

## Heterogeneity in the Impact of Economic Cycles and the Great Recession: Effects within and across the Income Distribution<sup>†</sup>

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The Great Recession led to historic reductions in employment, earnings, and income for workers and families in the United States. The impacts of recessions are not shared equally across groups. Prior work has shown that the impacts are felt most strongly by men, black and Hispanic workers, youth, and low-education workers (for example, see Hoynes, Miller, and Schaller 2012). An analysis of workers, however, does not create a complete picture of the well-being of American families and how they are affected by economic cycles. Here, we extend the literature by estimating the effect of cycles both within and across the income distribution.

As with the prior labor market literature, we analyze the effects of cycles on individuals. However, we focus on the effects on household after-tax-and-transfer income (ATTI) (rather than individual employment or earnings). The advantage of using household ATTI is that it captures the cumulative effects of recessions on all of the (potential) workers and nonworkers in the household and the effects of both the cash and noncash safety net and the tax system. We use household ATTI and observed household size to calculate household income-to-poverty ratios, using the official poverty thresholds associated with each household size. We then examine the effects of cycles across the income-to-poverty distribution, and can compare the effects of a 1

percentage point increase in the unemployment rate on the propensity to have income below 50 percent of the poverty threshold, 100 percent of the poverty threshold, 200 percent of the poverty threshold, and so on.

We present three sets of results. First, we estimate the effect of cycles on the distribution of income-to-poverty ratios for the full sample and full period. Once we establish these basic findings, in our second set of results we examine how these effects vary for different demographic groups defined by age, race/ethnicity, and family type. In our final set of results, we examine whether the impacts across the income-to-poverty distribution have changed between the early 1980s recession and the Great Recession.

We build our estimation sample using the Current Population Survey (CPS), providing annual data covering calendar years 1980–2013. We collapse the data to state by year (by demographic group) cells and estimate state panel data models controlling for state and year fixed effects. We measure the economic cycle using the state unemployment rate. The effect of cycles is identified using variation across states and over time in the timing and severity of recessions. We then extend our basic model to examine differences across groups and to see if the experience in the Great Recession differs from the historical relationship between unemployment and the income-to-poverty ratio.

This study builds on a rich and substantial literature that examines the connection between labor market opportunities, economic growth, and poverty.<sup>1</sup> In our own recent work

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<sup>1</sup>For example, see Bitler and Hoynes (2010); Blank (1989, 1993); Blank and Blinder (1986); Blank and Card (1993); Cutler and Katz (1991); Freeman (2001); Gunderson and Ziliak (2004); Hines, Hoynes, and Krueger (2001); Hoynes, Page, and Stevens (2006); and Meyer and Sullivan (2011).

we developed our measure of ATTI poverty (Bitler and Hoynes 2010, forthcoming) and estimated the impact of cycles on non-elderly poverty (Bitler and Hoynes forthcoming) and child poverty (Bitler, Hoynes, and Kuka 2014). Here we extend that work in several ways. First, we more comprehensively examine the effects across the income distribution, comparing the effects of cycles at different points of the income-to-poverty distribution. Second, we compare the effects across groups defined by age (children, prime aged adults, the elderly), race and ethnicity, and family type (families with married versus single heads).

Our analysis yields several important findings. We find that poverty rises in recessions and falls in expansions, and the level of cyclical poverty is substantially higher at the lowest levels of the income-to-poverty distribution. Elderly poverty rates are much less affected by cycles than are other age groups. On the other hand, for given levels of income-to-poverty, there is little difference in the cyclical poverty across other demographic groups (race/ethnicity, gender, family structure). Finally, we find that the Great Recession has led to a significant increase in the cyclical poverty at the lowest income-to-poverty levels (e.g., below 50 percent poverty) while the cyclical poverty has increased modestly at higher points of the income-to-poverty distribution (e.g., above 150 percent poverty).

### I. Measuring Poverty

We use the Annual Social and Economic Supplement (ASEC) to the Current Population Survey, providing annual income data for the calendar years 1980–2013 (survey years 1981–2014).<sup>2</sup> The ASEC provides labor market outcomes, income, and program participation for the previous calendar year, as well as demographic information from the time of the survey. This survey is used to report official poverty each year in the United States (deNavas-Walt and Proctor 2014), and more

recently the Supplemental Poverty Measure (Short 2014).

Based on the CPS, we construct household after-tax-and-transfer income (ATTI). Our measure of ATTI includes cash income plus the cash value (as reported by the household or imputed by the Census Bureau) of noncash programs (food stamps, school lunch, housing subsidies, energy subsidies) and subtracts taxes (payroll tax, state taxes and federal net taxes including the Earned Income Tax Credit, child and child care tax credits, and stimulus payments). The household's ATTI is the sum across all persons in the household (after dropping the very small number of "unrelated" children). We combine this with the official poverty thresholds (deNavas-Walt and Proctor 2014) for each household (using observed household size and structure) to create the income-to-poverty ratio, which is assigned to everyone in the household. For more information on the construction of our ATTI poverty measure and how it differs from official poverty (and the supplemental poverty measure (SPM)) see Bitler and Hoynes (forthcoming).<sup>3</sup>

### II. Empirical Approach

We use a state panel data model, controlling for fixed state characteristics and common shocks where the economic cycle is measured by the state unemployment rate. In particular, we estimate:

$$(1) \quad y_{st} = \beta UR_{st} + \alpha_s + \delta_t + \varepsilon_{st},$$

where  $y_{st}$  is the share of individuals in state  $s$  in year  $t$  who have ATTI below some multiple of the threshold (e.g., below 150 percent of poverty),  $UR_{st}$  is the state unemployment rate, and state and year fixed effects are given by  $\alpha_s$  and  $\delta_t$ , respectively. We cluster the standard errors at the state level, and the regressions are weighted using the relevant denominator (the relevant CPS total weighted population in the state-year cell). Our empirical strategy exploits variation in the timing and severity of cycles across states to estimate the effect of labor market conditions on the income distribution.

<sup>2</sup>The CPS surveys for calendar years 1987 and 1991 are missing noncash safety net programs; therefore our data are missing for those years.

<sup>3</sup>The key differences are two-fold. First, official poverty uses cash, pretax income and second it measures income at the family (rather than household) level and compares it to the thresholds for the family (not household) size.

We extend the basic model to explore whether the effect of the unemployment rate on the distribution of income-to-poverty in the Great Recession represents a change from historical patterns. We modify (1) and estimate:

$$(2) \quad y_{st} = \beta_{80} D_{80} UR_{st} + \beta_{GR} D_{GR} UR_{st} + \beta_O D_O UR_{st} + \alpha_s + \delta_t + \varepsilon_{st}$$

We split 1980–2013 into three periods: the 1980s recessions and expansions ( $D_{80} = 1$ , 1980–1989), the Great Recession and expansion ( $D_{GR} = 1$ , 2007–2013), and the rest of period ( $D_O = 1$ , 1990–2006), and estimate the responsiveness ( $\beta_k$ ) across the periods.

### III. Impacts of Cycles within and across the Income Distribution

We begin by estimating the effect of unemployment on income-to-poverty for all non-elderly persons (we turn to the elderly below). We estimate equation (1) for a series of outcome variables, the share of non-elderly persons in the state-year that have ATTI below 25 percent of the poverty threshold, 50 percent of the poverty threshold, 75 percent of the poverty threshold, and so on up to below 400 percent of the poverty threshold. To provide some context, for a family of three in 2013, the poverty threshold is \$18,769, implying an income of \$9,384 for 50 percent poverty, about \$37,500 for 200 percent poverty, and about \$75,000 for 400 percent poverty. Because of the significant variation in the fraction of families in each of these groups, we divide the coefficient in equation (1) by the (full period) mean of the dependent variable, and present percent impacts. The main results are presented in Figure 1 where we present the estimated percent impacts along with the 95 percent confidence intervals. For example, the coefficient plotted for 100 percent ATTI poverty implies that a 1 percentage point increase in the unemployment rate leads to a 6.2 percent increase in the share of persons with household ATTI below 100 percent poverty.

There are several findings evident from Figure 1. First, across the income-to-poverty

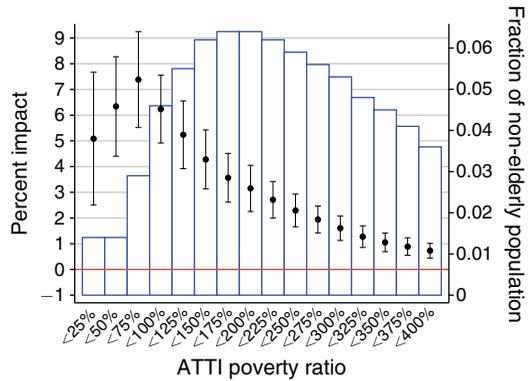


FIGURE 1. PERCENT IMPACTS OF THE UNEMPLOYMENT RATE ON THE HOUSEHOLD AFTER TAX AND TRANSFER INCOME-TO-POVERTY RATIO, NON-ELDERLY POPULATION

*Notes:* The figure presents (on the left scale) the coefficient estimate (and 95 percent confidence intervals) for the effect of a 1 percentage point increase in the unemployment rate on the propensity to be below various cuts of the household income-to-poverty ratio, estimated from a series of regressions that also control for state and year fixed effects, for the non-elderly population, presented in percent impacts. Household income-to-poverty ratio is calculated using ATTI income and household number of persons compared to the official poverty thresholds, averaged for each state-year cell using the CPS ASEC for calendar years 1980–2013. Regressions are weighted using the sum of person weights within each state-year cell, and are clustered at the state level. Percent effects divide the coefficient on the unemployment rate by the mean of the dependent variable (mean is taken over the entire period), CIs also presented in percent impacts. The graph also contains a histogram (on the right scale) for the share of the non-elderly population that is between adjacent cuts of the income-to-poverty ratio. Twenty-five percent of the population is above 400 percent of the household after tax and transfer income-to-poverty ratio.

distribution, the effects are positive and statistically significantly different from zero, showing that recessions (expansions) reduce (increase) incomes across the distribution.<sup>4</sup> Second,

<sup>4</sup>Note that we are estimating a number of models for different outcomes on the same data, which may raise concerns about multiple testing, and over-rejection. We adjust for this multiple testing using the Bonferroni correction to adjust the  $p$ -values to control the family-wise error rate (this controls the probability of falsely rejecting one of a family of null hypotheses). In our context, this means a result is significant at the 5 percent level (using the Bonferroni adjustment) if 16 times the original  $p$ -value is less than 0.05, as there are 16 different outcomes. The Bonferroni correction is known to be conservative; despite this, we reject all 16 of these estimates being zero at the 5 percent level after adjusting the  $p$ -values in this fashion.

throughout most of the income-to-poverty distribution, the effects of unemployment on income-to-poverty are declining in income. That is, lower income-to-poverty levels are more affected by recessions than are higher income-to-poverty levels. This follows the results in the labor market literature whereby workers with lower education levels experience greater employment and earnings losses in recessions (e.g., Hoynes, Page, and Stevens 2006). Third, and importantly, the very lowest income levels, below 50 percent of poverty and below 25 percent of poverty, experience somewhat lower cyclical effects in percent terms compared to somewhat higher levels of income-to-poverty (below 75 percent or 100 percent of poverty).

It is important to note that the share of the distribution in each of these bins (0–25 percent, 25–50 percent, 50–75 percent, etc.) is not uniform. To illustrate this point, we also show on Figure 1 the (full sample) share of the population in each bin, for example the share below 25 percent of poverty, the share at or above 25 percent but below 50 percent of poverty, the share at or above 50 and below 75 percent of poverty, etc. This shows that the share with ATTI below 25 percent poverty is 0.014 and the share between 25 and 50 percent poverty is 0.013. Thus, the very large (percent) effects at the bottom of the distribution are affecting relatively few people.<sup>5</sup>

The results in Figure 1 refer to non-elderly persons. In Figure 2, we present results at the different points of the income-to-poverty distribution (share with ATTI below each cut of poverty) and examine how the effects vary across individuals of different age groups, broken into children (<18), prime age adults (18–64), and the elderly (65 and older). As with Figure 1, each point comes from estimation of equation (1), expressed as percent effects, along with the 95 percent confidence intervals. The effects of cycles on children and prime age adults are quite cyclical at low cuts of income-to-poverty. By marked contrast, elderly individuals have small and statistically insignificant effects of cycles

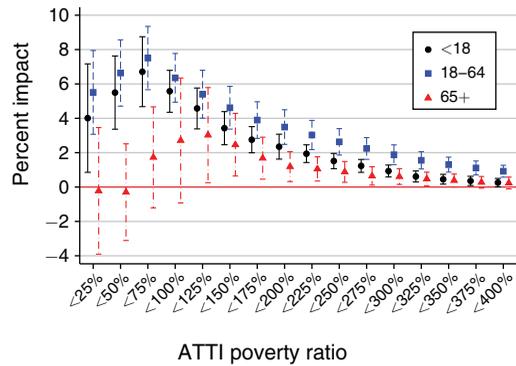


FIGURE 2. PERCENT IMPACTS OF THE UNEMPLOYMENT RATE ON THE HOUSEHOLD AFTER TAX AND TRANSFER INCOME-TO-POVERTY RATIO, BY AGE GROUP

Notes: The figure presents the coefficient estimates (and 95 percent confidence intervals) for the effect of a 1 percentage point increase in the unemployment rate on the propensity to be below various cuts of the household income-to-poverty ratio, by age group, presented in percent impacts. The circles are the estimates for children (<18), the squares are for those 18–64, and the triangles are for the elderly. Each regression also controls for state and year fixed effects. Household income-to-poverty is calculated using ATTI income and household number of persons compared to the official poverty thresholds, averaged for each state-year cell using the CPS ASEC for calendar years 1980–2013. Regressions are weighted using the sum of person weights within each state-year cell, and are clustered at the state level. Percent effects divide the coefficient on the unemployment rate by the mean of the dependent variable (mean is taken over the entire period), CIs also, presented in percent impacts.

on ATTI below around 125 percent poverty, and are much smaller than those for the non-elderly until relatively high up the income distribution.<sup>6</sup> This may be due to the elderly experiencing less exposure to the labor market and more protection through Social Security. We have also broken the estimates down by race/ethnicity and by marital status and gender of the family head. There is strikingly little difference in the cyclicity of income-to-poverty across the race and ethnicity of the family heads. This implies that the greater cyclicity of average income

<sup>5</sup>Note that the regression estimates refer to cuts on the income-to-poverty distribution that are cumulative—ATTI below 25 percent poverty, below 50 percent poverty, etc. The histogram shares, though, are not cumulative but correspond to the bins (<25 percent, 25–50 percent, 50–75 percent, etc.).

<sup>6</sup>Again, within each subgroup, we adjust the *p*-values using the Bonferroni correction, known to be conservative. Thirteen of the 16 estimates for children retain significance at the 5 percent level (the non-significant values include being below 25 percent of poverty, 375 percent of poverty, and 400 percent of poverty). All of the values are significant for the prime aged adults, and none are for the elderly.

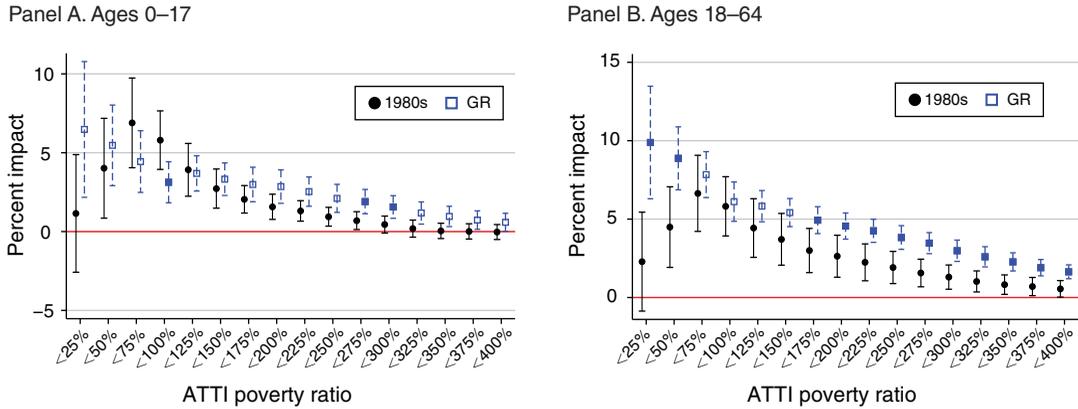


FIGURE 3. PERCENT IMPACTS OF THE UNEMPLOYMENT RATE ON THE HOUSEHOLD AFTER TAX AND TRANSFER INCOME-TO-POVERTY RATIO, GREAT RECESSION VERSUS 1980s RECESSIONS

Notes: Each figure presents the coefficient estimates (and 95 percent confidence intervals) for the effect of a 1 percentage point increase in the unemployment rate on the propensity to be below various cuts of household income-to-poverty, for the Great Recession (squares) and 1980s recessions (circles). Square symbols for Great Recession are filled if the coefficient is statistically significantly different from the 1980s coefficient at the 5 percent level. Estimates for panel A of Figure 3 are for children and those for panel B are for 18–64-year-olds, presented in percent impacts. Each regression also controls for state and year fixed effects. Household income-to-poverty is calculated using ATTI income and household number of persons compared to the official poverty thresholds, averaged for each state-year cell using the CPS ASEC for calendar years 1980–2013. Regressions are weighted using the sum of person weights within each state-year cell, and are clustered at the state level. Percent effects divide the coefficient on the unemployment rate by the mean of the dependent variable (mean is taken over the entire period), CIs also presented in percent impacts.

for Hispanics and African Americans (compared to whites) is explained by differences in the distribution of incomes across these groups (rather than across group per se). There is somewhat more of a difference across marital status groups, with unmarried female heads at the bottom of the income-to-poverty distribution being somewhat less responsive to the unemployment rate.<sup>7</sup>

Next, we turn to comparisons across the two most recent deep recessions, the Great Recession and the two consecutive severe downturns of the early 1980s. We estimate equation (2), generalizing our model to allow for differential effects during the Great Recession (2007–2013), the early 1980s period (1980–1989), and the rest of the period (1990–2006). As with Figure 1, we estimate a series of models with different cuts across the income-to-poverty distribution. We plot percent effects and 95 percent confidence intervals, and compare the effects in the Great Recession to the 1980s (we consider the rest of period estimates to be incidental parameters, but

these results are available on request).<sup>8</sup> We show this broken down by age group, with panel A of Figure 3 showing the coefficients for the Great Recession and 1980s recessions for children and panel B showing the coefficients for the same two periods for those 18–64. In each figure, the estimates for the Great Recession are given by squares and for the 1980s recessions they are given by circles. The square symbols for Great Recession are filled if the coefficient is statistically significantly different from the 1980s coefficient at the 5 percent level.

There are several important findings in panels A and B of Figure 3. The most striking differences in the effect of unemployment on poverty are at the lowest levels of the income-to-poverty ratio. While the 1980s period shows an overall “inverted U-shaped pattern” with smaller percent effects at the lowest and highest income-to-poverty levels, the Great Recession shows the largest effects at the lowest income-to-poverty levels and instead a steep

<sup>7</sup>Due to space limitations, these figures are not included here but are available on request.

<sup>8</sup>We use the full period mean for constructing the percent effects and therefore we plot  $\beta_{GR/\bar{y}}$  and  $\beta_{80/\bar{y}}$ .

gradient, with cyclicity declining as we move up the income distribution. For adults, the higher cyclicity during the Great Recession extends throughout the entire income-to-poverty distribution. For children, 75 percent and 100 percent poverty show substantially lower cyclicity in the Great Recession, but at 150 percent of poverty and higher, incomes are more cyclical. Overall, though, few of the estimates are significantly different for the children (<100 percent, <275 percent, <300 percent), but they are significantly different for adults at the very bottom (<25 percent and <50 percent) as well as at <175 percent and above. Finally, although not shown here, there is little difference in responsiveness across these two periods for the elderly.<sup>9</sup>

In earlier work, we have argued that changes in the social safety net may explain some of these differences over time (Bitler and Hoynes forthcoming). The increase in cyclical sensitivity at the bottom of the distribution seems clearly tied to welfare reform and the dramatic decrease in welfare caseloads and take-up of Temporary Assistance for Needy Families (TANF) (changes which should only have affected households with children). In contrast to the pre-welfare reform era, in the post welfare reform era TANF caseloads and expenditures have no relationship to “need,” as measured by state labor market conditions (Bitler and Hoynes forthcoming). Because the generosity of Aid to Families with Dependent Children (AFDC) never reached much above extreme poverty, the increased exposure to the cycle is concentrated at the very bottom of the distribution. We also find somewhat greater protection in the Great Recession due to Supplemental Nutrition Assistance Program (SNAP), which could explain the lower cyclicity for children at 75 percent and 100 percent of poverty. The greater cyclicity in the Great Recession experienced by income-to-poverty between 125–400 percent poverty is likely due to the changes in the composition of the unemployed, with historic increase in long term unemployment (Valetta 2013) which we are not accounting for in our analysis.

<sup>9</sup>Adjusted these for the multiple hypotheses using the conservative Bonferroni correction, none of the differences remain significant for children, and only that for being under 275 percent of poverty is significant for the prime age adults.

#### IV. Conclusion

In this paper, we have comprehensively examined the effects of the business cycle on the distribution of income-to-poverty. We find that effects are more cyclical at very low levels of income-to-poverty, and then become increasingly smaller as one goes up the income distribution. This gradient has become steeper in the Great Recession (when compared to the early 1980s recession), with the most disadvantaged being relatively more affected (compared to higher income levels) in the Great Recession. We also have explored differences across groups, finding large distinctions between the cyclical effects for both children and prime age adults and the correspondingly lacking evidence of cyclicity for the elderly. There were few significant differences across other demographic groups such as race/ethnicity, gender, or marital status of the family heads.

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