes to Table 2.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.1: Normalized Mean Employment-Population Ratio, by County-Level Severity of the 1980–1982 Recession



Notes: Figure displays the population-weighted mean employment-population (age 15–64) ratio, among counties with a below and above median 1979–1982 decrease in log real earnings per capita. I calculate the median using 1979 population weights. I adjust the less severe recession line to equal the more severe recession line in 1979, which amounts to an upward shift of 0.026. Sample contains 3,076 counties in the continental U.S.
Source: BEA Regional Economic Accounts

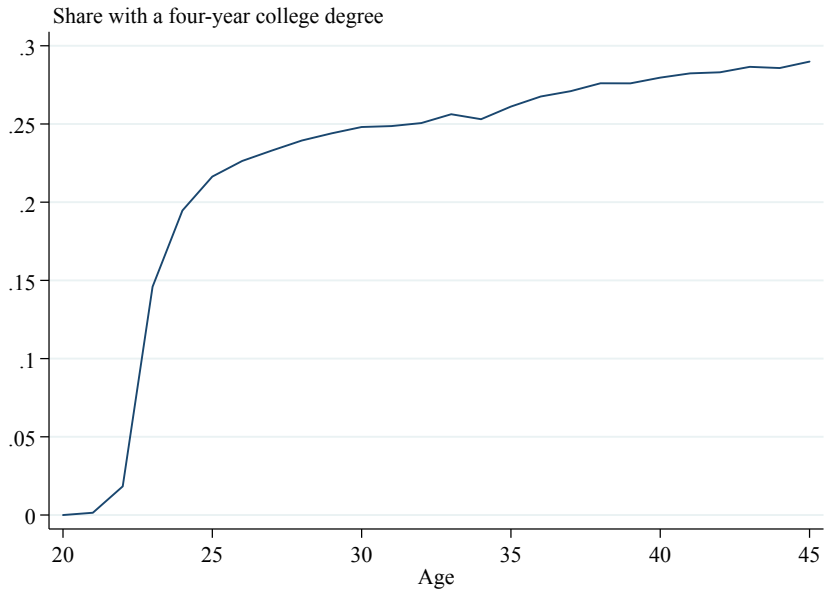
Figure A.2: Log Real Median Family Income Before and After the 1980–1982 Recession



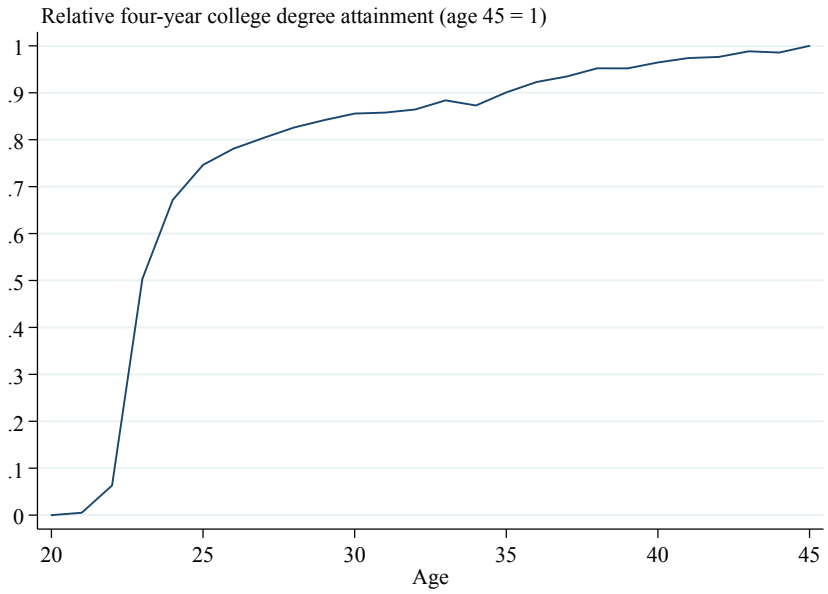
Notes: Figure plots the estimated coefficients on interactions between year and the 1979–1982 decrease in log real earnings per capita, where the coefficient for 1980 is normalized to equal zero. The dependent variable is log real median family income for 1950–1990 and log real median household income for 2000–2010. Regressions are estimated by 2SLS, using the predicted log employment change from 1979–1982 as an instrumental variable. Pre-recession covariates are year interacted with the 1950–1960, 1960–1970, and 1970–1980 log population change, and the 1960 level of log population, log population density, percent urban, percent black, percent foreign, percent with a high school degree, and percent of families with income below $3,000. Changes in log median family income are also interacted with year. For models 2 and 3, the dashed lines are pointwise 95 percent confidence intervals based on standard errors clustered by state. Sample is limited to the 2,550 counties with less than 5 percent of 1976 employment in the mining sector.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Census County Data Books, Minnesota Population Center (2011)

Figure A.3: Four-Year College Degree Attainment by Age

(a) Share with a Four-Year College Degree

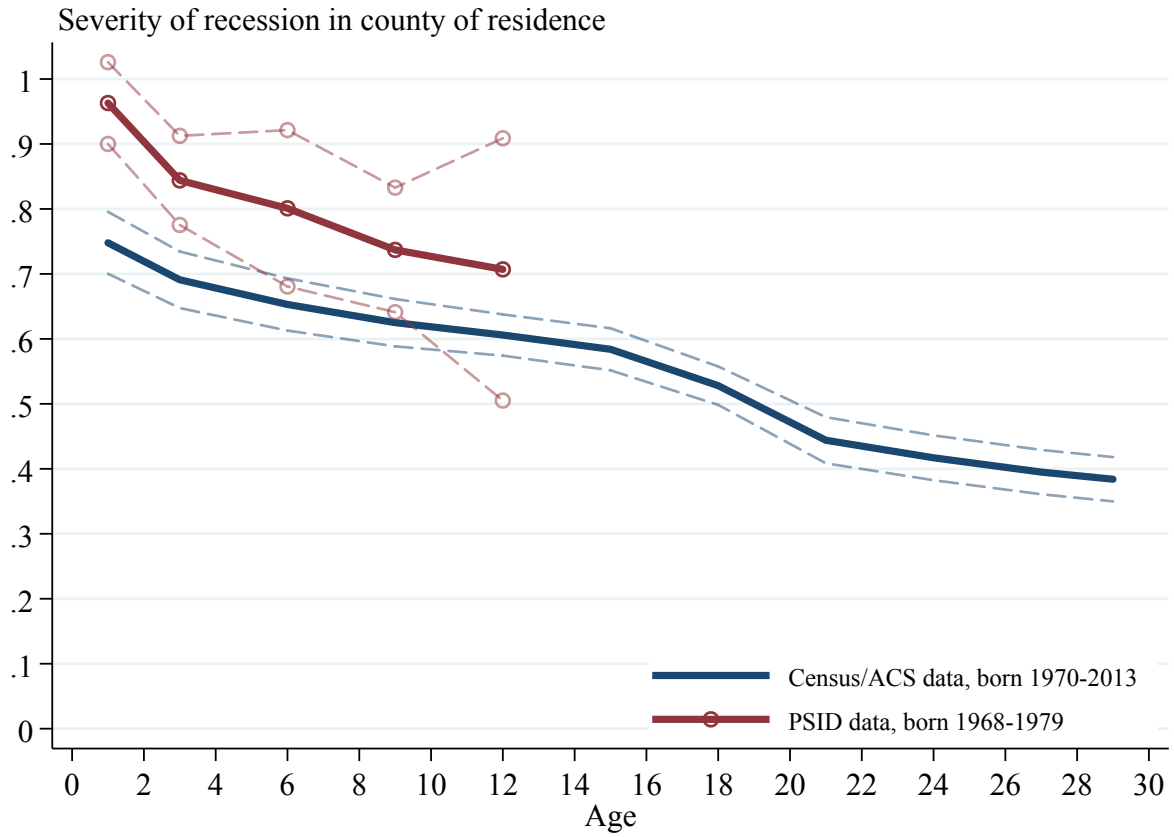


(b) Share with a Four-Year College Degree, Relative to Age 45 Attainment



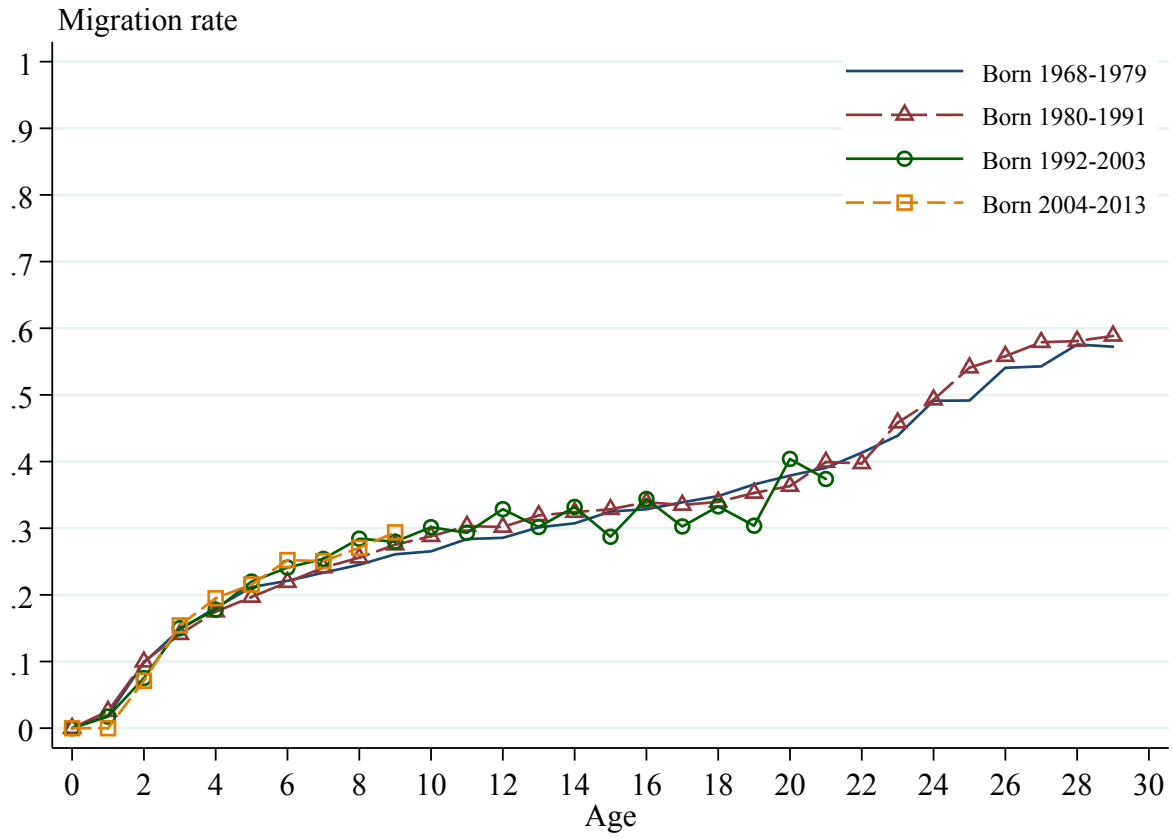
Notes: Panel A displays the share of individuals with a four-year college degree, for a constant sample of individuals born in the U.S. from 1957–1964. Panel B displays the share of attainment divided by attainment at age 45. I use custom weights from the NLS to account for the fact that these tabulations use multiple survey years.
Source: National Longitudinal Survey of Youth 1979 (1979–2010)

Figure A.4: Relationship between Severity of 1980–1982 Recession in County of Residence and County of Birth



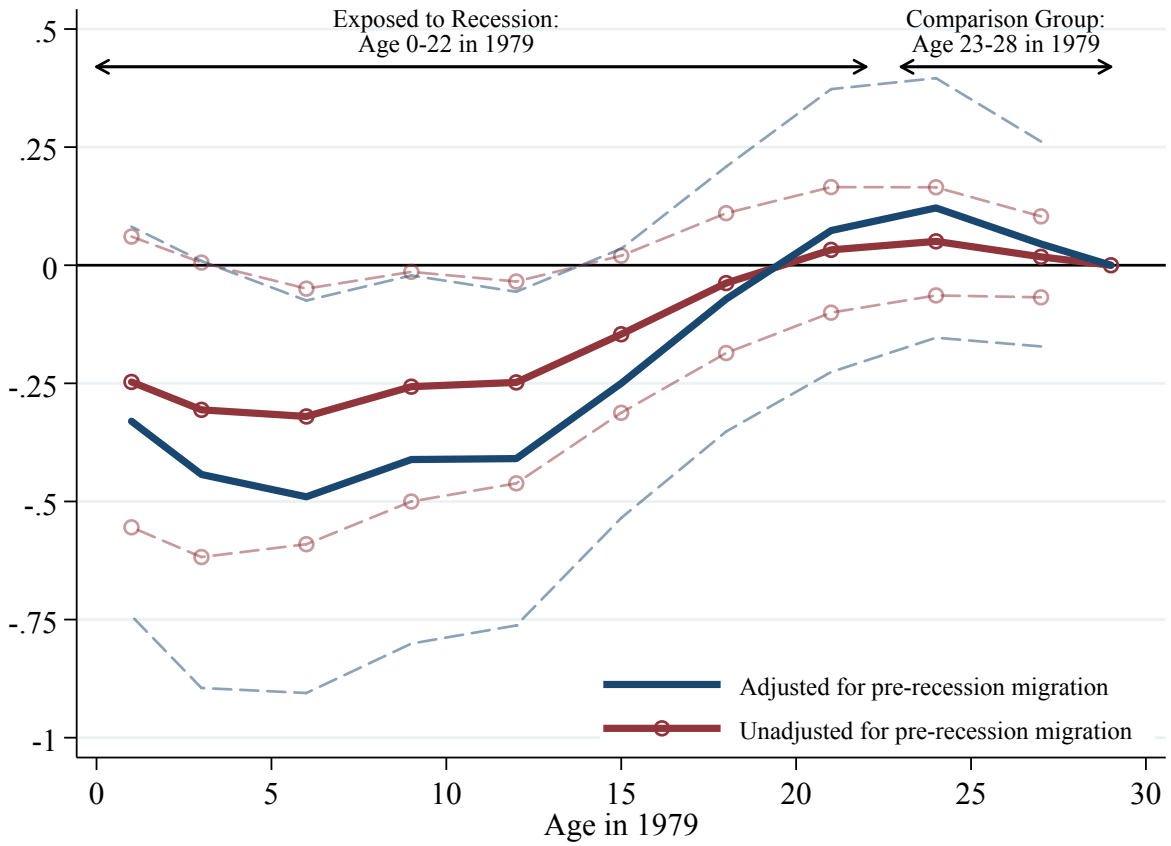
Notes: Figure plots OLS estimates of the interaction between the 1979–1982 decrease in log real earnings per capita in individuals' county of birth and indicators for age. The dependent variable is the 1979–1982 decrease in log real earnings per capita in individuals' county of residence. I estimate this relationship using confidential Census/ACS data for individuals born from 1970–2013 (county of residence observed from 2000–2013) and confidential PSID data for individuals born from 1968–1979 (county of residence observed in 1979). Both regressions include fixed effects for gender, race, and birth year-by-birth state, plus birth year interacted with the 1950–1960, 1960–1970, and 1970–1980 change in log real median family income and log population, and the 1960 level of log population, log population density, percent urban, percent black, percent foreign, percent with a high school degree, and percent of families with income below $3,000. The Census/ACS regression additionally includes fixed effects for age at time of survey by gender and age at time of survey by birth state. The dashed lines are pointwise 95 percent confidence intervals based on standard errors clustered by state. The Census/ACS sample contains 23.8 million individuals born in the continental U.S. with a unique PIK, unique birth county, and non-allocated variables. The PSID sample contains 3,684 individuals born in the continental U.S.
Sources: BEA Regional Economic Accounts, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file, Confidental PSID data

Figure A.5: Comparison of Birth County Out-Migration Rates by Cohort



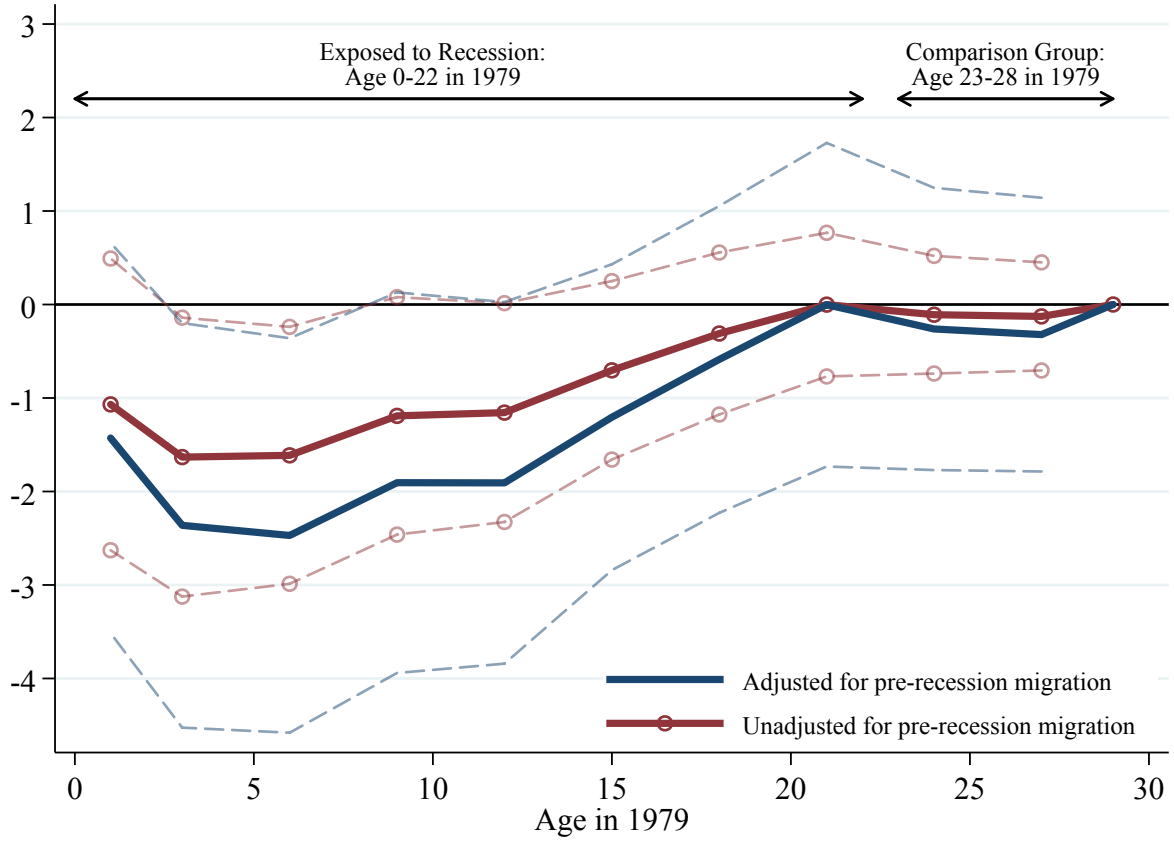
Notes: Figure displays the share of individuals living outside of their birth county for different birth cohorts. In the PSID, birth county is identified based on individuals' county of residence when first observed. I limit the PSID sample to individuals first observed before age 3.
Source: Confidental PSID data

Figure A.6: The Long-Run Effects of the 1980–1982 Recession on Four-Year College Degree Attainment, With and Without Measurement Error Adjustment



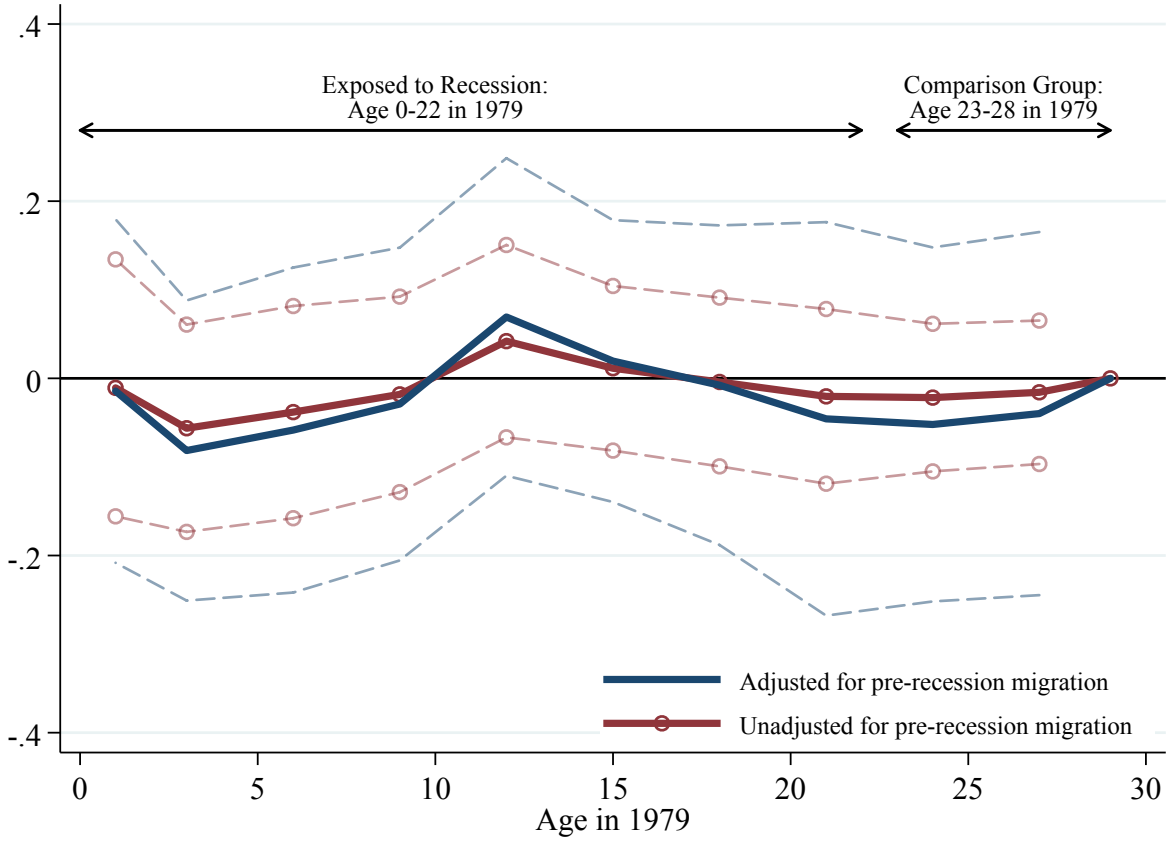
Notes: See notes to Figure 3. The dependent variable is an indicator for four-year college degree attainment. The line that adjusts for pre-recession migration divides the unadjusted estimates by the Census/ACS coefficient from Appendix Figure A.4. See Appendix D for details.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.7: The Long-Run Effects of the 1980–1982 Recession on Years of Schooling, With and Without Measurement Error Adjustment



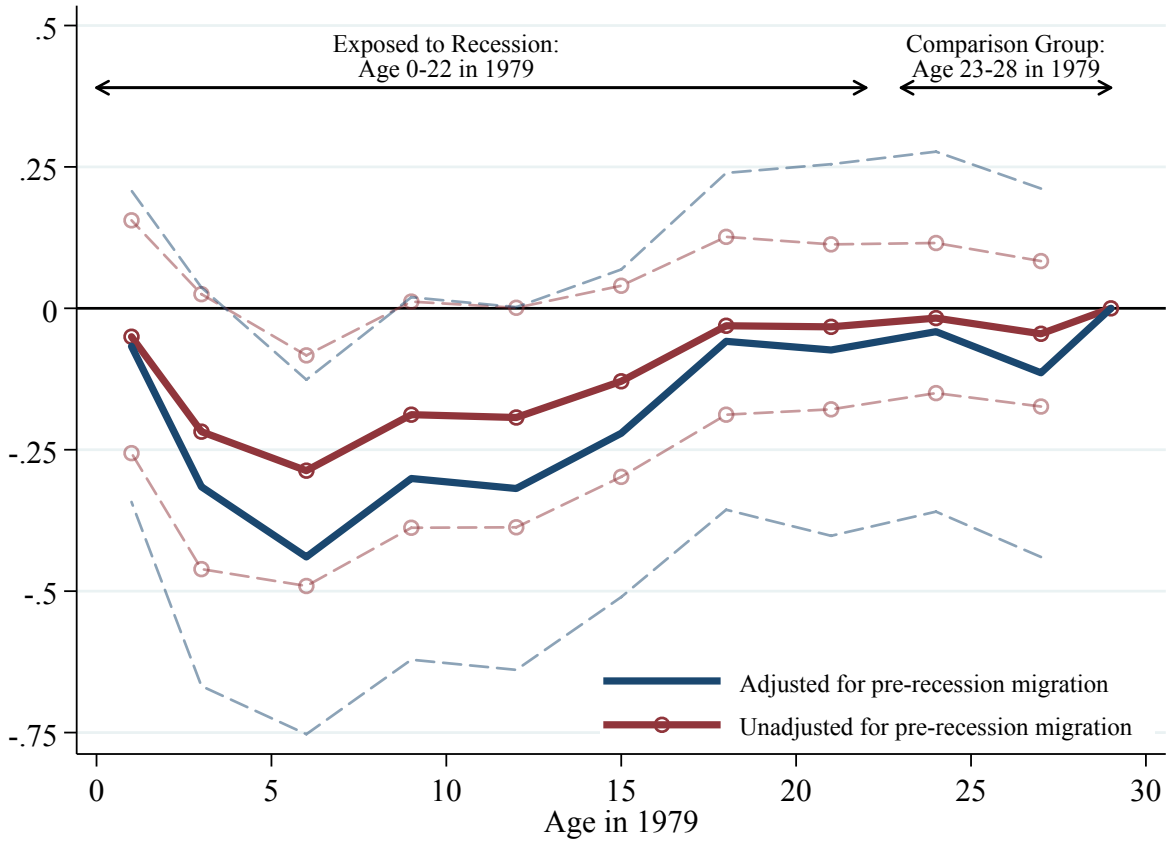
Notes: See notes to Figures 3 and A.6. The dependent variable is years of schooling.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.8: The Long-Run Effects of the 1980–1982 Recession on High School or GED Attainment



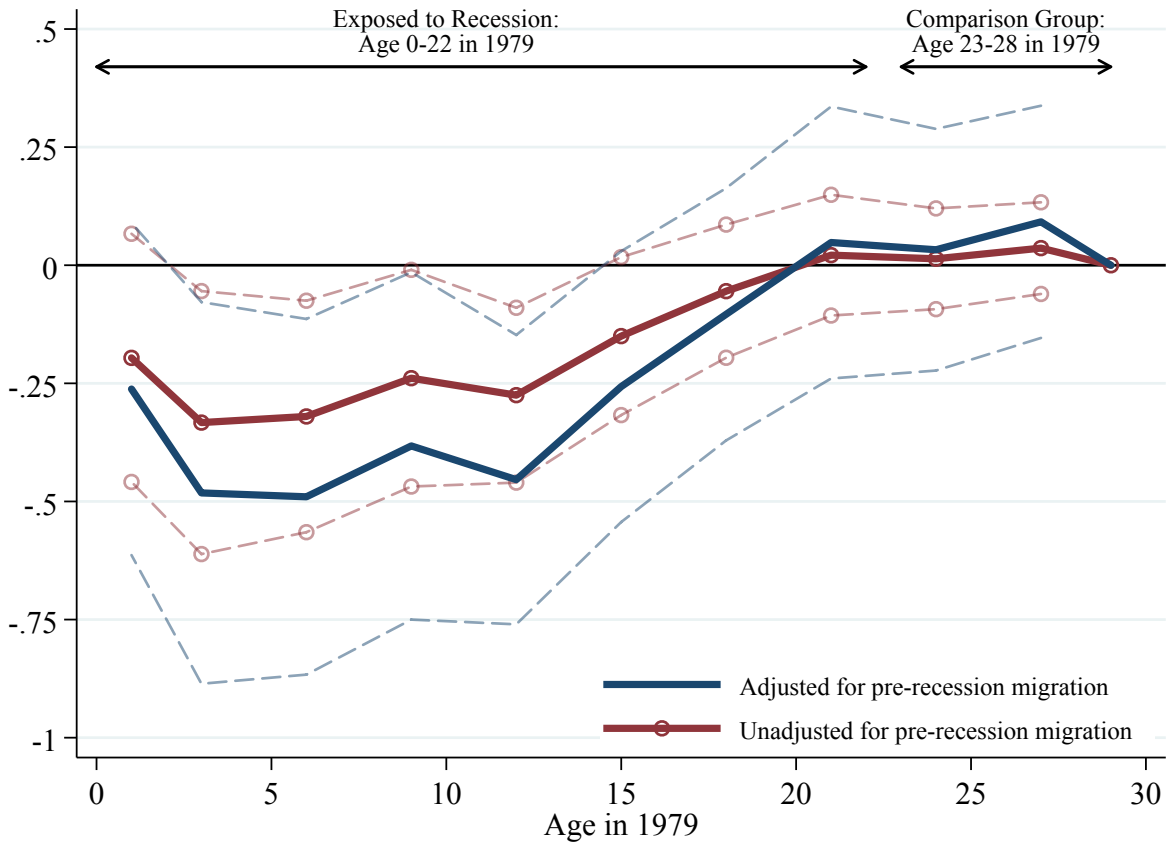
Notes: See notes to Figures 3 and A.6. The dependent variable is an indicator for high school or GED attainment.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.9: The Long-Run Effects of the 1980–1982 Recession on Any College Attendance



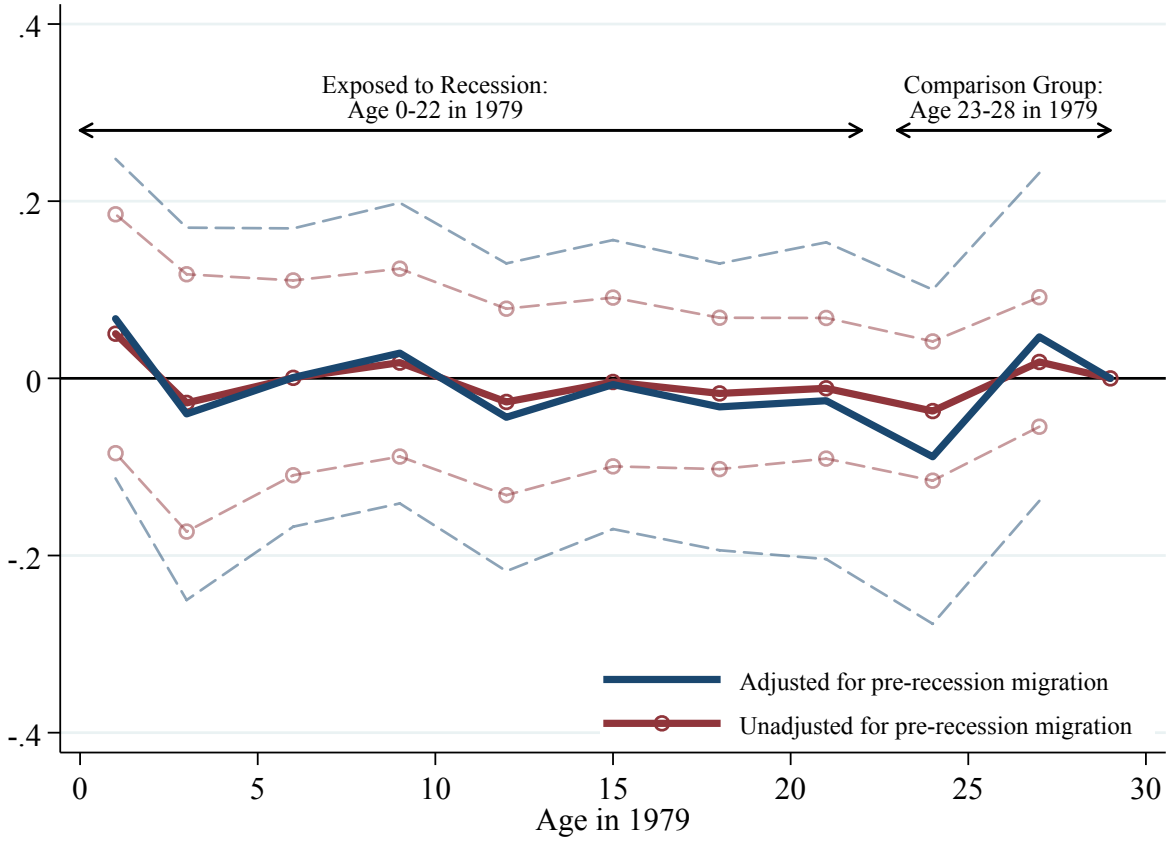
Notes: See notes to Figures 3 and A.6. The dependent variable is an indicator for any college attendance.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.10: The Long-Run Effects of the 1980–1982 Recession on Any College Degree Attainment



Notes: See notes to Figures 3 and A.6. The dependent variable is an indicator for any college degree attainment.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

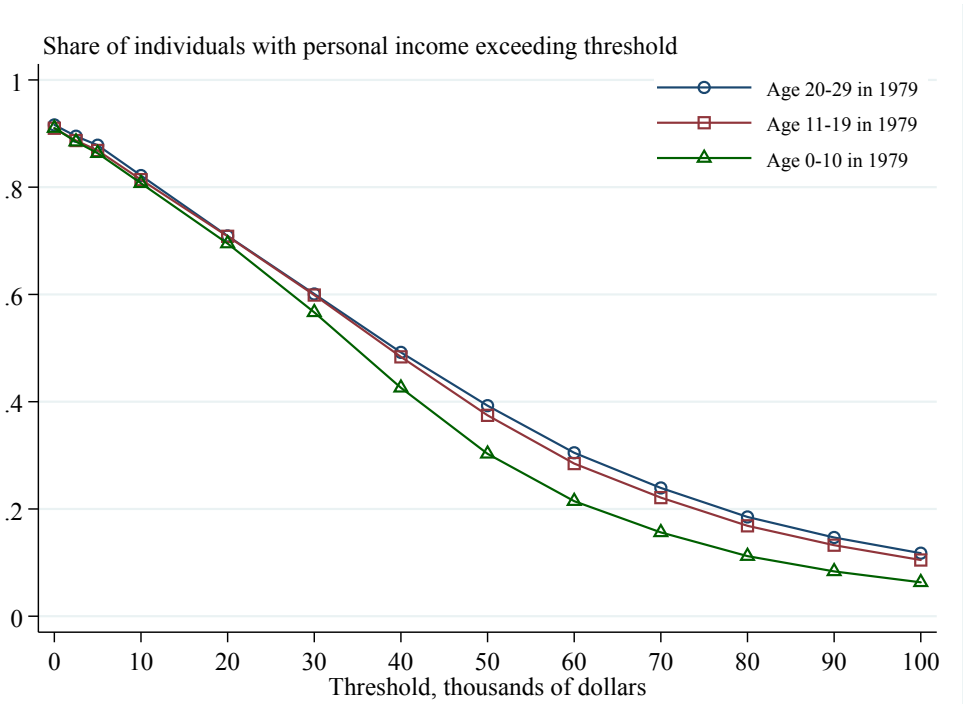
Figure A.11: The Long-Run Effects of the 1980–1982 Recession on Two-Year College Degree Attainment



Notes: See notes to Figures 3 and A.6. The dependent variable is an indicator for two-year college degree attainment.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.12: Summary Statistics, Income Thresholds

(a) Personal income



(b) Earned income

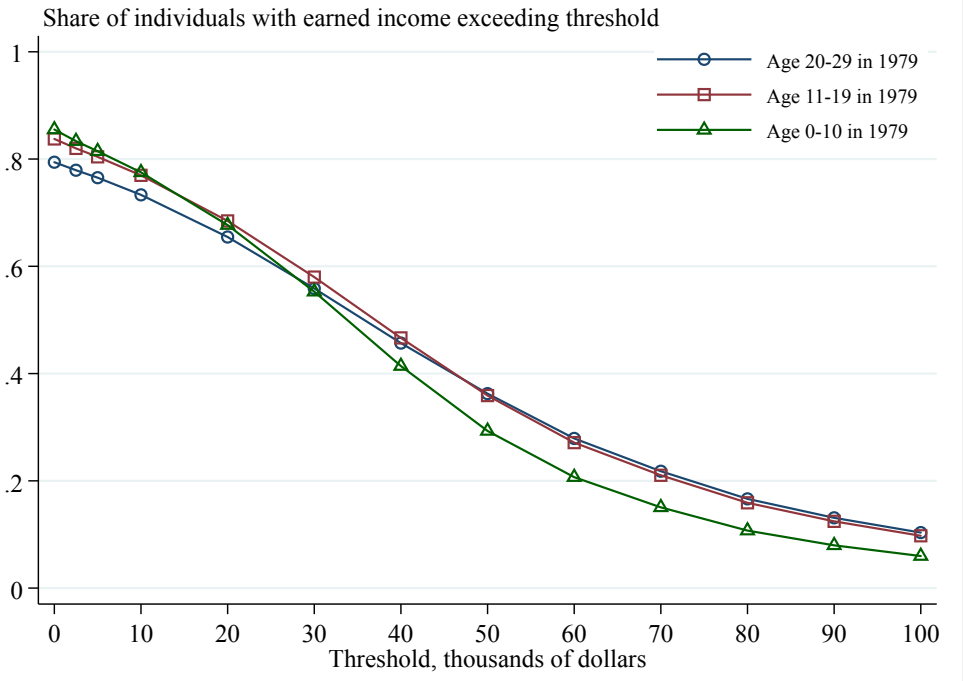
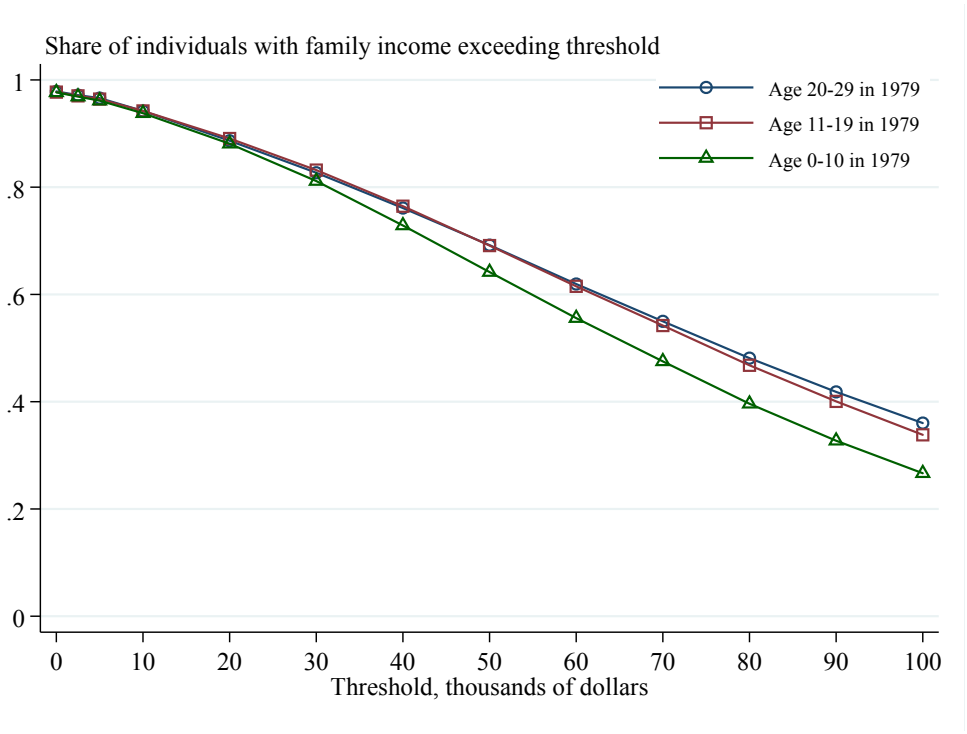


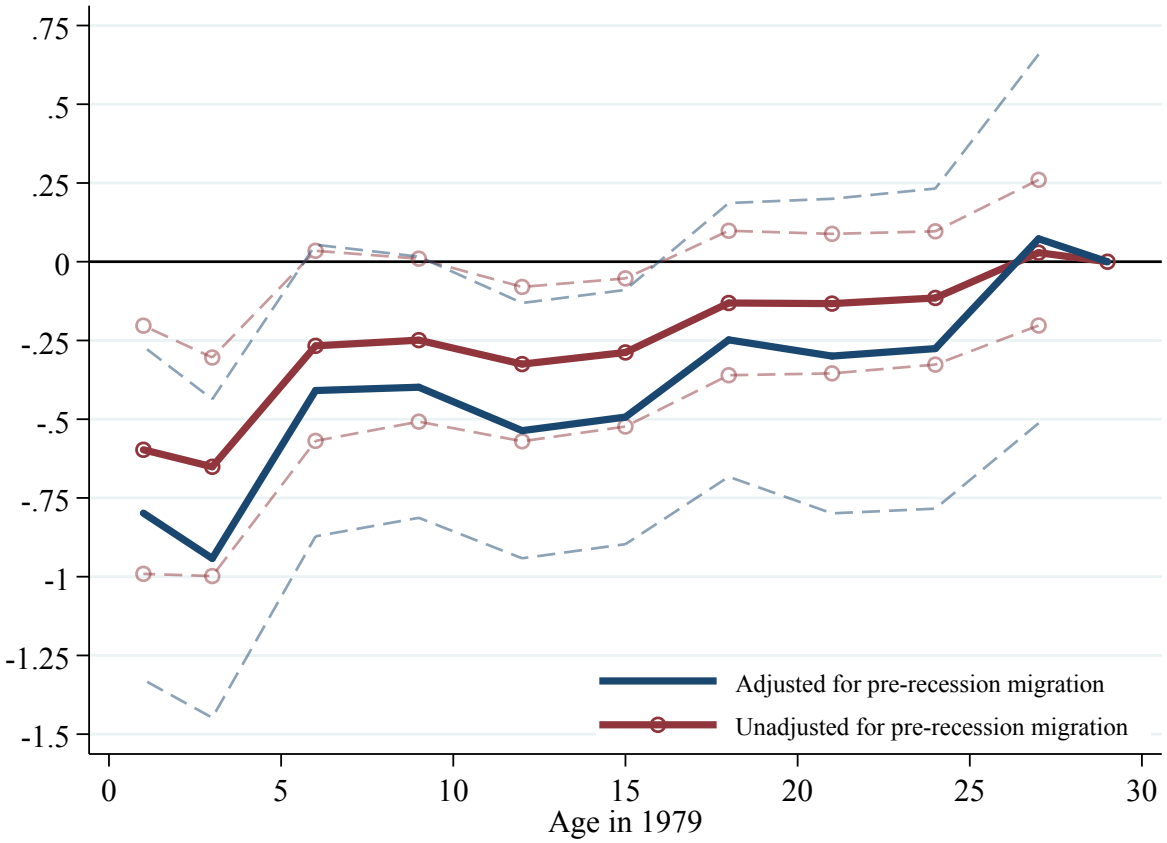
Figure A.12: Summary Statistics, Income Thresholds

(c) Family income



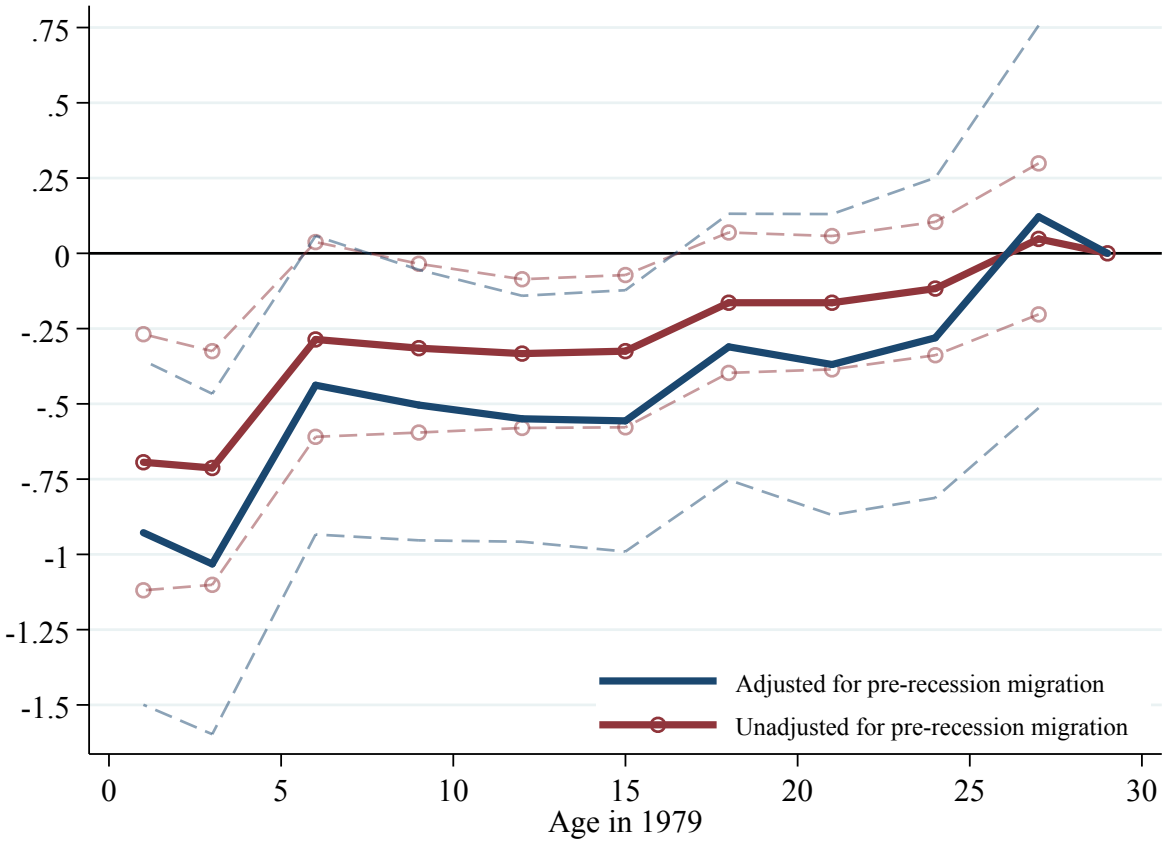
Notes: Figure reports the share of individuals with income that exceeds the indicated thresholds ($0, $2,500, $5,000, $10,000, $20,000, . . . , $100,000) as of 2000–2013 for the indicated birth cohort.
Sources: Publicly available 2000–2013 Census/ACS data from Ruggles et al. (2015)

Figure A.13: The Long-Run Effects of the 1980–1982 Recession on Log Personal Income



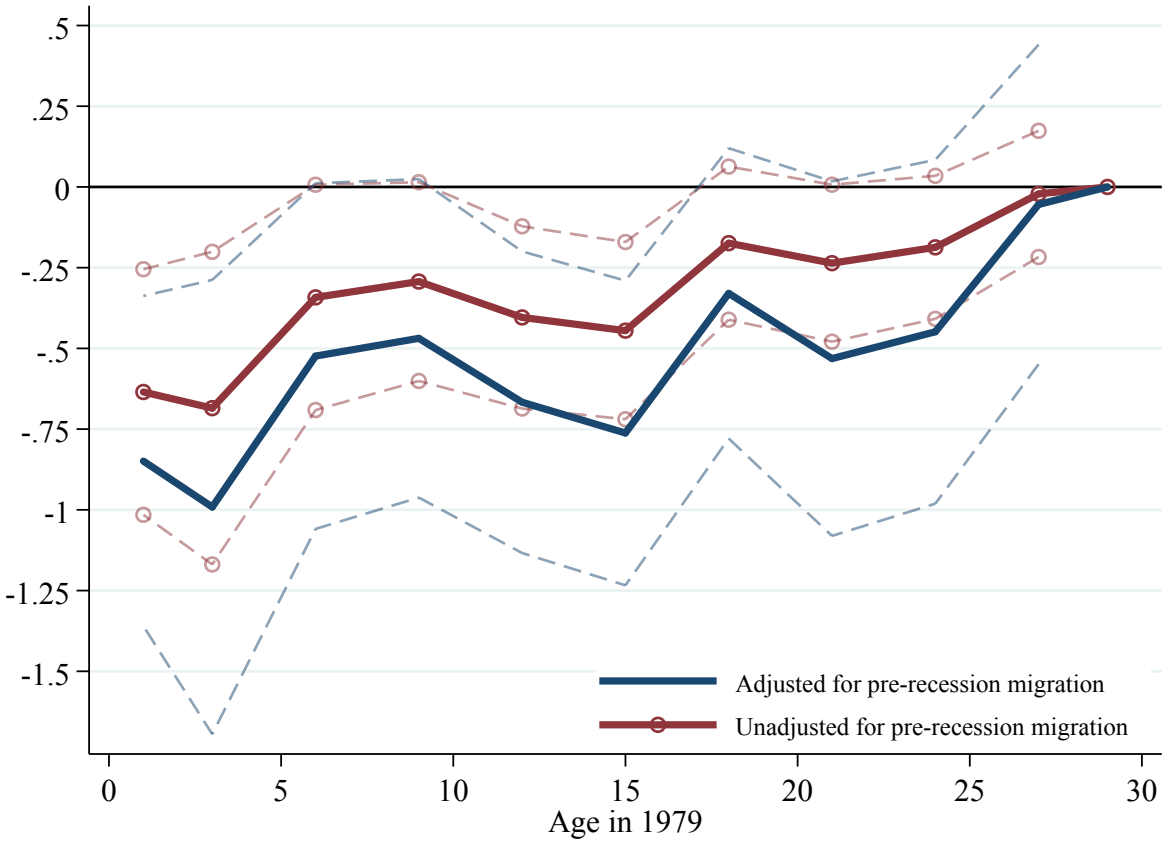
Notes: See notes to Figure 3 and Table 3. The dependent variable is log personal income.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.14: The Long-Run Effects of the 1980–1982 Recession on Log Earned Income



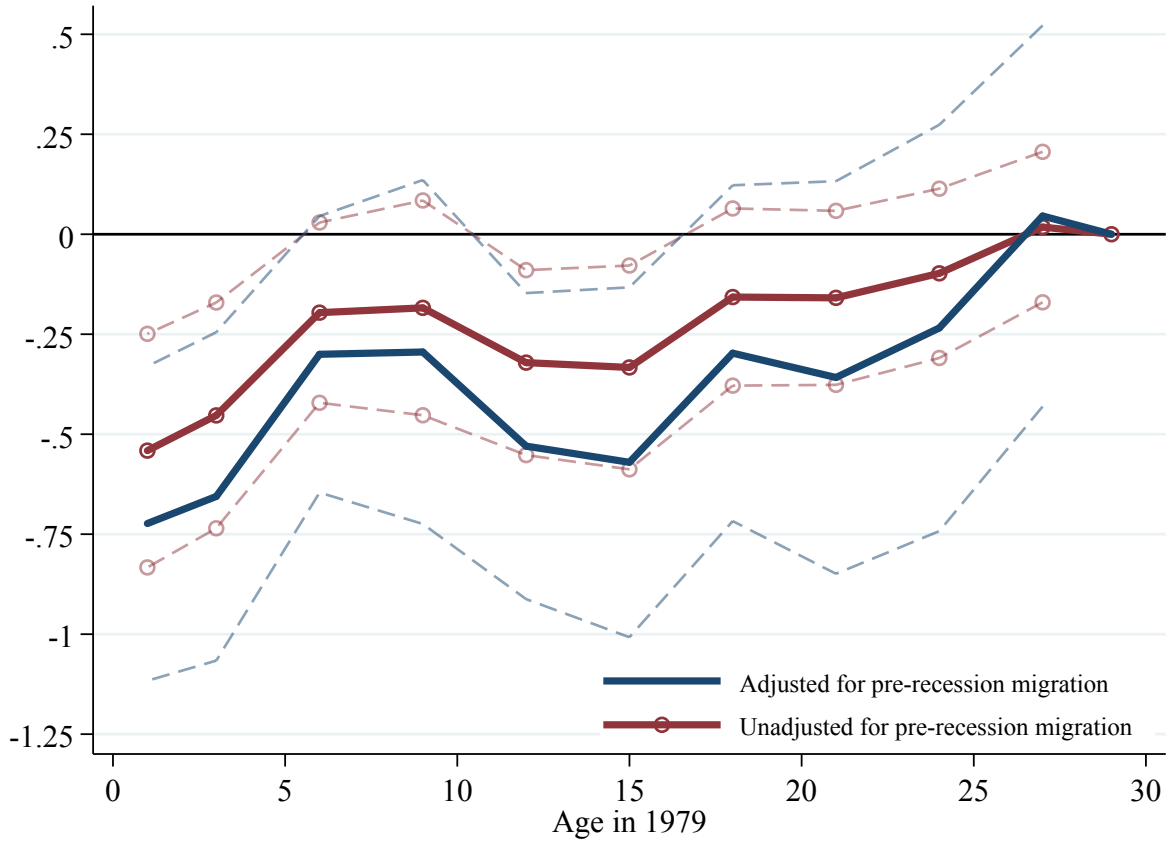
Notes: See notes to Figure 3 and Table 3. The dependent variable is log earned income.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.15: The Long-Run Effects of the 1980–1982 Recession on Log Family Income



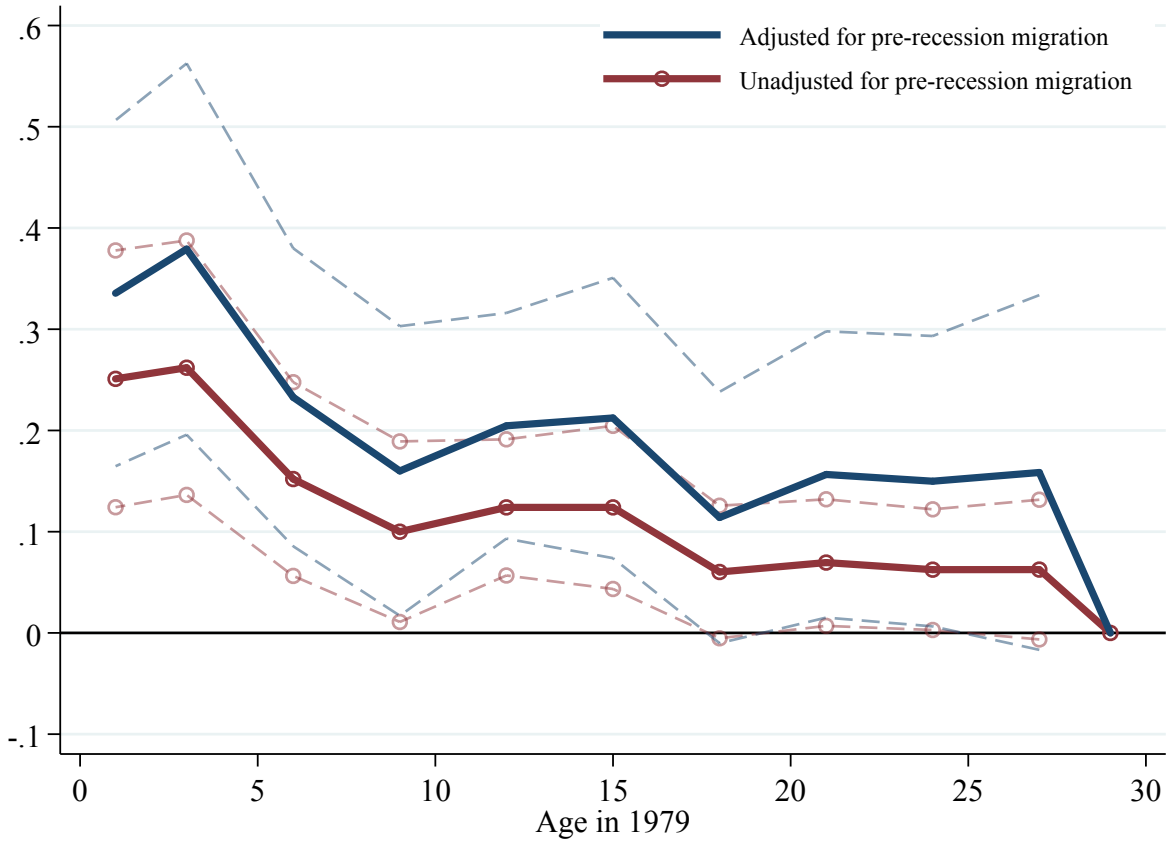
Notes: See notes to Figure 3 and Table 3. The dependent variable is log family income.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.16: The Long-Run Effects of the 1980–1982 Recession on Log Hourly Wage



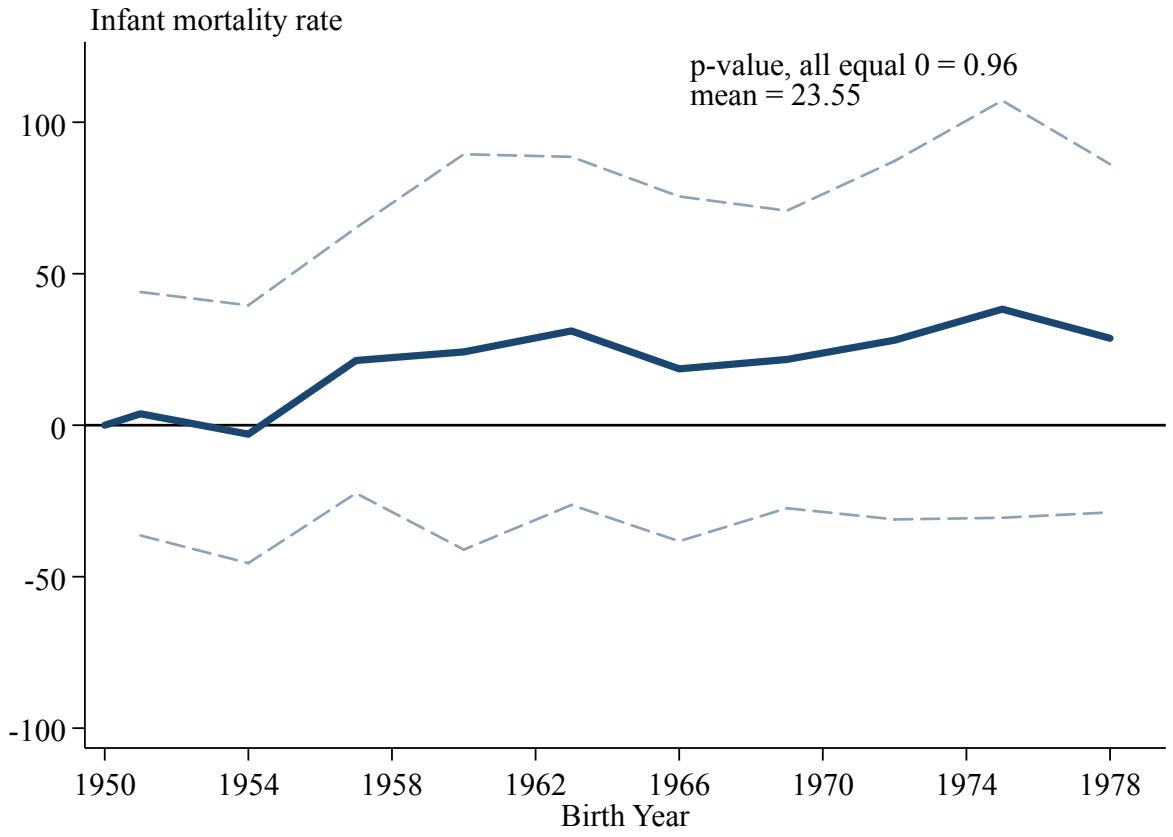
Notes: See notes to Figure 3 and Table 3. The dependent variable is log hourly wage.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.17: The Long-Run Effects of the 1980–1982 Recession on Poverty



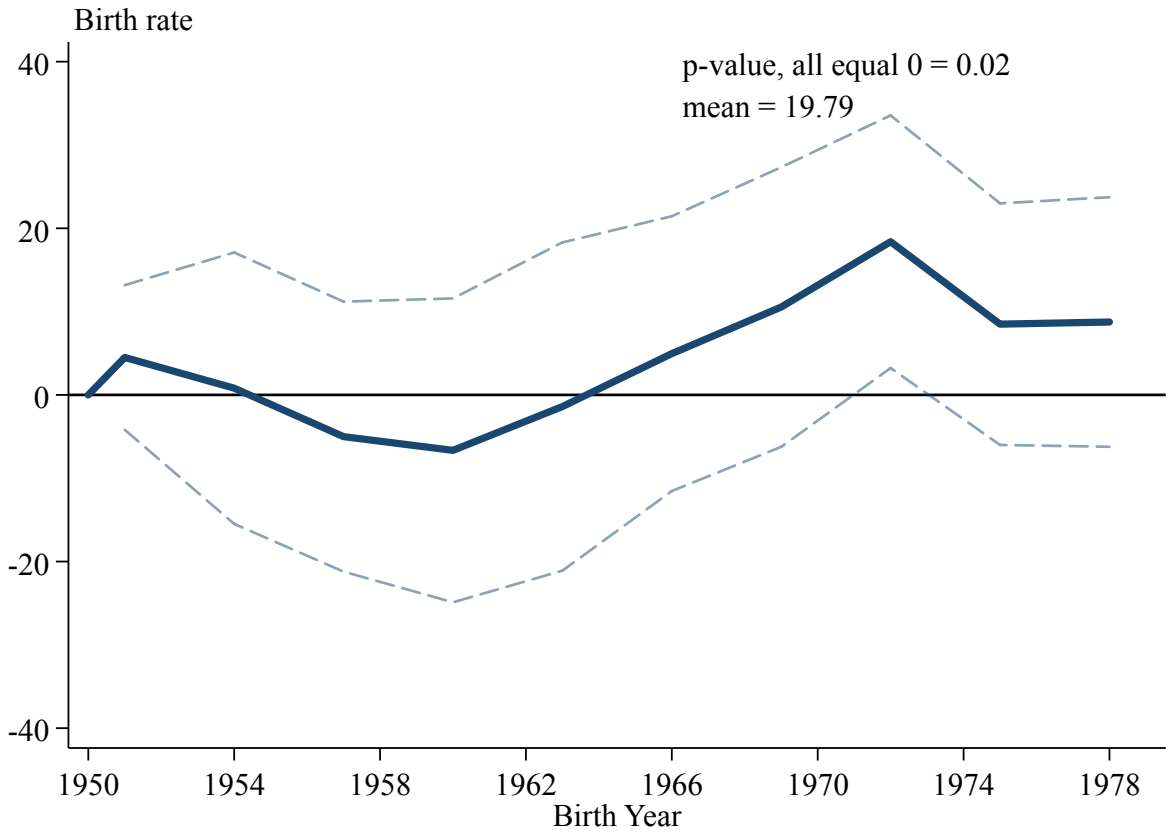
Notes: See notes to Figure 3 and Table 3. The dependent variable is an indicator for being in poverty.
Sources: BEA Regional Economic Accounts, Census County Business Patterns, Confidential 2000–2013 Census/ACS data linked to the SSA NUMIDENT file

Figure A.18: Infant Mortality Before the 1980–1982 Recession



Notes: Figure plots the estimated coefficients on interactions between birth year and the 1979–1982 decrease in log real earnings per capita, where the coefficient for 1950 is normalized to equal zero. The dependent variable is the infant mortality rate (deaths per 1,000 births). The regression is estimated by 2SLS, using the predicted log employment change from 1979–1982 as an IV. The regression includes the share of births to nonwhite mothers and fixed effects for county and state-by-year, plus year interacted with the 1950–1960, 1960–1970, and 1970–1980 change in log real median family income and log population, and the 1960 level of log population, log population density, percent urban, percent black, percent foreign, percent with a high school degree, and percent of families with income below $3,000. The dashed lines are pointwise 95 percent confidence intervals based on standard errors clustered at the birth state level. Sample is limited to the 2,550 counties with less than 5 percent of 1976 employment in the mining sector.
Sources: Bailey et al. (2018), BEA Regional Economic Accounts, Census County Business Patterns, Census County Data Books, Minnesota Population Center (2011)

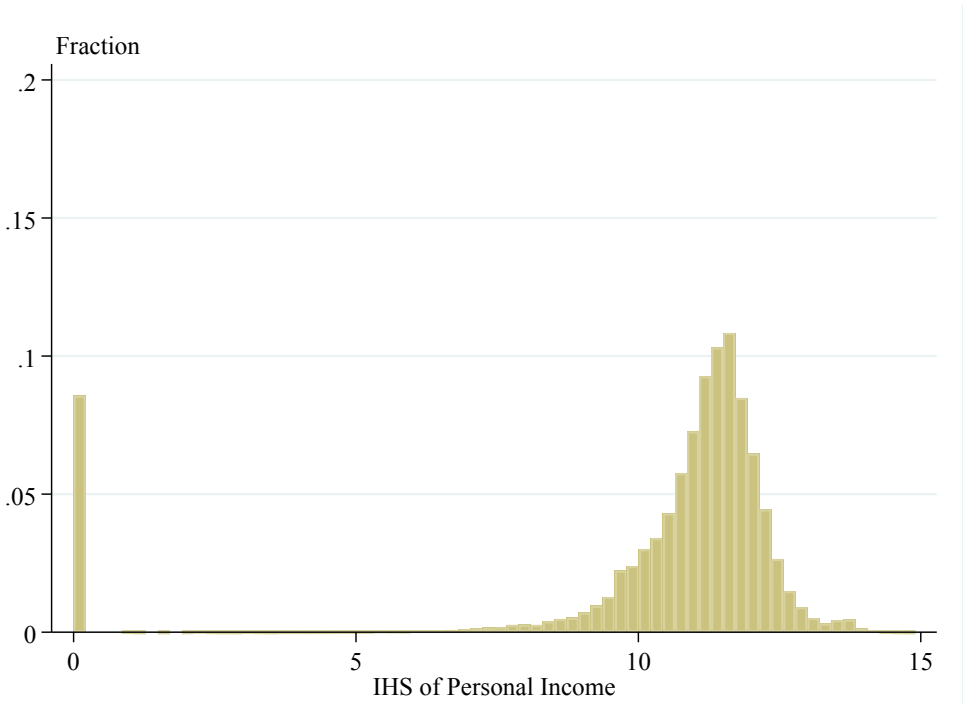
Figure A.19: Birth Rates and the 1980–1982 Recession



Notes: Figure plots the estimated coefficients on interactions between birth year and the 1979–1982 decrease in log real earnings per capita, where the coefficient for 1950 is normalized to equal zero. The dependent variable is the birth rate (births per 1,000 people). The regression is estimated by 2SLS, using the predicted log employment change from 1979–1982 as an IV. The regression includes the share of births to nonwhite mothers and fixed effects for county and state-by-year, plus year interacted with the 1950–1960, 1960–1970, and 1970–1980 change in log real median family income and log population, and the 1960 level of log population, log population density, percent urban, percent black, percent foreign, percent with a high school degree, and percent of families with income below $3,000. The dashed lines are pointwise 95 percent confidence intervals based on standard errors clustered at the birth state level. Sample is limited to the 2,550 counties with less than 5 percent of 1976 employment in the mining sector.
Sources: Bailey et al. (2018), BEA Regional Economic Accounts, Census County Business Patterns, Census County Data Books, Minnesota Population Center (2011)

Figure A.20: Distribution of Inverse Hyperbolic Sine of Income Measures, 2000-2013

(a) Personal income



(b) Earned income

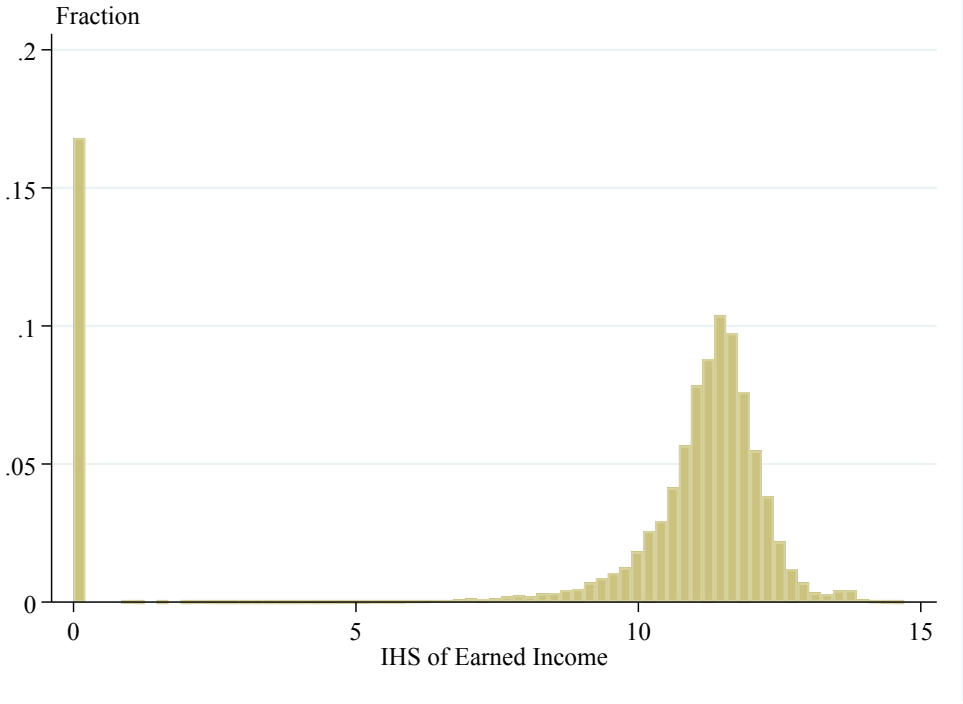
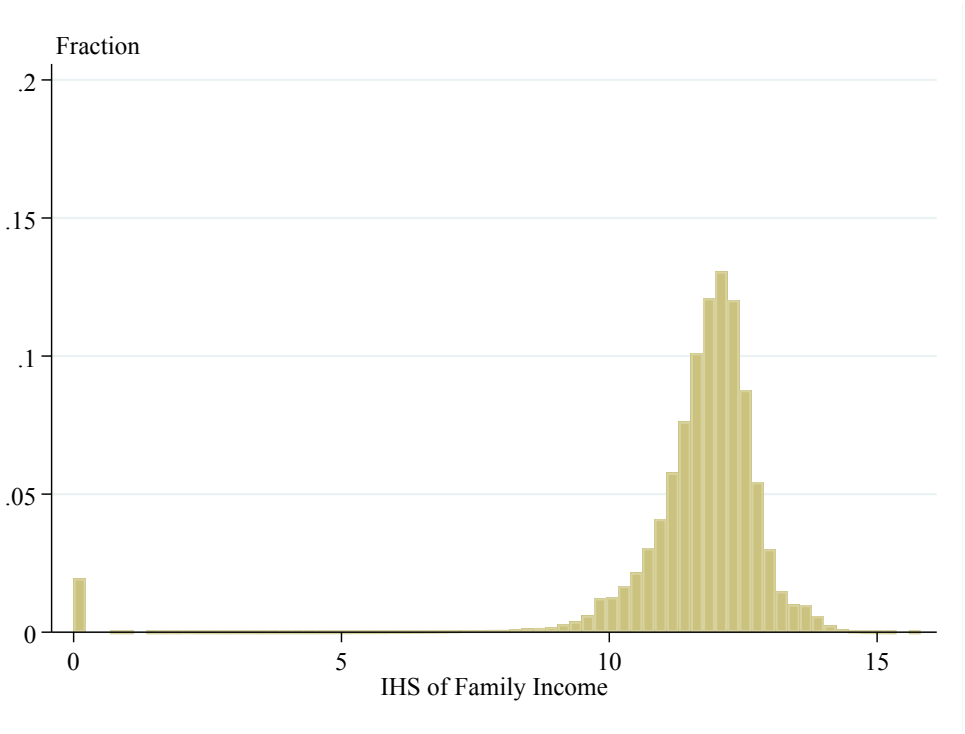


Figure A.20: Distribution of Inverse Hyperbolic Sine of Income Measures, 2000-2013

(c) Family income



Notes: Figure displays histograms of inverse hyperbolic sine of indicated income measures for individuals age 25-64 observed in the 2000 Census and 2001-2013 ACS.
Sources: Public Use Census/ACS Data

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