The College Spike in Poverty

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Abstract

Poverty is examined over the age distribution for the United States, with specific attention paid to the increased poverty among college-age individuals and how this coincides with decreased poverty among older retired individuals. The aggregate poverty data contain 80 years of age (0-79), over 28 years (1987-2014), with 22 constructed 5-year birth cohorts (1908-2014). An age-cohort-year decomposition analysis with this data finds significant spikes in poverty at college and pre-retirement ages, that younger birth cohorts are relatively worse off than older birth cohorts, and that poverty rates move counter-cyclically.

Keywords: aging, college spike, distribution, poverty, retirement dip.
JEL Codes: D3, D6, I3, J1, J2.

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1 Introduction

Within any given year, poverty can manifest itself across the age distribution, from the youngest to the oldest individuals. Radner (1992, 1993) is one of the first scholars to have shown poverty rates over the age distribution, with his work being replicated in Hurd (1997). This representation is a powerful and effective tool to understand the relationship of poverty and aging, as well as evaluate its changes over time. When the headcount poverty rates were calculated over the age distribution for the United States in the years of 1967 and 1990 using 5-year age bands, it exhibited a U-shape, with rates that were gradually higher for children and elders and relatively lower for adults under most scenarios. Between 1967 and 1990, poverty was drastically reduced among the old, while steadily rising for the young and working-age population.

In the forthcoming handbook chapter of Marchand and Smeeding (2016), these previous results of Radner (1992, 1993) and Hurd (1997) were replicated using the latest data up to 2014, spanning a total period of 48 years. This descriptive evidence showed that this U-shape has widened and slowly rotated clockwise over the past few decades, mainly due to a further rise in child and working age poverty and a continued reduction in elderly poverty. Using more detailed data for the past 28 year period from 1987 to 2014, they discovered the emergence of what they deemed a "college spike" and a "retirement dip" in poverty rates over the age distribution, with both forces offering insight into the changing relationship between poverty and aging. In addition, women are shown to have particularly higher poverty rates over the age distribution, especially during their peak child bearing and child rearing years, as well as late in life. These new descriptive findings were also shown to not

be unique to the U.S, having taken place across OECD countries as well, but to a lesser extent (OECD, 2008, 2015).

Building upon this previous descriptive evidence, the current paper goes deeper into the measurement of this phenomenon of the college spike and retirement dip in poverty rates and attempts to provide a unique framework to do so. The quantification of these deviations from the U-shape relationship between poverty and age are crucial to understand exactly who it is that is particularly affected by poverty in various segments of the age distribution. While Marchand and Smeeding (2016) use data for 9 representative years from 1987 to 2014 with 5-year age bands for their descriptive evidence, the current paper instead uses all of the available 28 years of data over the 1987-2014 period with the more detailed 1-year age bands, adding much more variation for its in-depth measurement.

The evidence first replicates two of the descriptive figures from Marchand and Smeeding (2016), in order to show the emergence of the college spike and retirement dip in poverty over time. Once this is done, a third figure zeroes in on what is particularly happening to poverty among the college-aged over time, relative to high school aged and those likely to be just entering the workforce. Then, poverty rates are regressed upon age group binaries, without controlling for cohort or year, in order to see which ages are significant. Lastly, the age-cohort-year decomposition forms the main analysis, which allows for the age effects to be separated from the cohort and year effects using techniques laid out by Deaton (1997).

2 Data and Descriptive Evidence

The aggregate poverty data by years of age are compiled from the U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement. These data specifically contain the poverty status, by single year of age, of those individuals below 100% of poverty, for all races, for the years from 1987 to 2014.[1] Given that the information for individuals aged 80 and older is not consistent across years, this single year of age data goes from the ages of 0 to 79, resulting in 80 age groups, which are consistent across time. In this version of the paper, the data are not yet split by gender, so males and females are grouped together. In terms of the variation in this data thus far, there are 80 1-year age groups, from 0 to 79, and 28 years available, from 1987 to 2014.

In addition to the age and year variation of the data, birth cohorts are then constructed based on 5-year age bands, ages 0-4 to 75-79, resulting in 16 fully represented cohorts in a given year, or 17 partially represented cohorts. This was done by setting the 16 full birth cohorts within the final year of data in 2014, and then tracing them backwards through time until the first year of data in 1987 was reached. Tracing backwards in time allows for more total cohorts to be added, and keeps the cohort binaries of positive value. Overall, there are 16 full cohorts in a given year for every fifth year (1989, 1994, 1999, 2004, 2009, and 2014), resulting in 6 years of fully-represented cohorts, while the remaining years contain 17 partially represented cohorts each. Altogether, there are 22 different birth cohorts through the 28 years

[1] This particular series was labeled as "Table 23" and POV33" from 1987 to 2001, and then came to be labeled "POV34" from 2002 to 2014.

of data, born from 1908 to 2014.

In Marchand and Smeeding (2016), the authors re-examine the U-shape in poverty over the age distribution, building upon the work of Radner (1992, 1993) and Hurd (1997) through the use of more update-to-date and greater detailed data. The earliest data of this type was available in 1967 for the U.S., when the U-shape distribution in poverty rates was first observed over the age spectrum. This shape means that poverty rates were highest in the tails of the distribution, at the youngest and oldest ages, and lowest at middle ages, when peak earning years are taking place. While this U-shape is mostly preserved over time, it has widened and slowly rotated clockwise over the past few decades, mainly due to a rise in poverty among children and the working-aged coupled with a significant poverty reduction among the elderly.

Figures 2.1 and 2.2, similar to those found in Marchand and Smeeding (2016), help to show the emergence of this college spike in the United States (2.1) and its continued growth throughout the 2000s (2.2). The college spike in poverty around the age group of 20-24 was not very visible in the first year of 1987, nor was it apparent back in 1967. It has really only been during the 1990s and 2000s that this deviation from the U-shape relationship has been drawn out. At the other end of the age distribution, there seems to be another deviation in the U-shape: the so-called retirement dip around the ages of 65-69. Unlike the college spike, however, the retirement dip was already in place at the beginning of the sample period in 1987.

Figure 2.3 further reinforces this notion that the college spike is especially prominent during the 2000s. It does so by tracking the poverty rates of three specific 5-year age groups across all years of this time period. These specific age groups are those

aged 15 to 19, 20 to 24, and 25 to 29, with the 20-24 year olds representing the seemingly most affected group. As this figure shows, the poverty rates of those aged 15 to 19 and aged 20 to 24 were higher than those aged 25 to 29 in every year from 1987 to 2014, with the exception of 2013. But far more enlightening for the emergence of the college spike in poverty is that the rates for the college-aged (20-24) overlapped that of the younger group (15-19) throughout the 1990s, until the year 2000, when the poverty rates of the college-aged rose and remained significantly above the other two age groups.

The visualizations provided by these descriptive figures, of the sharp changes in poverty rates around college and retirement ages, motivate my approach to investigate which parts of this U-shape in poverty over the age distribution, and more importantly deviations from it, are attributable to age, cohort, or year effects. Before estimating a full decomposition, however, I begin by running a series of independent regressions for poverty rates on separate age binaries, in order to understand exactly which 1-year and 5-year age groups have statistically significant relationships with poverty over this time period from 1987 to 2014. While these age coefficients do not control for cohort or year effects, they do get us slightly closer to the decomposition.

The results (not displayed) for the 5-year age group binary regressions find that the age bands from 20-24 to 50-54 were statistically significant with positive effects, and the age bands from 65-69 to 75-79 were statistically significant with negative effects. Thus, the coefficients for age groups 0-4 through 15-19, as well as 55-59 and 60-64, were all statistically insignificant. These same type of regressions were also run for 1-year age groups. For these results (again not shown), the age bands

from 19 to 53 had statistically significant positive effects, ranging in magnitude from roughly 0.1 to 0.2, and the age bands from 65 to 70 displayed statistically significant negative effects. The coefficients for ages 0 to 18, as well as for ages from 54 to 64, were statistically insignificant.

3 Decomposition Analysis

While the descriptive statistics and independent binary regressions indicate the presence of age effects at a very minimum, they are not sufficient enough to completely understand the underlying mechanisms unless age is analyzed along with cohort and year. The age-cohort-year regression decomposition allows for a more in-depth investigation to pinpoint which sources of variation are the main causes of deviations from the pronounced U-shape in poverty over the age distribution during this time period. The equation for this age-cohort year decomposition is as follows:

$$poverty_{acy} = age_{acy} + cohort_{acy} + year_{acy} + \epsilon_{acy}$$

where *poverty* is the poverty rate for each year of age; *age*, *cohort*, and *year* are sets of binary variables, leaving the first binary term out of each variable set; and a, c, and y are the variation in age, cohort, and year for each variable and error term.

These decomposition coefficients are numerous, with almost 130 coefficients, making them not very informative if displayed in one large table. These coefficients are instead plotted within separate figures for the age, cohort, and year effects, in order to facilitate a greater understanding of each pattern, with poverty changes on the

y-axis and the continuous form of each variable on their own x-axis. While all of the estimated effects come from the same regression stated by the main equation, the displayed figures show each decomposed poverty effect orthogonal to their own trend, while controlling for the other two sets of effects through sets of binaries, in a procedure described by Deaton (1997). The age effects are displayed in Figure 3.1, the cohort effects are displayed in Figure 3.2, and the year effects are displayed in Figure 3.3. In what follows, I discuss these results separately for each component.

3.1 Age Effects

Overall, there is a clear U-shape of the aging effects in Figure 3.1, which is consistent with the descriptive evidence of Radner (1992, 1993), Hurd (1997), and most recently, Marchand and Smeeding (2016). Aside from the deviations in the U-shape around college and retirement ages, this U-shape of poverty over age is fairly symmetrical, with the poverty increases associated with very early ages being similar in magnitude to the poverty increases at later ages. In addition, the slopes of the U-shape in these age effects are fairly similar, with sharp increases in poverty on both sides of the distribution, and more consistent reductions in the middle of the age distribution. There are, however, significant deviations from this U-shape over this particular time period, including the spike around college age and the pre-retirement spike to post-retirement dip at later ages.

With strict adherence to the U-shape poverty trend, there should be a downward sloping line that connects the poverty rate from age 17 to age 26, with a somewhat increasing magnitude of poverty decreases with age. However, instead of this trend,

there is a sharp increase in the poverty rate at age 18, when individuals are first considered to be adults and are likely to be graduating high school. This is followed by an accelerated increase in the poverty rate, peaking at the ages of 21 and 22, and then continuing poverty increases of lesser magnitude until the age of 24. Given that these massive increases in poverty, away from the aging trend, are occurring at ages that individuals are likely to be undergraduates in college, this phenomenon is what was coined as the college spike in poverty by Marchand and Smeeding (2016), with a word play referencing the spike of a ball in collegiate football. These individuals need not be enrolled in college, however.

Even though poverty decreases are associated with the tapering off of this college spike in poverty from ages 25 and on, these effects really do not seem to get back to their U-shape trend until between the ages of 27 and 28. These are the ages when students would most likely be employed in their first jobs or possibly even wrapping up their graduate studies. The magnitude of poverty decreases increases with years of age until around the age of 45, when these decreases begin to lower in magnitude very slowly and then by more and more. It is around age 55 where these lesser magnitudes begin to accelerate once again. These largest decreases in poverty rates between the ages of 25 and 55 should not at all be surprising, as this is during the peak earning years of an individual's life.

If the right-hand side of the U-shape in poverty over the age distribution is to be preserved, then a line could also be drawn from roughly the change at the age of 54 to roughly the age of 69. Instead, there are larger than expected increases in the poverty rate beginning at the age of 55, peaking in magnitude from ages 60 to

63, and then falling thereafter. In Marchand and Smeeding (2016), this deviation was referred to as the retirement dip in poverty, meaning that the poverty rates were lower than seem to be implied by the U-shape following the retirement age of 65. Upon closer inspection of the age effects, however, this phenomenon could instead be described as a pre-retirement spike in poverty that matches the college spike, which is then mixed with a retirement dip.

3.2 Cohort Effects

For the interpretation of the isolated cohort effects in Figure 3.2, it is important to note that the lower number cohorts are the individuals who are born the latest (i.e. closest to present time) and the higher number cohorts are those born the earliest (i.e. furthest from the present). For example, cohort 1 was aged 0 to 4 in 2014, only appearing in years from 2010 to 2014, as the earliest set of these individuals would have only been born in 2010. On the opposite end, cohort 22 was aged 78 and 79 in 1987 and then aged out of the sample completely by 1989.

Taking a look at these isolated cohort effects, the results suggest that the lowest numbered cohorts, those born the latest, are at first quite variable in their poverty rate changes, moving from slightly negative changes to slightly positive changes and back again. From cohort 5 to cohort 9, however, a consistent pattern of poverty rate increases begins to emerge. This is followed by a series of poverty decreases from cohort 10 through 19, of varying magnitudes, with cohort 14 having the largest reduction in poverty. The highest number cohorts are also quite variable relative to the others, as the successive cohorts go from negative to positive changes quite

quickly with large positive magnitudes.

There is a simple explanation for the variation in these results, however. Given the way the cohorts are constructed, the ends of this cohort distribution contain the birth cohorts who are not fully represented with the maximum number of 140 observations for any given cohort. Therefore, it is best to concentrate attention upon the cohorts with at least 100 observations, which are cohorts 5 through 18, truncating off 4 cohorts from each end of the distribution. Note that this is not an issue with the age nor the year effects, as those have a balanced number of observations throughout. To provide specific numbers, the age effects have 28 observations for each one of the 80 age groups, and the year effects have 80 observations for each of the 28 years.

Among this narrower set, the cohort effects are much more straightforward. The latest birth cohort in this set, cohort 5, was born from 1990 to 1994, making them aged 0 to 4 in that end year and aged 20 to 24 in 2014. Beginning from cohorts 5 to 9, who were born before our sample period begins and aged 40 to 44 in 2014, there are small positive changes in their poverty rates. From cohorts 10 to 14, there are successively larger decreases associated with each cohort. From cohort 15 to 18, these poverty decreases then become smaller in magnitude. Therefore, when it comes to the cohort effects on the whole, younger birth cohorts are relatively worse off than older birth cohorts. More specifically, birth cohorts 5 through 8 (born from 1975 to 1994) seem to be the worse off, while birth cohorts 13 through 15 (born from 1940 to 1954) seem to be the best off.

3.3 Year Effects

Let's first examine the general trend of the year effects in Figure 3.3. During the three years that represent the 1980s (i.e. 1987, 1988, and 1989), there were no significant changes in the headcount poverty rate whatsoever. However, beginning in the 1990s, the poverty rate changes were significant and monotonically increasing, with the magnitude peaking in 1993. By the mid-1990s, there were no significant changes in poverty once again. Then, starting in 1998, there were several successive reductions in the poverty rate, the largest of which was observed in 2000. Following 2000, there continued to be associated poverty reductions of lesser magnitude through to 2008. In 2009, poverty increases began anew and continued through to the end of the period in 2014. These positive changes at the end of the time period are of slightly lower magnitude relative to the poverty increases in the early 1990s.

The interpretation of these year effects can fully be explained by the economic cycle. Each increase in the poverty rate is associated with the on-set of a recession that lingers for a few years beyond the time that each recession is said to have officially ended. During this time period of 1987 to 2014, there were three official recessions: the early 1990s recession from July 1990 to March 1991, lasting 8 months; the early 2000s recession from March 2001 to November 2001, which also lasted for 8 months and was of similar magnitude; and the Great Recession from December 2007 to June 2009, which was the longest and strongest, lasting 18 months and being the most severe over this period.

When considered along economic cycles, the peak of the poverty effects tend to lag the timing of the recession in all three cases. First, while the early 1990 recession

officially began in 1990 and ended in 1991, when the associated poverty increases first began, the peak of these increases did not come until 1993, and the increases did not stop until 1997. For the early 2000s recession, which took place during 2001 when the magnitude of the poverty reduction began wearing off, the successive decrease of lowest magnitude was not until 2004, over three years later. This was the least severe recession of the three, which is reinforced by the lower poverty effects. The Great Recession from 2007 to 2009 was not shown as an increase in poverty until the last of those years, but those increases lasted throughout the end of the time period, through 2014, although they did taper off a bit in magnitude.

4 Discussion

The U-shape of poverty over the age distribution was first shown for the U.S. by Radner (1992, 1993) and then replicated by Hurd (1997). The current study focuses on two particular departures from this trend. At younger ages on the left-hand side of the age distribution, there is a "college spike" in poverty around the early 20s. And, at older ages on the right-hand side of the distribution, there is a "retirement dip" in poverty. This college spike, and subsequent retirement dip, were first discovered (and terms coined) by Marchand and Smeeding (2016) using detailed descriptive evidence, leaving plenty of room for future empirical work to follow in their wake.

The main analysis of the current paper involves an age-cohort-year decomposition of the U.S. headcount poverty rate from 1987 to 2014. The age effects show spikes in poverty not only at college ages, but also happening prior to retirement ages, making

the previously described retirement dip in poverty more muddled. For the cohort effects, once the partially-represented birth cohorts are ignored, it becomes clear that the younger birth cohorts are worse off in poverty than the older birth cohorts. The year effects show that poverty tends to rise during each of the three recessions over the 1987-2014 time period, but the peak effects lag and the positive effects linger the official end dates of those recessions by several years.

It is also possible to speculate a bit about the possible sources for the college age spike in poverty, which would be more worrisome for those born between the mid-1970s to mid-1990s, especially during a time of recession. More younger people are going to college nowadays, which means more educational attainment, but also a later entry into the labor force. Meanwhile, both the costs of college and college debt have been on the rise (Avery and Turner, 2012). At the same time, more and more younger people are living at home with their parents (Adamopoulou and Kaya, 2016), which could be correlated with working later and more education, but also might lead to less financial support from their parents than otherwise.

The question remaining is then what to do about these poverty spikes and dips. Public expenditure could be channeled, at least in part, toward the segments of the age distribution that need it the most. The challenge in doing so will be to rearrange these resources without drastically increasing poverty elsewhere in the distribution. For the college spike, much more would need to be known about the emergence of this phenomenon and why it is ever increasing in recent decades. For the pre-retirement spike and post-retirement dip, the associated finances and policies regarding the retirement decision must be looked at as the main drivers.

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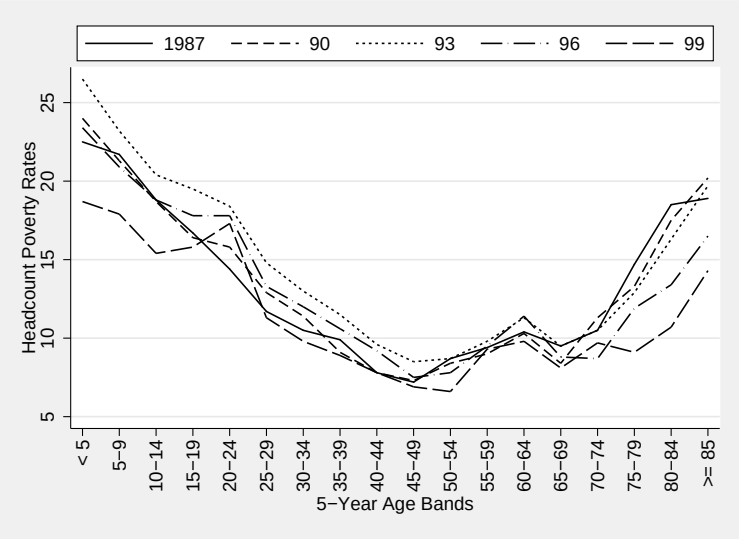
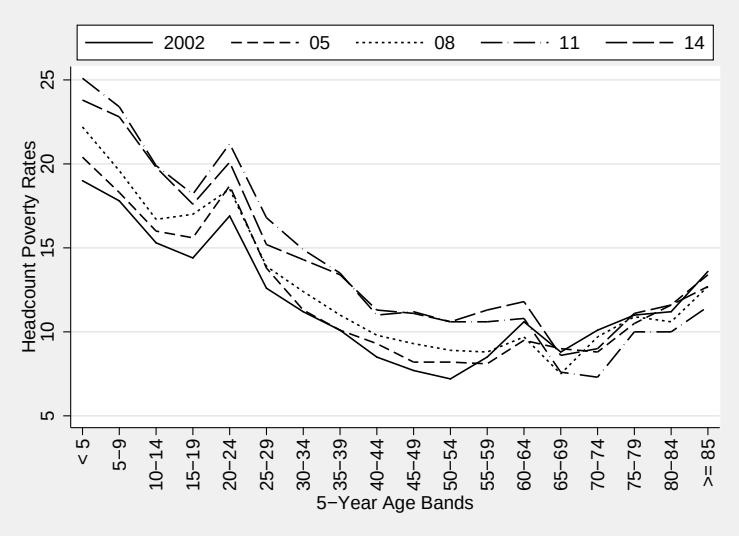
Figure 2.1: Poverty Rates over Age Distribution for 1980s-90s



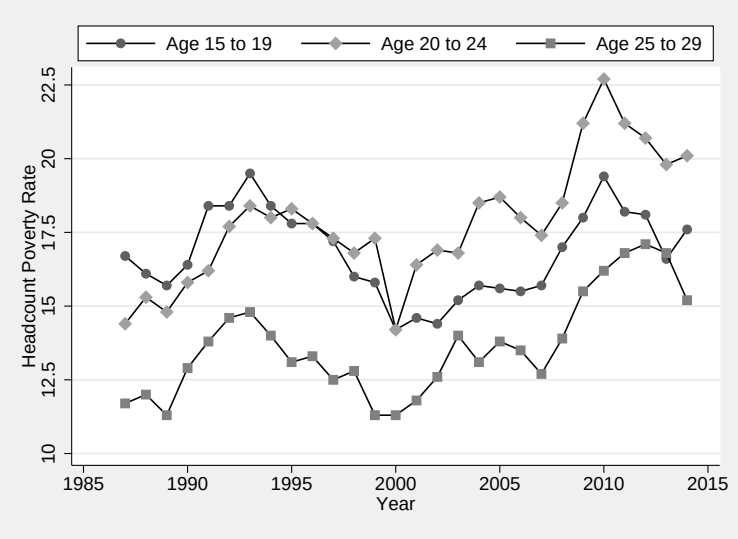
Notes: Author's presentation of 1987 to 1999 data from the U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement.

Figure 2.2: Poverty Rates over Age Distribution for 2000s-10s



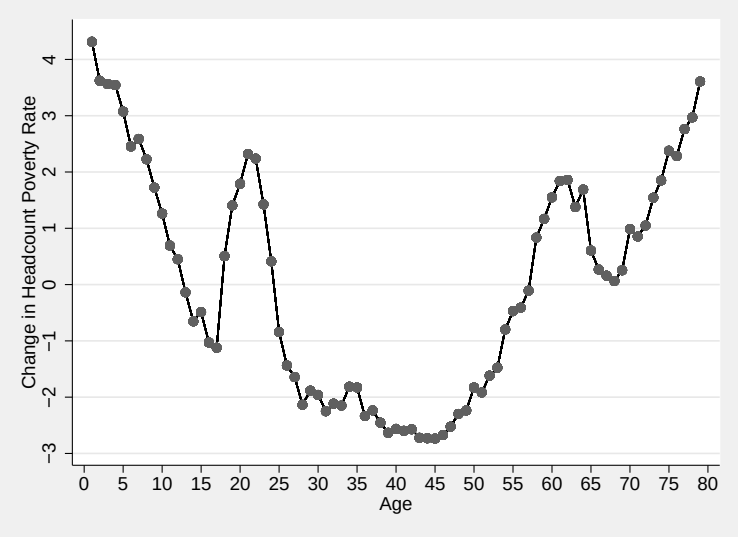
Notes: Author's presentation of 2002 to 2014 data from the U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement.

Figure 2.3: Poverty Rates over Time for 3 Younger Age Groups



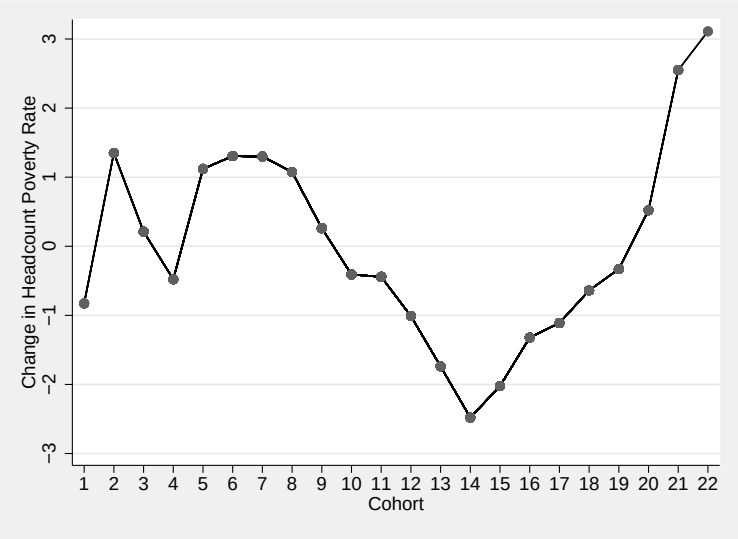
Notes: Author's presentation of 1987 to 2014 data from the U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement.

Figure 3.1: Age Effects from Poverty Rate Decomposition



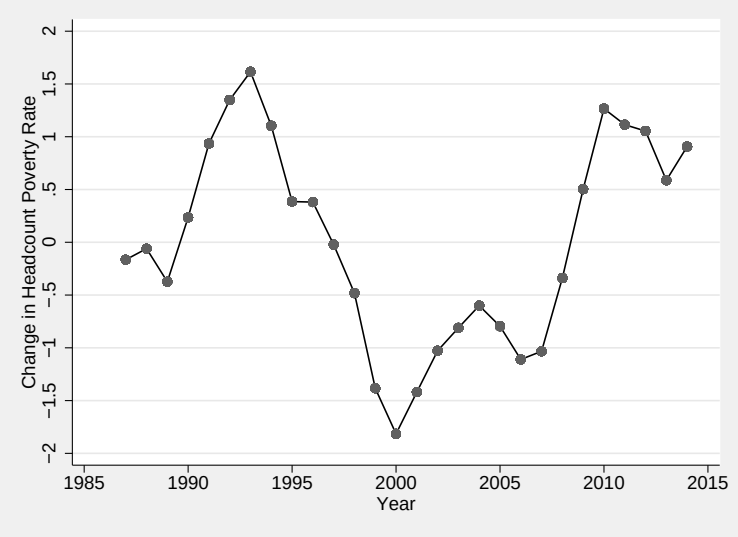
Notes: Author's presentation of 1987 to 2014 data from the U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement.

Figure 3.2: Cohort Effects from Poverty Rate Decomposition



Notes: Author's presentation of 1987 to 2014 data from the U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement.

Figure 3.3: Year Effects from Poverty Rate Decomposition



Notes: Author's presentation of 1987 to 2014 data from the U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement.