Black-White Differences in Intergenerational Economic Mobility in the US [*]

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Abstract: Traditional measures of intergenerational mobility such as the intergenerational elasticity are not useful for inferences concerning group differences in mobility with respect to the pooled income distribution. This paper uses transition probabilities and measures of "directional rank mobility" that can identify inter-racial differences in intergenerational mobility. The study uses two data sources including one that contains social security earnings for a large intergenerational sample. I find that recent cohorts of blacks are not only significantly less upwardly mobile but also significantly more downwardly mobile than whites. This implies a steady-state distribution in which there is no racial convergence in income. A descriptive analysis using covariates reveals that test scores in adolescence can explain much of the racial difference in both upward and downward mobility. Family structure can account for some of the racial gap in upward mobility but not downward mobility. Completed schooling and parental wealth also appear to account for some of the racial gaps in intergenerational mobility.

## 1.    Introduction

The large and persistent gap in economic status between blacks and whites in the United States has been a topic of considerable interest among social scientists and policy makers for many decades. The historical legacy of slavery and segregation raises the question of how long blacks may expect to remain a disadvantaged minority in the United States. Despite the enormous literature on black-white inequality and its historical trends, few studies have directly measured black-white differences in intergenerational mobility. Estimates of current rates of relative intergenerational mobility by race can provide insight on whether racial differences in the US are likely to be eliminated and if so, how long it will take.

A further question of interest is whether blacks today enjoy the same opportunities for economic success as whites, despite differences in family background.  Finally, understanding the causes behind racial differences in intergenerational mobility might also shed light on the more general question of the underlying mechanisms behind the relatively high degree of intergenerational persistence of inequality in the US.

Surprisingly, only a few studies in the literature (e.g. Hertz, 2005; Isaacs, Sawhill and Haskins, 2008; and Bhattacharya and Mazumder (2011) have sought to examine black-white differences in intergenerational mobility.[1]  The first reason for this is that a key measure of intergenerational income mobility, the intergenerational elasticity (IGE) is not well suited for comparing black-white differences in mobility with respect to the *entire* income distribution (comprising of both blacks and whites).  This is because the IGE for any particular subgroup only estimates the rate of regression to the mean for that particular subgroup and not for the overall

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[1] Other notable exceptions are Hertz (2008), Datcher (1981) and Corcoran and Adams (1997) have also studied the racial dimension of the intergenerational transmission of status more generally, but have not used summary measures of intergenerational mobility.  None of the previous studies have used the samples considered here.

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distribution.[2]  Figure 1 provides a hypothetical and stylized example to illustrate this point.  The

chart plots the log income of children against the log income of parents.  The open circles in blue

represent white families while the red boxes represent blacks.  The slopes of the lines represent

the IGE for each group with a flatter slope indicating a smaller IGE and greater mobility.  In

Figure 1, although the slope of the line for blacks is flatter than for whites it is clear that blacks

are regressing to a lower mean and hence are not more mobile with respect to the overall income

distribution.[3]  In principle, therefore, it is possible that blacks do not regress to the overall mean,

even if there is regression to the mean within each group and apparent regression to the mean for

the overall population.

A second reason for the paucity of studies of racial differences in intergenerational

mobility is that intergenerational samples of black families are relatively small making it hard to

make meaningful inferences about group differences.[4]

This study expands upon recent methodological contributions made by Bhattacharya and

Mazumder (2011) that overcome the pitfalls of relying on the IGE to measure group differences

in intergenerational mobility.  First, they develop the distribution theory for estimating transition

probabilities with covariates. Transition probabilities measure the probability of moving across

specific quantile intervals of the income distribution over generations and can therefore be used to

compare group differences in mobility with respect to a common distribution.  The inclusion of

covariates makes it possible to better understand which factors (e.g. education, family structure)

are associated with racial differences in mobility.[5]

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[2] A similar criticism applies to the intergenerational correlation.  Measured within groups it is only informative about mobility within each group and not about mobility across the broader distribution. Hertz (2008) also proposes an alternative estimator to deal with this limitation.
[3] I thank Nathan Grawe for suggesting that I make this point graphically.
[4] For example, Solon (1992) using the representative portion of the PSID, reports that only 6% of his multiple sons sample of 428 individuals is black.  This yields only 26 black father-son pairs.  There are also concerns about the use of the oversample of poorer families in the PSID due to a technical problem in the collection of the initial list of households used for the sampling frame (Lee and Solon, 2008).  In addition about two-thirds of the oversample was dropped starting in 1997 due to budget cutbacks (Isaacs, 2008).
[5] Hertz (2005) and Isaacs, Sawhill and Haskins (2008) also use transition probabilities to estimate racial differences in mobility using the PSID.

In addition, Bhattacharya and Mazumder also introduce a new set of measures of "upward mobility" that compare the relative positions of parents and children in the income distribution of each respective generation. For example, upward mobility can be measured by an indicator for whether the child's rank in the distribution is higher than the parents' rank in the prior generation. Although Bhattacharya and Mazumder's study was focused solely on upward movements, their measures can easily be adapted to study downward movements. Therefore, I refer to these measures as "directional rank mobility". Like transition probabilities, estimates of directional rank mobility are also well suited for comparing group differences with respect to a common distribution since one can easily calculate the percent of individuals who experience upward or downward mobility relative to their parents within each racial group. A key advantage of these measures is that unlike the transition probability which imposes an arbitrary threshold for measuring mobility, the directional rank measures uses one's parent rank as a threshold. Bhattacharya and Mazumder use these measures to produce new estimates of upward mobility in earnings for black and white men using the National Longitudinal Survey of Youth (NLSY79). They also show that cognitive skills during adolescence appear to explain much of the difference in the racial gap in men's upward mobility.

This paper expands upon this previous work along several key dimensions yielding some important new findings. First, in addition to the NLSY, I also use a second intergenerational dataset that matches families in the Survey of Income and Program Participation (SIPP) to administrative earnings data from the Social Security Administration, hereafter, "SIPP-SSA". Compared to the NLSY, the SIPP-SSA data provides many more years of data on parents' earnings that are potentially less prone to measurement error since they are derived from tax records. In addition, the SIPP contains data on key characteristics of the parents (e.g. wealth, marital history) that are lacking in the NLSY and which could help explain racial differences in intergenerational mobility. On the other hand there are disadvantages to using administrative data which I discuss in more detail in section 3. The two data sources, viewed in conjunction,

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however, may provide a more robust set of facts concerning intergenerational mobility differences by race and mechanisms that may account for these differences.

Second, I broaden the analysis to consider racial differences in *downward* mobility. Suppose it were the case that blacks were not only less upwardly mobile than whites but also less downwardly mobile, then this might suggest that the relative economic disadvantage faced by blacks might not be as severe as an analysis that only considered upward mobility. In general, in order to understand the long-term prospects for racial inequality in the "steady-state", one must consider rates of both upward and downward mobility. Previous studies that have examined downward mobility by race have relied exclusively on transition probabilities that use arbitrarily chosen cutoffs. A contribution of this paper is to also use the downward rank mobility measure which avoids this problem by using the parent's rank as a yardstick for mobility.

Third, the analysis here further extends the NLSY sample to include women and to use family income as an outcome. Fourth, and perhaps most importantly, I explore how estimates of both upward and downward mobility, and racial gaps in these outcomes, are affected by a wide array of covariates concerning characteristics of the parents (e.g. family structure, and wealth) and children (e.g. cognitive skill, non-cognitive skills).[6]

These extensions lead to several important new findings. First, the results show that blacks are both substantially less upwardly mobile *and substantially more downwardly mobile than whites*. Should these patterns of mobility persist, the implications for racial differences in the steady state distribution of income would be alarming. Instead of "regressing to the mean" as the standard IGE estimates would imply, these results would instead imply that blacks would make no further progress. In contrast, if we were to use the population wide estimate of the IGE of around 0.6 from Mazumder (2005), then even this high level of intergenerational persistence would still imply eventual convergence in black-white earnings.

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[6] I also lengthen the time span of the data used in the NLSY to 2006. Bhattacharya and Mazumder's analysis only uses NLSY data through 2002.

This study also uses non-parametric regressions and a statistical decomposition to shed light on which factors are associated with the racial gaps in upward and downward mobility. While the analysis is descriptive and not causal, it nonetheless provides some highly suggestive "first order" clues for the underlying mechanisms leading to black-white differences in intergenerational mobility. It appears that cognitive skills during adolescence as measured by scores on the Armed Forces Qualifying Test (AFQT) are strongly associated with these gaps. For example, conditional on having the median AFQT score, the racial gaps in both upward and downward mobility are relatively small. As with previous studies linking AFQT scores to racial differences in adult outcomes (e.g. Neal and Johnson, 1996; Cameron and Heckman, 2001), I do not interpret these scores as measuring innate endowments but rather they reflect the accumulated differences in family background and other influences. Indeed, a growing literature suggests that black-white differences in tests scores can be strongly affected by environmental influences.

A commonly proposed explanation for racial gaps in achievement has been the relative high rates of black children growing up with single mothers. I find evidence that for blacks, the lack of two parents in the household throughout childhood does indeed hamper upward mobility. However, patterns in downward mobility are unaffected by family structure for either blacks or whites. Importantly, the negative effects of single motherhood on blacks are only identified in the SIPP where the entire marital history during the child's life is available. This highlights the importance of access to data on family structure over long windows of time rather than a single snapshot at a point in time.

I also find that black-white gaps in both upward and downward mobility are significantly smaller for those who have completed 16 years of schooling. Low levels of parental wealth among blacks also inhibit the prospects for upward mobility. In contrast, I find that measures of non-cognitive skills available in these data do not appear to play a significant role in explaining intergenerational mobility gaps. A caveat is that previous research (e.g. Heckman, Stixrud and

Urzua 1996) has emphasized the importance of using dynamic structural models that better deal with measurement and selection issues to identify the long-term effects of non-cognitive skills.

It should also be noted that the focus of this paper is on *relative* mobility across generations and that the measures are relevant for answering questions concerning the relative progress of blacks compared to whites. It may also be interesting to consider measures of *absolute* mobility but that is not the focus of this paper.

The rest of the paper proceeds as follows: section 2 presents the measures of mobility, section 3 describes the data, section 4 presents the unconditional mobility estimates, section 5 analyzes the effects of including covariates and section 6 concludes.

## 2. Measures of Mobility

*Transition Probabilities*

The upward transition probability (hereafter "UTP") used in this analysis is the probability that the child's income percentile ($Y_1$) exceeds a given percentile *s*, in the child's income distribution by an amount $\tau$, conditional on the parent's income percentile ($Y_0$) being at or below *s* in the parent's income distribution:[7]

$$(1) \quad UTP_{\tau,s} = \Pr(Y_1 > s + \tau \mid Y_0 \leq s)$$

For example, in a simple case where $\tau = 0$ and *s* =0.2, the upward transition probability ($UTP_{0,s}$) would represent the probability that the child exceeded the bottom quintile in the child's generation, conditional on parent income being in the bottom quintile of the parent generation.[8] The empirical analysis of upward transition probabilities will vary *s* in increments of 10 percentiles throughout the bottom half of the distribution (i.e. 10, 20,…50). Using this approach

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[7] Bhattacharya and Mazumder (2011) use a more general notation that allows for a less restricted set of transition probabilities. For example, transition probabilities can be estimated conditional on parent income lying within any specific percentile interval.

[8] In a transition matrix using quintiles of the income distribution, this example would measure 1 minus the probability of remaining in the bottom quintile. The introduction of $\tau$ is useful to parallel variations on the URM estimator that are introduced later.

implies that the samples will overlap as progressively more families are added to the sample as $s$ increases. This approach is helpful in making comparisons with the directional mobility estimator that will be introduced shortly. I will also show results that use non overlapping percentile *intervals* of the parent income distribution (e.g. $s <= 10^{th}$ percentile, $10^{th}$ percentile $> s <= 20^{th}$ percentile,..., $40^{th}$ percentile $> s <= 50^{th}$ percentile).

It is straightforward to see that this estimator can be modified to measure downward transition probabilities by altering the inequality signs:

$$(2) \quad DTP_{\tau,s} = \Pr(Y_1 <= s + \tau \mid Y_0 > s)$$

In this case I will vary $s$ from 50 to 90. I will also consider intervals such as the $90^{th}$ percentile $< s <= 100^{th}$ percentiles, $80^{th}$ percentile $< s <= 90^{th}$ percentiles,..., $50^{th}$ percentile $< s <= 60^{th}$ percentile.

Formby, Smith and Zheng (2004) develop the distribution theory for marginal transition probabilities that can be easily extended to the case of discrete covariates. Unfortunately, for many covariates of interest that are commonly treated as continuous, such as years of schooling or test scores, this is not of much practical value. Bhattacharya and Mazumder (2011) show how the transition probability can be estimated conditional on continuous covariates using nonparametric regression techniques and demonstrate that bootstrapping is a valid approach for calculating standard errors.[9] Using this methodology one can, for example, estimate the difference in transition probabilities between blacks and whites while controlling for the effects of children's test scores, and determine whether these differences are statistically significant.

*Directional Rank Mobility*

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[9] In order to implement the TP estimator one must first estimate quantiles of the income distribution. Since the TP estimates conditional on continuous covariates will involve non-smooth functions of these initially estimated functions, it is technically challenging to show that one can bootstrap the standard errors.

Following Bhattacharya and Mazumder (2011), I use a measure of upward rank mobility ("URM") which estimates the likelihood that an individual will surpass their parent's place in the distribution by a given amount, conditional on their parents being at or below a given percentile.[10]

$$(3) \quad URM_{\tau,s} = \Pr(Y_1 - Y_0 > \tau \mid Y_0 \leq s)$$

In the simple case where $\tau = 0$, this is simply the probability that the child exceeds the parents place in the distribution. As with the UTP measure, positive values of $\tau$ enable one to measure the *amount* of the gain in percentiles across generations. Results will be shown for a range of values for $\tau$ and also as $s$ is progressively increased. Bhattacharya and Mazumder show that the URM measure can also be estimated conditional on continuous covariates using nonparametric regressions.

Similarly one can construct a measure of downward rank mobility ("DRM") using an analogous approach:

$$(4) \quad DRM_{\tau,s} = \Pr(Y_0 - Y_1 > \tau \mid Y_0 \geq s)$$

*Comparison of transition probabilities and directional rank mobility*

Since there are an infinite number of possible transition probabilities, depending on the specific quantiles that are chosen, a criticism of transition probabilities is that they require using arbitrarily chosen cutoffs. In contrast, the directional rank mobility measures simply compare the child's rank to the parent's rank rather than to an arbitrarily chosen quantile.[11]

Importantly, in this paper both mobility measures use distributions that pool across races so that mobility is compared using a common distribution. The two measures may roduce biased measures of group differences depending on the properties of the group-specific distribution. For example, Bhattacharya and Mazumder (2011) show that since the white income distribution lies

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[10] Bhattacharya and Mazumder (2011) refer to this measure as "UP".
[11] When making comparisons between population subgroups this is an unambiguous advantage to using the URM. However, Bhattacharya and Mazumder (2011) show that when using the full sample (i.e. pooling all subgroups), the URM measure is only meaningful if there is some cutoff, $s$ used to condition the sample. The choice of $s$ of course, is likely to be arbitrary. Even in this case, however, children's ranks are still directly compared to their parents' rank as opposed to an arbitrary quantile.

to the right of the black distribution over virtually the entire support, the upward transition probability will be biased in favor of whites. This is because at any point of the overall income distribution an equivalent increase in income given to both whites and blacks would mechanically allow more whites to surpass any specified threshold. A similar argument suggests that the URM measure is potentially biased in favor of blacks. Overall, then it seems reasonable to consider both measures and to examine a range of estimates.

## 3.    Data

*NLSY79*

The first source of data I use is the National Longitudinal Survey of Youth 1979 cohort (NLSY79), a dataset that has been neglected by most previous studies of intergenerational mobility despite having several attractive features.[12] Most notably there is a very large sample of over 6000 individuals for whom we know both family income in adolescence (1978-1980) and various economic outcomes as adults (1997-2005).

The NLSY began with a sample of individuals who were between the ages of 14 and 21 as of January 1, 1979 and who have since been tracked through adulthood. The NLSY conducted annual interviews until 1994 and has since shifted to biennial surveys. The analysis is restricted to the sample of youth who were living at home with their parents during the first three years of the survey and for whom family income was directly reported by the parents in any of these years. Respondents also must have stayed in the sample to adulthood and been interviewed in one of the surveys beginning with 1998 and ending in 2006. The analysis includes individuals from both the cross-sectional representative samples as well as the supplemental samples (e.g., blacks and Hispanics). Following Neal and Johnson (1996) and Cameron and Heckman (2001) I combine the cross-sectional and supplemental samples of blacks. However, as a group, blacks

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[12] Exceptions include Bratsberg et al (2007) and Aaronson and Mazumder (2008). Some previous studies such as Zimmerman (1992) have used an earlier NLS cohort of young men and women

and Hispanics are overrepresented in the sample. Therefore, all of the analyses utilize the 1979 sampling weights. The final sample includes 3,440 men and 3,250 women.

The measures of mobility utilize data on the family income of the children during the years 1997, 1999, 2001, 2003 and 2005 when sample members were between the ages of 33 and 48. The measures of permanent family income are constructed for each generation by using multiyear averages using *any* available years of data. Years of zero income are included in the averages. Family income is converted into 2004 dollars using the headline CPI series.

A nice feature of the NLSY is that it also includes a rich set of covariates pertaining to the children. Measures of human capital include completed years of education and scores on the Armed Services Vocational Aptitude Battery test (ASVAB) which was given to all NLSY respondents. I will focus on the composite AFQT score which is used as a screening device by the military and has been used in many previous economic studies. Non-cognitive measures include self-esteem and the Rotter scale of locus of control. The NLSY also has information on parent education and family structure at age 14.

*SIPP-SSA*

The second data source pools the 1984, 1990, 1991, 1992 and 1993 panels of the Survey of Income and Program Participation ("SIPP") matched to administrative earnings records maintained by the Social Security Administration (SSA).[13] The Census Bureau attempted to collect the social security numbers (SSN) of all individuals in the surveys and they were subsequently matched to SSA administrative data bases of Summary Earnings Records (SER) and Detailed Earnings Records (DER). Davis and Mazumder (2011) show that the match rates are high for most SIPP panels and that selection does not appear to be a serious concern.[14]

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[13] This data source is not publicly available. Researchers must apply to obtain the data through the Center for Economic Studies at the US Census Bureau (http://www.census.gov/ces)

[14] For example, the matched SIPP-SSA samples slightly over-represent individuals with financial assets and those who received government transfer programs since such individuals are more likely to have SSNs.

The SER data covers annual earnings both from employers and self-employment over the period from 1951 to 2007. In the SER data the earnings of individuals who are not covered by the social security system will have their earnings recorded as zero. Further, the SER data are censored at the maximum level of earnings subject to the social security tax. While the DER data is not subject to either of these issues it is only available since 1978. Further, the DER data used in this paper only covers labor market earnings reported on W-2 form and not self-employment earnings. Therefore, I combine information from both the SER and DER by taking the maximum value of earnings from the two sources in order to use earnings data from both labor market earnings and self-employment. I therefore only use the data beginning in 1978.[15]

In order to satisfy Census Bureau disclosure avoidance review requirements and to maximize the sample size, I use a relatively liberal set of sample selection rules. I start with a sample of white or black males who were living with their parents at the time of the SIPP and who were no older than 25 years old.[16] I also require that the adult earnings of these men are observed when they are at least 21 years old. Sons' earnings are taken over the five years spanning 2003 through 2007 so as to take earnings at as late a stage in the life cycle as possible to minimize life cycle bias for the younger cohorts. Although years of zero earnings are included in

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[15] Subsequent to having all of the results in this paper released through the Census Bureau's disclosure avoidance review process, I learned that the self-employment earnings in the DER were available to me but that I had not been making use of it. Therefore, for a small set of self-employed individuals whose earnings were above the taxable maximum, the use of the SER rather than the DER self-employment earnings understates their true earnings. To address this, I have redone all the calculations in this paper using only the full DER data (including the non-topcoded self-employed earnings) and found that it has an imperceptible effect on the results (typically only changing estimates at the third decimal place). Since there are procedural difficulties in releasing a second set of statistical results through the Census Bureau disclosure avoidance review process in cases where revised estimates lead the sample size to change by just 1 or 2 individuals, and since the current results are virtually identical to the corrected ones, I have opted to show the current results that combines both the SER and DER data.

[16] Restricting the sample to whites and blacks avoids implicitly disclosing any information concerning men who are neither white nor black thereby making it easier to pass Census Bureau disclosure avoidance review. Similarly the upper age restriction of 25 is not ideal as one might prefer a younger age cutoff such as 17 or 18 to avoid including men who lived at home into adulthood but was chosen to make it easier to maximize sample sizes for the purposes of Census Bureau disclosure avoidance review. It is worth noting that in the SIPP individuals residing at college are included in the household. To some degree this mitigates the concern of having an older age cutoff. In any case, the results are not sensitive to restricting the age cutoff to 18, however these results were not publically disclosed and are unavailable. However, NLSY results using a sample who lived at home only until age 18 is available upon request. There is no lower bound on the age when living at home.

the average, sons must have positive earnings in at least one year to be included. This produces a sample of 16,782 men who could have been born anytime between 1959 and 1982 and who are observed as adults between the ages of 21 and 48.[17]

For children who lived with both their mother and their father, both parents' earnings are combined and are averaged over all years between 1978 and 1986 to construct a measure of permanent earnings. For those children who only lived with a single parent at the time of the SIPP, the parent earnings are recorded as the single parents' earnings. To be included in the sample, parents must have had positive earnings in at least one year.

A limitation of the SIPP-SSA data is that there is little information available for the children during their adult years aside from their administrative earnings records. However, unlike the NLSY, a rich set of data on the parents is available. For example, information is available on parental wealth and the complete marital histories of the parents present at the time of the SIPP.

*Comparison of NLSY79 and SIPP-SSA*

Table 1 presents summary statistics for each sample. There are a number of potentially important differences between the samples. The NLSY79 sample includes both sons and daughters and uses family income for both generations. Family income is useful as a way of including daughters in the sample and avoiding issues dealing with selective labor force participation. The administrative data in the SIPP-SSA only has earnings, and only for the individuals (not the spouse). Since there is no ideal way of dealing with selection of which daughters participate in the labor force, the analysis with the SIPP-SSA only uses sons. The NLSY79 covers individuals born between 1957 and 1964 while the SIPP sample covers those born over a much longer time span, 1959-1982. Parent income is measured over just a three year period (1978 to 1980) in the NLSY79 but over a nine year period from 1978 to 1986 in the SIPP.

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[17] As I discuss later the results are not sensitive to requiring sons to be at least 28 years old, however these results were not publicly disclosed and are unavailable.

All ranks and quantiles used in the NLSY are based on distributions that include individuals who are neither white nor black. The SIPP-SSA data in contrast is restricted to just whites and blacks. Finally, the NLSY will continue track respondents and collect income data among respondents even if they become incarcerated. The SIPP-SSA data in contrast, is confined to the civilian non-institutionalized population.

Haider and Solon (2006) demonstrate that lifecycle bias affects estimates of the intergenerational elasticity in permanent income and the extent of the bias depends on the ages at which the incomes of children and parents are measured. They find that such bias is minimized in the US when income is measured around the age of 40. It is not clear whether a similar bias would arise with respect to the statistical measures utilized here since they are very different from the regression coefficients analyzed by Haider and Solon. Indeed the directional rank mobility measures in particular, seem to be robust to the various measurement differences between the samples. In any case lifecycle bias is likely to be minimal in the NLSY sample since the mean age of the kids in 2001 (the middle year of the sample) is 39 which is close to ideal according to Haider and Solon. In the SIPP-SSA sample, the mean age of the sons in 2005 (the middle year of the sample) is 33. However, in results that are not publically disclosed I found very similar results using an older SIPP-SSA sample.

## 4.      Unconditional Estimates of Intergenerational Mobility

*Upward Transition Probabilities (UTP)*

I begin by presenting race-specific estimates of upward transition probabilities in Table 2.[18] Panel A shows the results from the NLSY while panel B presents analogous results from the SIPP-SSA. The first entry in panel A shows that among white men and women in the NLSY whose parents' income was at or below the 10$^{th}$ percentile, 84 percent exceed the 10$^{th}$ percentile as adults. Moving across the first row demonstrates the effect of raising $\tau$, the percentile cutoff in

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[18] Results for the pooled samples are available from the author upon request.

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the child's generation.  For example, only about 42 percent of whites starting in the bottom decile exceed the $40^{th}$ percentile ($\tau =0.3$).  Moving down the columns shows the effect of raising the cutoff percentile in the parent generation.  For example, among whites starting below the $40^{th}$ percentile in the parent generation only 54 percent exceed the $40^{th}$ percentiles as adults.

In all cases, the comparable UTP estimates are much lower among blacks.  For example, among blacks starting in the bottom decile only 65 percent exceed the bottom decile as adults, a 19 percentage point difference compared to whites.  The black-white gap in the probability of rising out of the bottom quintile is even higher at 27 percent.[19]  Owing to the large samples in the NLSY, all of the estimated gaps in Table are highly statistically significant.  Figure 2 plots the race-specific upward transition probabilities along with confidence bands as the sample is progressively increased.

In panel B the SIPP-SSA sample consists only of sons, includes only blacks and whites, includes many more recent cohorts and uses administrative earnings data rather than family income.  Despite these different concepts and measures, the UTP estimates are very similar to those shown in Panel A.  This is evident visually in Figure 2 which plots estimates from both datasets.  The general pattern of large and statistically significant differences in point estimates is also evident in the SIPP-SSA data.  Across the 20 entries for each race, it appears that white transition probabilities are typically about 1.5 percentage points higher for whites in the NLSY compared to the SIPP-SSA and about 1.5 percentage points lower for blacks.  The fact that the key findings are so similar across the datasets is advantageous since each dataset has its own exclusive set of covariates.

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[19] For ease of exposition I will refer to the "black-white" gap in the text in terms of the absolute value of the difference in levels between the groups.  The tables and charts actually report the white level minus the black level ("W-B") and will typically report a positive number for this racial difference in upward mobility and a negative number for the racial difference in downward mobility.

*Downward Transition Probabilities (DTP)*

Table 3 presents an analogous set of downward transition probabilities. Using either dataset, I find that blacks are clearly more downwardly mobile in relative terms. For example, about 60 percent of blacks whose parents were in the top half of the income distribution fall below the 50th percentile in the subsequent generation. The analogous figure for whites is 36 percent. Although the datasets provide broadly similar patterns, there is a somewhat notable difference between the two datasets in the degree of downward mobility out of the top decile for blacks which is visually evident in Figure 3. In the NLSY which uses family income in both generations, 81 percent of black children whose parents were in the top decile fall below the top decile as adults. The comparable figure is 88 percent in the SIPP-SER data, where the income concept is earnings.

*Upward Rank Mobility (URM)*

Table 4 shows estimates of upward rank mobility based on equation (3). As might be expected, the rates of upward mobility using this measure are somewhat higher than for the upward transition probability. For example, using the NLSY I find that 75 percent of blacks whose parents were below the $20^{th}$ percentile, surpass their parents' percentile in the family income distribution. In table 2, it is shown that 48 percent of this same subsample exceeds the $20^{th}$ percentile, implying that although about 37 percent of blacks starting in the bottom quintile exceed their parents' percentile, they do not transition out of the bottom quintile. For whites, the difference in upward mobility between the two measures is much smaller. Therefore, the upward rank mobility estimator (for $\tau = 0$, and $s = 0.2$ ) shows a much smaller black-white gap of about 0.12. Interestingly, using this measure, the estimates are now nearly identical across the two datasets as is apparent in Figure 4. This suggests that the URM is an especially robust measure.

The finding of a smaller black white gap using the URM rather than the UTP measure is sensitive to the chosen value of $\tau$. For example, if $\tau$ is set to 0.2, then the black-white differences

in upward rank mobility rise considerably. For example, among men and women in the NLSY whose parents' family income placed them in the bottom quintile, blacks are nearly 25 percent less likely to surpass their parents' rank by 20 percentiles or more. Using the SIPP-SSA data the analogous black-white difference for men is 21 percent. Figure 5 plots the full set of estimates for the case where $\tau$ equals 0.2

*Downward Rank Mobility (DRM)*

In Table 5 and Figure 6, I present estimates of downward rank mobility. Using the simple measure ($\tau$ equals 0), I again observe higher rates of downward mobility among blacks than whites that is less pronounced in the top two deciles. Compared to the estimates of DTP, however, the estimates of DRM are higher. For example, among whites in the NLSY sample whose parents' income was in the top half of the income distribution, 69 percent were in a lower rank in the distribution than their parents even though only 36 percent fell below the median. For blacks starting in the top half of the income distribution, 79 percent fell below their parents and 61 percent also dropped below the median. Therefore, the estimates of the black-white gap in downward mobility using the baseline DRM measure are considerably smaller than the analogous estimates using DTP.

As was the case with the pair of upward mobility measures, the comparison of the two downward mobility measures is also sensitive to the choice of $\tau$. For example, if we consider the probability of those in the top half of the distribution falling 20 percentiles or more, the black-white gap is 18 percent in the NLSY and 14 percent in the SIPP-SSA. The racial differences in DRM when $\tau = 0.2$ show somewhat different patterns across the income distribution depending on the dataset used as is shown in Figure 7. For example, the black-white difference in the probability of falling 20 percentiles below one's parents, among those who start in the top decile is only 7 percent in the NLSY but is 23 percent in the SIPP-SSA. This likely reflects differences that are due to the relevant concept of income. Compared to whites, blacks starting in the top

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decile are more likely to suffer larger drops in their earnings rank than in their family income rank.

*Upward Mobility Using Interval-based Samples*

Thus far all the estimates have used samples that have progressively cumulated deciles beginning at either the bottom or the top of the income distribution. One might instead be interested in estimates of upward or downward mobility within narrower percentile ranges and how these estimates vary along the distribution. Table 6 and Figure 8 address this by presenting estimates of UTP and URM using interval based samples using deciles in the bottom half of the income distribution and for the case where $\tau = 0$. The UTP estimates are drawn from the NLSY sample while the URM estimates are drawn from the SIPP-SSA sample. Figure 8 shows that aside from the bottom decile, the racial differences in upward mobility are consistently between 20 and 30 percent. The greater similarity between the UTP and URM estimates is not surprising since as the interval range becomes smaller, the two estimates will converge.[20] Partially for this reason, I have chosen to emphasize the estimates using the cumulative samples so as to highlight the differences between the transition probabilities and the directional rank mobility estimates. The cumulative samples, of course, also have the virtue of having larger sample sizes and therefore, providing more precise estimates.

*Implications of transition probabilities on the steady state distributions by race*

The transition matrix of movements across quintiles of the income distribution over generations, for blacks and whites based on the SIPP-SSA are shown in Table 7. The general patterns concerning racial differences in upward and downward mobility are again evident. For example, over 50 percent of blacks who start in the bottom quintile in the parent generation remain there in the child generation but only 26 percent of whites remain in the bottom quintile in

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[20] This is obvious at the limit since the probability of exceeding one's parents percentile (URM) and the probability of exceeding any given percentile threshold (UTP) will be identical if the sample is conditioned on the same percentile in each case.

both generations. Whites are less likely to transition out of the top quintile compared to Blacks suggesting a distribution that may not be exhibiting racial convergence. Assuming that these probabilities are a permanent feature of the US economy, they can be used to calculate an implied steady state distribution using standard matrix algebra methods for solving Markov chains. The results show, for example, that in the steady state, 39 percent of blacks would occupy the bottom quintile of the income distribution and only 8 percent would be in the top quintile.[21] This suggests that rather than convergence, blacks would perpetually remain an underclass in American society if mobility patterns continue to evolve as they have for the cohorts studied in this paper.

## 5.    Estimates of Intergenerational Mobility Conditional on Covariates

Ideally, we would like to understand the causal factors that explain the observed patterns of intergenerational mobility and the possible implications for policies designed to address racial differences in mobility. For example, we might like to know whether a particular schooling intervention such as smaller classes might improve the prospects for upward mobility and whether this could reduce the racial gap in upward mobility. Such a study would not only require a convincing research design to address standard concerns about endogeneity bias but would also likely require high quality income data spanning multiple years of adulthood for *two generations for the same set of families*. Instead, I opt for a more modest goal and conduct a descriptive analysis to explore how the inclusion of other available covariates of the parents and children affect the racial differences in upward and downward intergenerational mobility. Such a "first pass" analysis may yield important clues about which factors are potentially important.

The use of characteristics from the parent generation (e.g. father's education) provides a somewhat more straightforward interpretation than characteristics from the child generation,

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[21] Further, 22 percent of blacks would be in the second quintile, 17 percent in the third quintile and 14 percent would be in the fourth quintile. The share of whites across the distribution, from the bottom to top quintiles is as follows: 17 percent, 20 percent, 20 percent, 21 percent and 22 percent.

since they are "predetermined" and may be viewed as more clearly exogenous to children's future income. The use of children's own characteristics, even if they are measured prior to entering the labor market, may be somewhat more difficult to interpret since there may still be latent unobserved factors (e.g. patience) that could affect both long-run income of the child as well as the covariate. In any event, none of the estimates described in this section should be given a causal interpretation and are more akin to an accounting exercise that may still provide some meaningful descriptive evidence.

*Upward Mobility Conditional on Covariates*

Since there are a large number of potential estimates of upward mobility I simplify the analysis in this section by focusing only on the transition probability of moving out of the bottom quintile over a generation. In order to estimate how the inclusion of a particular continuous covariate affects this measure using a non-parametric approach, I start with samples of families starting in the bottom quintile and estimate locally weighted regressions, by race, where the outcome is an indicator for the son or daughter exceeding the bottom quintile as an adult. I then produce a series of plots of the upward transition probability at each value of the covariate for each racial group. In addition, I plot the black-white difference, along with 95 percent confidence bands.[22] Finally, as a point of reference, I include the unconditional transition probabilities in lightly shaded horizontal lines. In the NLSY sample the unconditional upward transition probability of leaving the bottom quintile is 0.75 for whites and 0.48 for blacks yielding a black-white gap of 0.27. A covariate with a positive association with upward mobility will produce an upward sloped line and may reduce the black-white gap in upward mobility for certain values of the covariate.

The left hand side panels in Figure 9 show the results for upward mobility when using NLSY variables (own education, father's education, AFQT scores, self esteem, the Rotter scale

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[22] These are produced by using the bootstrap method. Bhattacharya and Mazumder (2011) show that the bootstrap method is a valid method of inference for these measures.

and having a single mother at age 14) as covariates. Panel A shows that, as would be expected, more years of completed schooling are associated with a greater likelihood of rising out of the bottom quintile. For example, 89 percent of whites with exactly 16 years of schooling will escape the bottom quintile compared to 75 percent of whites with exactly 12 years of schooling. For blacks, rates of upward mobility are extremely low for those with less than a high school education but begin to rise sharply for those who attain more than a high school education. For example, for blacks with exactly 10 years of schooling only 28 percent will transition out of the bottom quintile compared to 69 percent of blacks with exactly 14 years of schooling.

With respect to the *racial gap* in upward mobility, controlling for education provides something of a mixed picture. The racial gap in upward mobility among those with less than a high school education is actually higher than the unconditional estimate. On the other hand the racial gap narrows sharply with additional years of post secondary education. Indeed among those with 16 years of schooling the racial gap in upward mobility gap is essentially closed. Nevertheless, the racial gap is still quite large among those with some post-secondary education but who have not completed college. For example, the black white gap among those with 14 years of schooling is still sizable at 16 percent. Given that only 17 percent of blacks in the NLSY attained more than 14 years of schooling, this suggests that marginal improvements in educational attainment may not do a great deal to improve the overall upward mobility prospects of blacks.

Panel C of Figure 9 suggests a somewhat different story when including father's education. In this case the slopes of the lines, though positive, are not nearly as upward sloping as they were for one's own education. However, in this case the point estimates of the black-white gap are consistently below the unconditional estimates throughout the distribution of fathers education although the one cannot reject that they are statistically the same. For example the black–white gap in upward mobility among those whose fathers had only 9 years of education is 20 percentage points or about 25 percent lower than the unconditional gap of 27 percentage

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points.  As with own education, the black-white gap is essentially closed if one's father completed 16 years of schooling.

The effects of including one's AFQT score on rates of upward mobility are shown in Panel E of Figure 9.  Here the results provide a relatively clean and compelling story.  For both blacks and whites upward mobility rises with AFQT scores in a fairly similar fashion.  There are especially sharp gains in upward mobility associated with increases in test scores at the low end of the AFQT distribution.  Upward mobility continues to rise at a somewhat slower but still strong rate in the middle and upper half of the AFQT distribution.  Remarkably, the lines for blacks and whites are relatively close throughout the AFQT distribution.  For example, the black-white gap in moving out of the bottom quintile is only 5.2 percentage points for those with median AFQT scores compared to the unconditional gap of 27 percentage points.  This suggests that cognitive skills measured at adolescence can "account" for much of the black-white difference in upward mobility.  This result echoes previous findings by Neal and Johnson (1996) and Cameron and Heckman (2001) who have also found that AFQT scores can account for much of the racial gap in adult earnings and college enrollment rates.  As with these aforementioned studies I interpret this finding as reflecting the cumulative effect of family background influences rather than reflecting innate differences.  A growing number of studies (Neal and Johnson 1996, Hansen, Heckman, and Mullen 2004, Cascio and Lewis 2001, Chay, Guryan, and Mazumder 2008 and Aaronson and Mazumder, forthcoming) have shown that environmental influences can have large effects on military test scores and narrow racial differences.

The effects of the two non-cognitive measures, self-esteem and the Rotter scale are shown in Panels G and I of Figure 9.  For self esteem, the slopes of the lines are in the expected direction however the inclusion of this variable does relatively little to narrow black-white differences as the gap is above 20 percentage points throughout the distribution and the confidence intervals always include the unconditional gap.  The Rotter scale appears to provide suggestive evidence that the black-white gap is lower among individuals who exhibit less internal

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control but the confidence intervals are too wide to say anything meaningful. There also appears to be little effect among those who report high levels of internal control.

In Panel K of Figure 9, I use a simple dichotomous measure of family structure, namely whether the NLSY respondent lived only with his or her mother at age 14. The black-white gap in upward mobility does appear to be smaller for those coming from two parent families but this appears to be driven mainly by *lower* upward mobility among whites in two parent families rather than higher mobility among black families. Overall, the evidence from the NLSY suggests that family structure does not play much of a role in accounting for the black-white gap in upward mobility.

The effects of family structure on upward mobility differ, however, when using the SIPP sample which contains the entire marital history of parents over the child's lifetime. In Figure 10 I compare the upward mobility rates for those sons who according to the SIPP always lived with both parents to those sons who ever lived with just a single parent.[23] For whites upward mobility out of the bottom quintile actually declines slightly from 0.75 (0.02) for those who ever lived with just one parent to 0.71 (0.02) for those who always lived two parents. For blacks, however, we see an increase in the transition probability from 0.47 (0.02) to 0.58 (0.02). The black-white gap declines from 0.28 (0.02) to 0.13 (0.06). This 15 percentage point improvement in upward mobility for blacks relative to whites is statistically significant at the 5 percent level.

Another key variable concerning parental status that could plausibly influence patterns of upward mobility is wealth. Becker and Tomes (1979, 1986) have suggested that rates of intergenerational mobility could be lower for families who face borrowing constraints and who therefore cannot optimally invest in their children's human capital. While the wealth of parents is not available in the NLSY, detailed data on assets and liabilities are collected in the SIPP. Figure 12 shows how the upward transition probability out of the bottom quintile varies over distribution

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[23] The latter category includes those whose parents were ever separated, divorced or widowed. The sample includes those who were given the marital history topical module in the SIPP and who had non-missing dat. There are no significant differences between this subsample and the full SIPP analysis sample

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of net worth in the SIPP-SSA sample. It is notable that in contrast to some of the other covariates, the pattern for wealth appears to be more nonlinear. For whites upward mobility rises with wealth in the bottom half of the wealth distribution but is fairly flat in the top half of the distribution. For blacks, there is a more striking upward slope at the bottom end of the wealth distribution and a similar leveling off in the middle of the distribution. Although the point estimates suggest a decline in upward mobility for the wealthiest blacks, this is driven by a small number of observations and is accompanied by very large confidence bands. Conditional on wealth, the black-white gap is about 20 percentage points or about 20 percent lower than the unconditional estimates. The fact that wealth only appears to matter at the bottom of the wealth distribution is consistent with the idea that wealth reflects borrowing constraints and that such constraints may inhibit upward mobility.

*Downward Mobility Conditional on Covariates*

For downward mobility I focus on the probability of moving out of the top half of the income distribution over the course of a generation. Using the NLSY data, the probability of such a downward transition is 36 percent for whites and 61 percent for blacks yielding a black-white gap (in absolute value) of 0.25. The right hand side panels of Figure 9 (and Figures 11 and 13) present the plots for the downward transition probability. As was the case with the upward mobility figures, the charts show the transition probability for each value of the covariate, by race and for the black-white difference, based on locally weighted regressions. In this case the racial gaps are negative since they are calculated as the white level minus the black level.

The effects of education on downward mobility are shown in Panel B of Figure 9. As expected the lines slope downward. Since I am conditioning on individuals whose parents are in the top half of the income distribution, the samples of individuals with less than a high school education are quite thin so the estimates for these values are especially noisy. As was the case with upward mobility, additional years of post-secondary schooling are associated with a

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reduction in the racial gap in downward mobility. Among those with 16 years of schooling, the black white gap is reduced to just 14 percentage points and entirely disappears among those with 17 years or more of schooling. Panel D of Figure 9 shows the patterns when using fathers' education. Here the slopes are a bit flatter and there is a much less pronounced reduction in the racial gap in downward mobility.

The effects of AFQT scores on downward mobility (Panel F of Figure 9) are quite striking. The lines for whites and blacks converge quite a bit and for a broad swath of the AFQT distribution the racial gap is below 10 percentage points and is not statistically different from 0. Therefore as was the case with upward mobility, test scores during adolescence are strongly associated with rates of downward mobility. In panels H and J of Figure 9, the effects of self esteem and the Rotter scale on downward mobility are shown. These variables do not appear to have much effect on reducing the black-white gap in downward mobility. In some areas of the distribution of these covariates, the point estimates suggest a narrowing but the confidence intervals are far too large to draw meaningful inferences. Panel L of Figure 9 shows that there is little difference in the prospects for downward mobility among blacks by family structure when using the NLSY but that whites from single mother headed families are far more likely to be downwardly mobile. In Figure 11, using data from the SIPP where I have data on family structure throughout the child's life, I find virtually no difference in downward mobility by whether sons always lived with two parents or not, for either blacks or whites.

Finally, Figure 13 suggests that accounting for wealth modestly reduces the black-white downward mobility gap. In the SIPP-SSA data the racial difference in the probability of dropping out of the top half of the distribution is 20 percentage points. At both the very top and the very bottom of the wealth distribution, there is suggestive evidence that the racial gap narrows considerably, though the estimates are very noisy. Throughout most of the wealth distribution, the racial gap appears to be between 10 and 15 percentage points.

*Regression Based Accounting Framework*

It would of course, be useful to include many of the covariates simultaneously in a multivariate framework to investigate the relative importance of the different factors. Since it is difficult to implement this non-parametrically I consider a simpler exercise where I simply use a linear regression framework to estimate the mean black-white mobility gaps conditional on the covariates.[24] For this exercise I use only the NLSY sample and show the effects on both the upward and downward mobility racial gaps when I separately include each covariate or include several simultaneously. Specifically, the dependent variable is the mobility measure and the right hand side variable of interest is an indicator for being black. The point of the exercise is to see how the coefficient on the black indicator changes as covariates are added (one at a time) to the right hand side.

The results are shown in Table 8. The inclusion of parent characteristics (father's education, mother's education, and having a single mother at age 14) reduces the upward mobility gap from 27.1 to 25.1 percentage points or a reduction of 7.5 percent. These variables, however, can account for a larger reduction in the downward mobility gap from 25.3 to 19.8 percentage points or a reduction of about 22 percent.

Table 8 further shows how accounting for children's own characteristics affects the racial mobility gaps. What is most striking is that only AFQT scores appear to have a noticeable effect. Including AFQT scores reduces the black-white gap in the probability of leaving the bottom quintile to 16 percentage points and reduces the black-white gap in the probability of leaving the top half of the income distribution to just 10 percentage points.

**5.    Conclusion**

One can potentially gain insight into the dynamics of the racial gap in economic status in the U.S. and better understand how long it will take before there is complete convergence by

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[24] This is similar to the approach used by Neal and Johnson (1996) to demonstrate the extent to which test scores in adolescence can account for the black-white gap in adult wages.

examining rates of intergenerational income mobility. However, commonly used measures of intergenerational mobility such as the rate of regression to the mean for the pooled sample may mask the possibility of non-convergence, if groups are regressing toward very different means. Using measures of intergenerational mobility that are better suited to describing racial differences in mobility with respect to a common distribution I find dramatically lower rates of upward mobility from the bottom of the income distribution and dramatically higher rates of downward mobility from the top of the distribution among blacks born between the late 1950s and early 1980s.

In combination the estimates imply a steady state income distribution that shows no racial convergence. In other words if future generations of white and black Americans experience the same rates of intergenerational mobility as these cohorts, we should expect to see that blacks would make no relative progress. While these results are provocative, it is clear that over the course of American history there have been periods of steady progress in reducing racial differentials. These findings therefore, should not be taken to imply that racial progress is impossible but rather to highlight what current trends suggest about the future.

These results also underscore the importance of understanding what kinds of policies can potentially foster greater upward mobility and reduce downward mobility for blacks. While this paper does not seek to identify definitive causal channels, the use of statistical models that include covariates suggests a few potential areas for policy makers to consider. Similar to previous studies that have looked at static gaps in black-white earnings and college-going rates using NLSY data (e.g. Neal and Johnson, 1996; Cameron and Heckman, 2001), it is apparent that the cumulative effects of a variety of influences that affect cognitive ability by adolescence play a critical role in accounting for racial differences in upward and downward mobility. A growing literature has shown that black-white differences in test scores, and military test scores in particular, have been narrowed through large scale policy interventions throughout American history (e.g. Chay, Guryan and Mazumder, 2009; Aaronson and Mazumder, forthcoming). Other

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studies (e.g. Dobbie and Fryer, 2011) have also shown the potential for modern educational interventions to improve the black-white gap in educational achievement.

Educational attainment also appears to matter for both upward and downward mobility but the results from non-parametric models suggest that the effects of education on reducing racial mobility differentials occur primarily at the margin of acquiring higher education. If racial gaps in college attainment are primarily due to skill differences determined in adolescence (Cameron and Heckman, 2001) then this also points to the importance of interventions earlier in life. Still, there may be some scope for higher education policies that ease credit constraints for those families for whom such constraints bind. Indeed evidence from the SIPP suggests that upward mobility is sharply lower for black families with especially low levels of wealth which is consistent with the hypothesis that credit constraints may impede intergenerational mobility (Becker and Tomes, 1979, 1986).

Many commentators have pointed to prevalence of black children raised by single mothers as a source of racial gaps in economic success. I find supportive evidence that blacks raised in two parent families *throughout childhood* experience significantly greater upward mobility. Interestingly, family structure appears not to matter for whites or for rates of downward mobility for either blacks or whites.

Finally, the analysis here finds much less of a role for measures of non-cognitive skills, though the effects of such measures may be better revealed in structural models that account for measurement and selection issues (Heckman, Stixrud and Urzua, 2006).

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**Table 1: Summary Statistics**

*Panel A: NLSY*

| | All | | | Whites | | | Blacks | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | SD | N | Mean | SD | N | Mean | SD |
| Family Income (1997-2005) | 6690 | 69395 | 58953 | 3205 | 76284 | 61316 | 2143 | 42289 | 39070 |
| Child Age in 2001 | 6690 | 39.1 | 2.2 | 3205 | 39.1 | 2.2 | 2143 | 39.2 | 2.2 |
| Education | 6673 | 13.0 | 2.3 | 3199 | 13.2 | 2.3 | 2136 | 12.4 | 2.1 |
| AFQT | 6432 | 46.0 | 28.5 | 3080 | 52.5 | 27.0 | 2082 | 21.6 | 19.8 |
| Self Esteem | 6446 | 17.3 | 4.0 | 3103 | 17.4 | 4.0 | 2069 | 17.2 | 4.0 |
| Rotter | 6621 | 5.9 | 2.0 | 3178 | 5.8 | 2.0 | 2118 | 6.3 | 2.2 |
| SF Physical health | 6315 | 23.7 | 6.8 | 3018 | 24.0 | 6.7 | 2036 | 22.8 | 7.3 |
| SF Mental health | 6315 | 24.2 | 7.4 | 3018 | 24.1 | 7.3 | 2036 | 24.4 | 8.0 |
| Parent Income (1978-1980) | 6690 | 57760 | 36299 | 3205 | 64354 | 35965 | 2143 | 33743 | 26725 |
| Dad's Education | 5714 | 11.8 | 3.5 | 3006 | 12.3 | 3.2 | 1588 | 10.2 | 3.4 |
| Single Mother at age 14 | 6690 | 0.13 | 0.33 | 3205 | 0.08 | 0.27 | 2143 | 0.3 | 0.5 |

*Panel B: SIPP-SSA*

| | All | | | Whites | | | Blacks | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | SD | N | Mean | SD | N | Mean | SD |
| Son Log Earnings | 16782 | 10.14 | 1.07 | 14757 | 10.23 | 1.00 | 2025 | 9.48 | 1.32 |
| Son Age in 2005 | 16782 | 30.93 | 5.69 | 14757 | 30.97 | 5.71 | 2025 | 30.66 | 5.55 |
| Single Parent | 16782 | 0.21 | 0.41 | 14757 | 0.17 | 0.38 | 2025 | 0.53 | 0.50 |
| 1984 Panel | 16782 | 0.26 | 0.44 | 14757 | 0.25 | 0.43 | 2025 | 0.27 | 0.45 |
| 1990 Panel | 16782 | 0.23 | 0.42 | 14757 | 0.23 | 0.42 | 2025 | 0.23 | 0.42 |
| 1991 Panel | 16782 | 0.14 | 0.35 | 14757 | 0.15 | 0.35 | 2025 | 0.12 | 0.33 |
| 1992 Panel | 16782 | 0.20 | 0.40 | 14757 | 0.20 | 0.40 | 2025 | 0.19 | 0.40 |
| 1993 Panel | 16782 | 0.18 | 0.38 | 14757 | 0.18 | 0.38 | 2025 | 0.18 | 0.38 |
| Parent log Earnings | 16782 | 10.32 | 1.06 | 14757 | 10.42 | 1.00 | 2025 | 9.63 | 1.26 |
| Dads Age in 1982 | 15354 | 35.72 | 8.85 | 13467 | 36.09 | 8.75 | 1887 | 33.11 | 9.14 |
| Net Worth | | | | | | | | | |

**Table 2: Upward Transition Probability Estimates by Race, cumulative samples**

*Panel A: NLSY sample*

| Parent percentile range | $\tau=0$ | | | $\tau=0.1$ | | | $\tau=0.2$ | | | $\tau=0.3$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B |
| 1 to 10 | 0.841 | 0.650 | 0.191 | 0.754 | 0.449 | 0.304 | 0.605 | 0.322 | 0.283 | 0.423 | 0.237 | 0.186 |
| $[N_w=197, N_b=676]$ | (0.031) | (0.020) | (0.040) | (0.035) | (0.021) | (0.042) | (0.039) | (0.021) | (0.043) | (0.039) | (0.019) | (0.019) |
| 1 to 20 | 0.748 | 0.477 | 0.271 | 0.604 | 0.341 | 0.262 | 0.448 | 0.250 | 0.198 | 0.328 | 0.188 | 0.140 |
| $[N_w=468, N_b=1127]$ | (0.022) | (0.018) | (0.029) | (0.024) | (0.018) | (0.030) | (0.027) | (0.016) | (0.032) | (0.023) | (0.015) | (0.015) |
| 1 to 30 | 0.649 | 0.368 | 0.281 | 0.513 | 0.274 | 0.239 | 0.388 | 0.203 | 0.185 | 0.284 | 0.128 | 0.156 |
| $[N_w=754, N_b=1449]$ | (0.018) | (0.013) | (0.025) | (0.019) | (0.013) | (0.026) | (0.018) | (0.013) | (0.023) | (0.018) | (0.010) | (0.010) |
| 1 to 40 | 0.537 | 0.286 | 0.251 | 0.425 | 0.215 | 0.210 | 0.314 | 0.141 | 0.173 | 0.227 | 0.097 | 0.130 |
| $[N_w=1081, N_b=1640]$ | (0.013) | (0.011) | (0.018) | (0.014) | (0.011) | (0.019) | (0.014) | (0.009) | (0.018) | (0.013) | (0.008) | (0.008) |
| 1 to 50 | 0.451 | 0.220 | 0.232 | 0.343 | 0.145 | 0.198 | 0.240 | 0.099 | 0.141 | 0.160 | 0.057 | 0.103 |
| $[N_w=1425, N_b=1767]$ | (0.011) | (0.012) | (0.019) | (0.011) | (0.010) | (0.016) | (0.010) | (0.008) | (0.013) | (0.008) | (0.007) | (0.007) |

*Panel B: SIPP-SSA sample*

| Parent percentile range | $\tau=0$ | | | $\tau=0.1$ | | | $\tau=0.2$ | | | $\tau=0.3$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B |
| 1 to 10 | 0.835 | 0.632 | 0.203 | 0.701 | 0.451 | 0.250 | 0.544 | 0.331 | 0.213 | 0.424 | 0.254 | 0.170 |
| $[N_w=1197, N_b=481]$ | (0.009) | (0.019) | (0.025) | (0.011) | (0.020) | (0.027) | (0.011) | (0.017) | (0.027) | (0.009) | (0.013) | (0.024) |
| 1 to 20 | 0.737 | 0.492 | 0.245 | 0.592 | 0.370 | 0.222 | 0.470 | 0.285 | 0.185 | 0.361 | 0.188 | 0.173 |
| $[N_w=2510, N_b=846]$ | (0.007) | (0.013) | (0.020) | (0.009) | (0.010) | (0.018) | (0.009) | (0.010) | (0.018) | (0.011) | (0.013) | (0.017) |
| 1 to 30 | 0.619 | 0.408 | 0.211 | 0.494 | 0.319 | 0.175 | 0.385 | 0.220 | 0.165 | 0.283 | 0.147 | 0.137 |
| $[N_w=3902, N_b=1132]$ | (0.004) | (0.009) | (0.016) | (0.008) | (0.016) | (0.016) | (0.005) | (0.016) | (0.015) | (0.007) | (0.009) | (0.013) |
| 1 to 40 | 0.515 | 0.329 | 0.186 | 0.404 | 0.234 | 0.170 | 0.301 | 0.155 | 0.146 | 0.204 | 0.097 | 0.106 |
| $[N_w=5325, N_b=1387]$ | (0.010) | (0.014) | (0.015) | (0.006) | (0.016) | (0.014) | (0.005) | (0.009) | (0.012) | (0.005) | (0.009) | (0.009) |
| 1 to 50 | 0.427 | 0.246 | 0.181 | 0.319 | 0.166 | 0.153 | 0.216 | 0.103 | 0.113 | 0.128 | 0.051 | 0.077 |
| $[N_w=6808, N_b=1583]$ | (0.004) | (0.012) | (0.012) | (0.005) | (0.009) | (0.011) | (0.005) | (0.009) | (0.009) | (0.002) | (0.005) | (0.007) |

*Notes:* See text for a description of the estimator. Panel A uses a sample of 6690 individuals from the NLSY and uses multiyear averages of son or daughter's family income over 1997-2005 and parent family income measured over 1978-1980. NLSY analysis incorporates the 1979 sampling weights. Panel B uses a sample of 16,782 men from the SIPP-SSA data and uses a multiyear average of sons' earnings over 2003-2007 and parent earnings over 1978-1986. Bootstrapped standard errors are in parentheses.

**Table 3: Downward Transition Probability Estimates by Race, cumulative samples**

*Panel A: NLSY sample*

| Parent percentile range | τ=0 | | | τ=0.1 | | | τ=0.2 | | | τ=0.3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B |
| 91 to 100 | 0.725 | 0.813 | -0.087 | 0.548 | 0.579 | -0.031 | 0.426 | 0.562 | -0.136 | 0.318 | 0.467 | -0.149 |
| $[N_w=368, N_b=46]$ | (0.020) | (0.069) | (0.072) | (0.024) | (0.082) | (0.084) | (0.023) | (0.079) | (0.083) | (0.022) | (0.081) | (0.081) |
| 81 to 100 | 0.603 | 0.685 | -0.082 | 0.471 | 0.620 | -0.148 | 0.363 | 0.507 | -0.144 | 0.270 | 0.475 | -0.204 |
| $[N_w=724, N_b=116]$ | (0.015) | (0.047) | (0.051) | (0.018) | (0.048) | (0.053) | (0.016) | (0.054) | (0.057) | (0.015) | (0.054) | (0.054) |
| 71 to 100 | 0.509 | 0.685 | -0.177 | 0.396 | 0.583 | -0.187 | 0.298 | 0.531 | -0.233 | 0.202 | 0.398 | -0.195 |
| $[N_w=1088, N_b=183]$ | (0.012) | (0.038) | (0.040) | (0.012) | (0.038) | (0.040) | (0.013) | (0.038) | (0.039) | (0.011) | (0.037) | (0.037) |
| 61 to 100 | 0.436 | 0.643 | -0.207 | 0.332 | 0.588 | -0.256 | 0.232 | 0.459 | -0.227 | 0.159 | 0.356 | -0.197 |
| $[N_w=1431, N_b=268]$ | (0.010) | (0.033) | (0.036) | (0.010) | (0.034) | (0.037) | (0.009) | (0.036) | (0.037) | (0.009) | (0.032) | (0.032) |
| 51 to 100 | 0.357 | 0.610 | -0.253 | 0.255 | 0.491 | -0.236 | 0.175 | 0.372 | -0.197 | 0.105 | 0.270 | -0.165 |
| $[N_w=1780, N_b=376]$ | (0.007) | (0.029) | (0.031) | (0.007) | (0.029) | (0.030) | (0.007) | (0.028) | (0.029) | (0.005) | (0.027) | (0.027) |

*Panel B: SIPP-SSA sample*

| Parent percentile range | τ=0 | | | τ=0.1 | | | τ=0.2 | | | τ=0.3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B |
| 91 to 100 | 0.720 | 0.882 | -0.162 | 0.561 | 0.765 | -0.204 | 0.455 | 0.676 | -0.222 | 0.374 | 0.618 | -0.243 |
| $[N_w=1645, N_b=34]$ | (0.009) | (0.059) | (0.059) | (0.012) | (0.076) | (0.076) | (0.012) | (0.082) | (0.085) | (0.012) | (0.082) | (0.082) |
| 81 to 100 | 0.620 | 0.764 | -0.144 | 0.498 | 0.652 | -0.154 | 0.404 | 0.573 | -0.169 | 0.323 | 0.449 | -0.126 |
| $[N_w=3268, N_b=89]$ | (0.007) | (0.043) | (0.044) | (0.007) | (0.051) | (0.052) | (0.008) | (0.055) | (0.056) | (0.007) | (0.053) | (0.053) |
| 71 to 100 | 0.529 | 0.726 | -0.197 | 0.429 | 0.626 | -0.196 | 0.342 | 0.525 | -0.183 | 0.263 | 0.441 | -0.178 |
| $[N_w=4856, N_b=179]$ | (0.006) | (0.034) | (0.036) | (0.006) | (0.038) | (0.039) | (0.006) | (0.037) | (0.038) | (0.006) | (0.036) | (0.037) |
| 61 to 100 | 0.459 | 0.646 | -0.188 | 0.365 | 0.554 | -0.188 | 0.279 | 0.471 | -0.193 | 0.203 | 0.357 | -0.155 |
| $[N_w=6433, N_b=280]$ | (0.005) | (0.029) | (0.030) | (0.005) | (0.031) | (0.032) | (0.005) | (0.029) | (0.029) | (0.004) | (0.028) | (0.029) |
| 51 to 100 | 0.382 | 0.577 | -0.195 | 0.290 | 0.495 | -0.205 | 0.207 | 0.382 | -0.175 | 0.132 | 0.285 | -0.153 |
| $[N_w=7949, N_b=442]$ | (0.004) | (0.025) | (0.027) | (0.004) | (0.022) | (0.024) | (0.004) | (0.024) | (0.025) | (0.003) | (0.022) | (0.023) |

*Notes:* See text for a description of the estimator. Panel A uses a sample of 6690 individuals from the NLSY and uses multiyear averages of son or daughter's family income over 1997-2005 and parent family income measured over 1978-1980. NLSY analysis incorporates the 1979 sampling weights. Panel B uses a sample of 16,782 men from the SIPP-SSA data and uses a multiyear average of sons' earnings over 2003-2007 and parent earnings over 1978-1986. Bootstrapped standard errors are in parentheses.

**Table 4: Upward Rank Mobility Estimates by Race, cumulative samples**

*Panel A: NLSY sample*

| Parent percentile range | $\tau=0$ | | | $\tau=0.1$ | | | $\tau=0.2$ | | | $\tau=0.3$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B |
| 1 to 10 | 0.908 | 0.824 | 0.084 | 0.801 | 0.540 | 0.262 | 0.675 | 0.386 | 0.288 | 0.490 | 0.274 | 0.216 |
| $[N_w=197, N_b=676]$ | (0.026) | (0.019) | (0.033) | (0.032) | (0.023) | (0.040) | (0.033) | (0.021) | (0.040) | (0.043) | (0.018) | (0.043) |
| 1 to 20 | 0.864 | 0.745 | 0.119 | 0.709 | 0.502 | 0.207 | 0.603 | 0.357 | 0.246 | 0.453 | 0.257 | 0.195 |
| $[N_w=468, N_b=1127]$ | (0.018) | (0.016) | (0.025) | (0.023) | (0.016) | (0.029) | (0.026) | (0.016) | (0.031) | (0.024) | (0.014) | (0.028) |
| 1 to 30 | 0.827 | 0.688 | 0.139 | 0.690 | 0.480 | 0.210 | 0.575 | 0.339 | 0.236 | 0.435 | 0.242 | 0.193 |
| $[N_w=754, N_b=1449]$ | (0.014) | (0.013) | (0.019) | (0.017) | (0.015) | (0.024) | (0.019) | (0.014) | (0.023) | (0.017) | (0.013) | (0.021) |
| 1 to 40 | 0.775 | 0.658 | 0.116 | 0.636 | 0.463 | 0.173 | 0.529 | 0.333 | 0.196 | 0.396 | 0.238 | 0.158 |
| $[N_w=1081, N_b=1640]$ | (0.011) | (0.013) | (0.017) | (0.014) | (0.013) | (0.019) | (0.015) | (0.013) | (0.020) | (0.015) | (0.012) | (0.020) |
| 1 to 50 | 0.721 | 0.632 | 0.089 | 0.593 | 0.445 | 0.147 | 0.485 | 0.318 | 0.167 | 0.358 | 0.228 | 0.130 |
| $[N_w=1425, N_b=1767]$ | (0.011) | (0.012) | (0.017) | (0.012) | (0.013) | (0.019) | (0.012) | (0.013) | (0.018) | (0.011) | (0.011) | (0.017) |

*Panel B: SIPP-SSA sample*

| Parent percentile range | $\tau=0$ | | | $\tau=0.1$ | | | $\tau=0.2$ | | | $\tau=0.3$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B |
| 1 to 10 | 0.919 | 0.807 | 0.112 | 0.764 | 0.538 | 0.225 | 0.623 | 0.399 | 0.224 | 0.475 | 0.297 | 0.178 |
| $[N_w=1197, N_b=481]$ | (0.005) | (0.009) | (0.021) | (0.009) | (0.018) | (0.026) | (0.009) | (0.020) | (0.026) | (0.009) | (0.013) | (0.028) |
| 1 to 20 | 0.870 | 0.740 | 0.130 | 0.731 | 0.520 | 0.211 | 0.600 | 0.392 | 0.207 | 0.463 | 0.284 | 0.179 |
| $[N_w=2510, N_b=846]$ | (0.005) | (0.014) | (0.018) | (0.008) | (0.012) | (0.020) | (0.012) | (0.020) | (0.020) | (0.007) | (0.014) | (0.019) |
| 1 to 30 | 0.820 | 0.699 | 0.121 | 0.683 | 0.508 | 0.176 | 0.555 | 0.389 | 0.166 | 0.429 | 0.278 | 0.151 |
| $[N_w=3902, N_b=1132]$ | (0.006) | (0.011) | (0.015) | (0.006) | (0.016) | (0.017) | (0.007) | (0.022) | (0.017) | (0.004) | (0.016) | (0.015) |
| 1 to 40 | 0.769 | 0.650 | 0.119 | 0.639 | 0.476 | 0.163 | 0.516 | 0.359 | 0.157 | 0.391 | 0.254 | 0.137 |
| $[N_w=5325, N_b=1387]$ | (0.007) | (0.010) | (0.014) | (0.005) | (0.018) | (0.014) | (0.008) | (0.018) | (0.015) | (0.005) | (0.015) | (0.013) |
| 1 to 50 | 0.726 | 0.618 | 0.108 | 0.597 | 0.451 | 0.146 | 0.473 | 0.337 | 0.136 | 0.353 | 0.236 | 0.117 |
| $[N_w=6808, N_b=1583]$ | (0.003) | (0.013) | (0.013) | (0.005) | (0.008) | (0.014) | (0.005) | (0.007) | (0.013) | (0.002) | (0.008) | (0.011) |

*Notes:* See text for a description of the estimator. Panel A uses a sample of 6690 individuals from the NLSY and uses multiyear averages of son or daughter's family income over 1997-2005 and parent family income measured over 1978-1980. NLSY analysis incorporates the 1979 sampling weights. Panel B uses a sample of 16,782 men from the SIPP-SSA data and uses a multiyear average of sons' earnings over 2003-2007 and parent earnings over 1978-1986. Bootstrapped standard errors are in parentheses.

**Table 5:  Downward Rank Mobility Estimates by Race, cumulative samples**

*Panel A: NLSY sample*

| Parent percentile range | $\tau=0$ | | | $\tau=0.1$ | | | $\tau=0.2$ | | | $\tau=0.3$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B |
| 91 to 100 | 0.870 | 0.912 | -0.042 | 0.630 | 0.661 | -0.032 | 0.491 | 0.562 | -0.071 | 0.371 | 0.522 | -0.151 |
| $[N_w=368, N_b=46]$ | (0.017) | (0.056) | (0.059) | (0.024) | (0.077) | (0.084) | (0.027) | (0.077) | (0.080) | (0.025) | (0.077) | (0.082) |
| 81 to 100 | 0.815 | 0.842 | -0.027 | 0.611 | 0.685 | -0.074 | 0.477 | 0.588 | -0.111 | 0.360 | 0.520 | -0.160 |
| $[N_w=724, N_b=116]$ | (0.015) | (0.037) | (0.038) | (0.014) | (0.051) | (0.053) | (0.017) | (0.052) | (0.055) | (0.019) | (0.051) | (0.054) |
| 71 to 100 | 0.771 | 0.842 | -0.071 | 0.575 | 0.699 | -0.123 | 0.451 | 0.613 | -0.162 | 0.342 | 0.526 | -0.185 |
| $[N_w=1088, N_b=183]$ | (0.011) | (0.033) | (0.034) | (0.012) | (0.037) | (0.040) | (0.013) | (0.039) | (0.041) | (0.013) | (0.037) | (0.039) |
| 61 to 100 | 0.733 | 0.823 | -0.090 | 0.557 | 0.716 | -0.159 | 0.435 | 0.630 | -0.196 | 0.327 | 0.535 | -0.208 |
| $[N_w=1431, N_b=268]$ | (0.010) | (0.028) | (0.030) | (0.012) | (0.031) | (0.034) | (0.010) | (0.031) | (0.033) | (0.010) | (0.032) | (0.033) |
| 51 to 100 | 0.693 | 0.788 | -0.094 | 0.528 | 0.682 | -0.154 | 0.408 | 0.591 | -0.184 | 0.299 | 0.473 | -0.173 |
| $[N_w=1780, N_b=376]$ | (0.009) | (0.025) | (0.026) | (0.010) | (0.028) | (0.030) | (0.009) | (0.027) | (0.030) | (0.009) | (0.027) | (0.030) |

*Panel B: SIPP-SSA sample*

| Parent percentile range | $\tau=0$ | | | $\tau=0.1$ | | | $\tau=0.2$ | | | $\tau=0.3$ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B | Whites | Blacks | W-B |
| 91 to 100 | 0.852 | 0.882 | -0.031 | 0.633 | 0.824 | -0.191 | 0.503 | 0.735 | -0.232 | 0.410 | 0.618 | -0.208 |
| $[N_w=1645, N_b=34]$ | (0.008) | (0.053) | (0.054) | (0.011) | (0.061) | (0.062) | (0.011) | (0.078) | (0.080) | (0.013) | (0.083) | (0.084) |
| 81 to 100 | 0.808 | 0.820 | -0.012 | 0.619 | 0.742 | -0.123 | 0.495 | 0.652 | -0.156 | 0.392 | 0.551 | -0.159 |
| $[N_w=3268, N_b=89]$ | (0.006) | (0.039) | (0.040) | (0.008) | (0.048) | (0.048) | (0.008) | (0.053) | (0.054) | (0.008) | (0.055) | (0.056) |
| 71 to 100 | 0.761 | 0.821 | -0.060 | 0.591 | 0.732 | -0.141 | 0.473 | 0.637 | -0.163 | 0.372 | 0.547 | -0.175 |
| $[N_w=4856, N_b=179]$ | (0.005) | (0.030) | (0.031) | (0.006) | (0.032) | (0.034) | (0.006) | (0.038) | (0.039) | (0.005) | (0.039) | (0.040) |
| 61 to 100 | 0.721 | 0.793 | -0.072 | 0.567 | 0.696 | -0.129 | 0.451 | 0.614 | -0.163 | 0.352 | 0.525 | -0.173 |
| $[N_w=6433, N_b=280]$ | (0.005) | (0.024) | (0.025) | (0.005) | (0.029) | (0.030) | (0.005) | (0.030) | (0.031) | (0.005) | (0.032) | (0.033) |
| 51 to 100 | 0.682 | 0.749 | -0.066 | 0.535 | 0.652 | -0.116 | 0.420 | 0.563 | -0.143 | 0.319 | 0.471 | -0.152 |
| $[N_w=7949, N_b=442]$ | (0.004) | (0.020) | (0.021) | (0.004) | (0.024) | (0.024) | (0.004) | (0.025) | (0.026) | (0.005) | (0.023) | (0.024) |

*Notes:* See text for a description of the estimator.  Panel A uses a sample of 6690 individuals from the NLSY and uses multiyear averages of son or daughter's family income over 1997-2005 and parent family income measured over 1978-1980.  NLSY analysis incorporates the 1979 sampling weights.  Panel B uses a sample of 16,782 men from the SIPP-SSA data and uses a multiyear average of sons' earnings over 2003-2007 and parent earnings over 1978-1986. Bootstrapped standard errors are in parentheses.

**Table 6: Comparison of Upward Transition Probability and Upward Rank Mobility Race Using interval samples**

*Panel A: Upward Transition Probability*

| Parent percentile range | $\tau=0$ Whites | Blacks | W-B | $\tau=0.1$ Whites | Blacks | W-B | $\tau=0.2$ Whites | Blacks | W-B | $\tau=0.3$ Whites | Blacks | W-B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 to 10 | 0.841 | 0.650 | 0.191 | 0.754 | 0.449 | 0.304 | 0.605 | 0.322 | 0.283 | 0.423 | 0.237 | 0.186 |
| $[N_w=197, N_b=676]$ | (0.031) | (0.020) | (0.040) | (0.035) | (0.021) | (0.042) | (0.039) | (0.021) | (0.043) | (0.039) | (0.019) | (0.019) |
| 11 to 20 | 0.744 | 0.519 | 0.226 | 0.603 | 0.371 | 0.233 | 0.465 | 0.268 | 0.197 | 0.346 | 0.197 | 0.149 |
| $[N_w=468, N_b=1127]$ | (0.031) | (0.027) | (0.044) | (0.032) | (0.026) | (0.044) | (0.036) | (0.026) | (0.047) | (0.034) | (0.023) | (0.023) |
| 21 to 30 | 0.711 | 0.458 | 0.253 | 0.602 | 0.353 | 0.249 | 0.469 | 0.250 | 0.220 | 0.359 | 0.159 | 0.200 |
| $[N_w=754, N_b=1449]$ | (0.029) | (0.031) | (0.043) | (0.031) | (0.032) | (0.043) | (0.032) | (0.029) | (0.041) | (0.030) | (0.022) | (0.022) |
| 31 to 40 | 0.584 | 0.376 | 0.209 | 0.499 | 0.307 | 0.191 | 0.374 | 0.238 | 0.135 | 0.279 | 0.169 | 0.110 |
| $[N_w=1081, N_b=1640]$ | (0.028) | (0.038) | (0.047) | (0.029) | (0.034) | (0.044) | (0.029) | (0.032) | (0.043) | (0.027) | (0.030) | (0.030) |
| 41 to 50 | 0.524 | 0.275 | 0.249 | 0.425 | 0.194 | 0.232 | 0.279 | 0.130 | 0.149 | 0.194 | 0.072 | 0.123 |
| $[N_w=1425, N_b=1767]$ | (0.027) | (0.044) | (0.053) | (0.027) | (0.036) | (0.046) | (0.025) | (0.034) | (0.044) | (0.022) | (0.026) | (0.026) |

*Panel B: Upward Rank Mobility*

| Parent percentile range | $\tau=0$ Whites | Blacks | W-B | $\tau=0.1$ Whites | Blacks | W-B | $\tau=0.2$ Whites | Blacks | W-B | $\tau=0.3$ Whites | Blacks | W-B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 to 10 | 0.908 | 0.824 | 0.084 | 0.801 | 0.540 | 0.262 | 0.675 | 0.386 | 0.288 | 0.490 | 0.274 | 0.216 |
| $[N_w=197, N_b=676]$ | (0.026) | (0.019) | (0.033) | (0.032) | (0.023) | (0.040) | (0.033) | (0.021) | (0.040) | (0.043) | (0.018) | (0.043) |
| 11 to 20 | 0.834 | 0.628 | 0.206 | 0.646 | 0.446 | 0.200 | 0.555 | 0.314 | 0.241 | 0.427 | 0.232 | 0.195 |
| $[N_w=468, N_b=1127]$ | (0.026) | (0.027) | (0.040) | (0.033) | (0.024) | (0.041) | (0.035) | (0.026) | (0.043) | (0.036) | (0.023) | (0.043) |
| 21 to 30 | 0.776 | 0.496 | 0.281 | 0.664 | 0.408 | 0.255 | 0.536 | 0.279 | 0.257 | 0.411 | 0.190 | 0.221 |
| $[N_w=754, N_b=1449]$ | (0.026) | (0.030) | (0.040) | (0.032) | (0.032) | (0.048) | (0.030) | (0.029) | (0.041) | (0.033) | (0.025) | (0.042) |
| 31 to 40 | 0.672 | 0.440 | 0.233 | 0.532 | 0.332 | 0.199 | 0.440 | 0.286 | 0.154 | 0.320 | 0.207 | 0.112 |
| $[N_w=1081, N_b=1640]$ | (0.025) | (0.039) | (0.048) | (0.027) | (0.037) | (0.047) | (0.027) | (0.033) | (0.043) | (0.027) | (0.033) | (0.041) |
| 41 to 50 | 0.570 | 0.314 | 0.256 | 0.469 | 0.232 | 0.237 | 0.360 | 0.140 | 0.220 | 0.250 | 0.106 | 0.144 |
| $[N_w=1425, N_b=1767]$ | (0.026) | (0.044) | (0.052) | (0.029) | (0.043) | (0.052) | (0.029) | (0.038) | (0.049) | (0.025) | (0.030) | (0.040) |

*Notes:* See text for a description of the estimator. Panel A uses a sample of 6690 individuals from the NLSY and uses multiyear averages of son or daughter's family income over 1997-2005 and parent family income measured over 1978-1980. NLSY analysis incorporates the 1979 sampling weights. Panel B uses a sample of 16,782 men from the SIPP-SSA data and uses a multiyear average of sons' earnings over 2003-2007 and parent earnings over 1978-1986. Bootstrapped standard errors are in parentheses.

**Table 7: Transition Matrices by Race Using SIPP-SSA sample**

Panel A: Whites

| | | Child's Income Quintile | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | **0.263** | **0.267** | **0.208** | **0.159** | **0.103** |
| | 1 | (0.008) | (0.007) | (0.006) | (0.005) | (0.005) |
| | | 2510 | 2510 | 2510 | 2510 | 2510 |
| | | **0.205** | **0.239** | **0.219** | **0.204** | **0.133** |
| | 2 | (0.009) | (0.008) | (0.007) | (0.006) | (0.005) |
| | | 2815 | 2815 | 2815 | 2815 | 2815 |
| Parent's | | **0.156** | **0.203** | **0.236** | **0.223** | **0.182** |
| Income | 3 | (0.007) | (0.007) | (0.007) | (0.006) | (0.006) |
| Quintile | | 2999 | 2999 | 2999 | 2999 | 2999 |
| | | **0.147** | **0.162** | **0.206** | **0.234** | **0.250** |
| | 4 | (0.007) | (0.006) | (0.007) | (0.006) | (0.006) |
| | | 3165 | 3165 | 3165 | 3165 | 3165 |
| | | **0.113** | **0.136** | **0.155** | **0.217** | **0.380** |
| | 5 | (0.006) | (0.006) | (0.006) | (0.007) | (0.007) |
| | | 3268 | 3268 | 3268 | 3268 | 3268 |

Panel B: Blacks

| | | Child's Income Quintile | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| | | **0.508** | **0.207** | **0.155** | **0.092** | **0.038** |
| | 1 | (0.017) | (0.021) | (0.025) | (0.034) | (0.048) |
| | | 846 | 846 | 846 | 846 | 846 |
| | | **0.357** | **0.246** | **0.203** | **0.129** | **0.065** |
| | 2 | (0.013) | (0.020) | (0.023) | (0.028) | (0.041) |
| | | 541 | 541 | 541 | 541 | 541 |
| Parent's | | **0.341** | **0.212** | **0.176** | **0.190** | **0.081** |
| Income | 3 | (0.012) | (0.018) | (0.021) | (0.030) | (0.045) |
| Quintile | | 358 | 358 | 358 | 358 | 358 |
| | | **0.272** | **0.236** | **0.173** | **0.178** | **0.141** |
| | 4 | (0.010) | (0.012) | (0.019) | (0.028) | (0.042) |
| | | 191 | 191 | 191 | 191 | 191 |
| | | **0.213** | **0.180** | **0.180** | **0.191** | **0.236** |
| | 5 | (0.007) | (0.011) | (0.015) | (0.026) | (0.048) |
| | | 89 | 89 | 89 | 89 | 89 |

*Notes:* See text for a description. Both panels use sub-samples drawn from a sample of 16,782 men from the SIPP-SSA data and uses a multiyear average of sons' earnings over 2003-2007 and parent earnings over 1978-1986. Bootstrapped standard errors are in parentheses. Sample sizes are shown below the standard errors.

**Table 8: Regression decomposition of black-white mobility gaps**

| | UTP leaving bottom quintile | | DTP leaving top half | |
|---|---|---|---|---|
| | W-B gap | Percent Explained | W-B gap | Percent Explained |
| Unconditional | -0.271 | -- | 0.253 | -- |
| **Parent Covariates** | | | | |
| Father's Education | -0.242 | 0.107 | 0.208 | 0.179 |
| Mother's Education | -0.261 | 0.036 | 0.234 | 0.075 |
| Single Mother | -0.279 | -0.030 | 0.244 | 0.039 |
| All Parent covariates | -0.251 | 0.075 | 0.198 | 0.221 |
| **Children Covariates** | | | | |
| Education | -0.279 | -0.031 | 0.225 | 0.112 |
| AFQT Score | -0.160 | 0.408 | 0.103 | 0.594 |
| Self Esteem | -0.274 | -0.010 | 0.257 | -0.015 |
| Rotter Scale | -0.258 | 0.046 | 0.244 | 0.037 |
| Adult Physical Health | -0.270 | 0.004 | 0.239 | 0.057 |
| Adult Mental Health | -0.279 | -0.028 | 0.256 | -0.011 |
| All Children covariates | -0.226 | 0.165 | 0.153 | 0.397 |

Figure 1: Stylized Example of Racial Differences in Intergenerational Elasticities
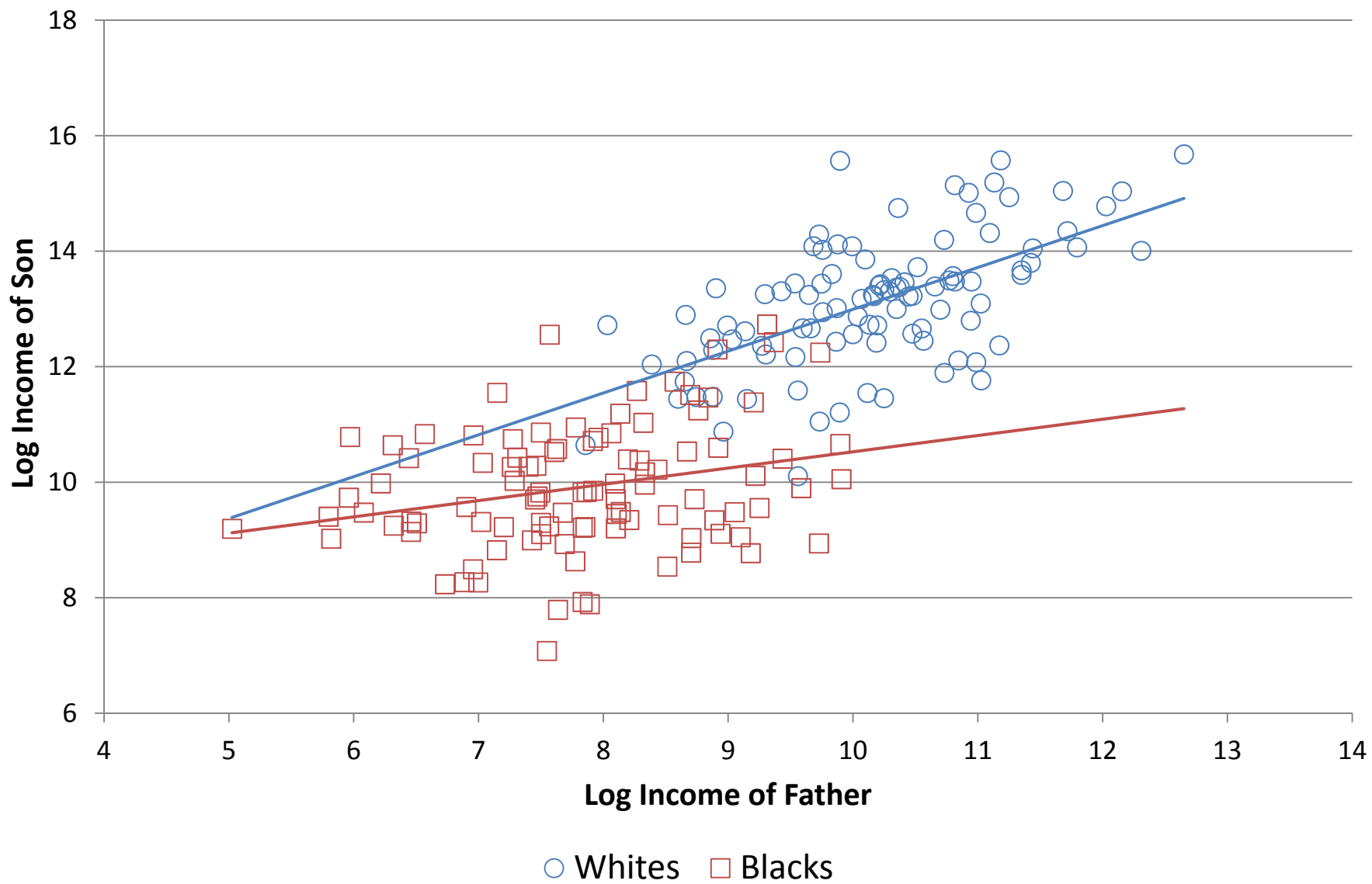
Figure 2: Upward Transition Probabilities by Race Using Cumulative Samples (tau=0)
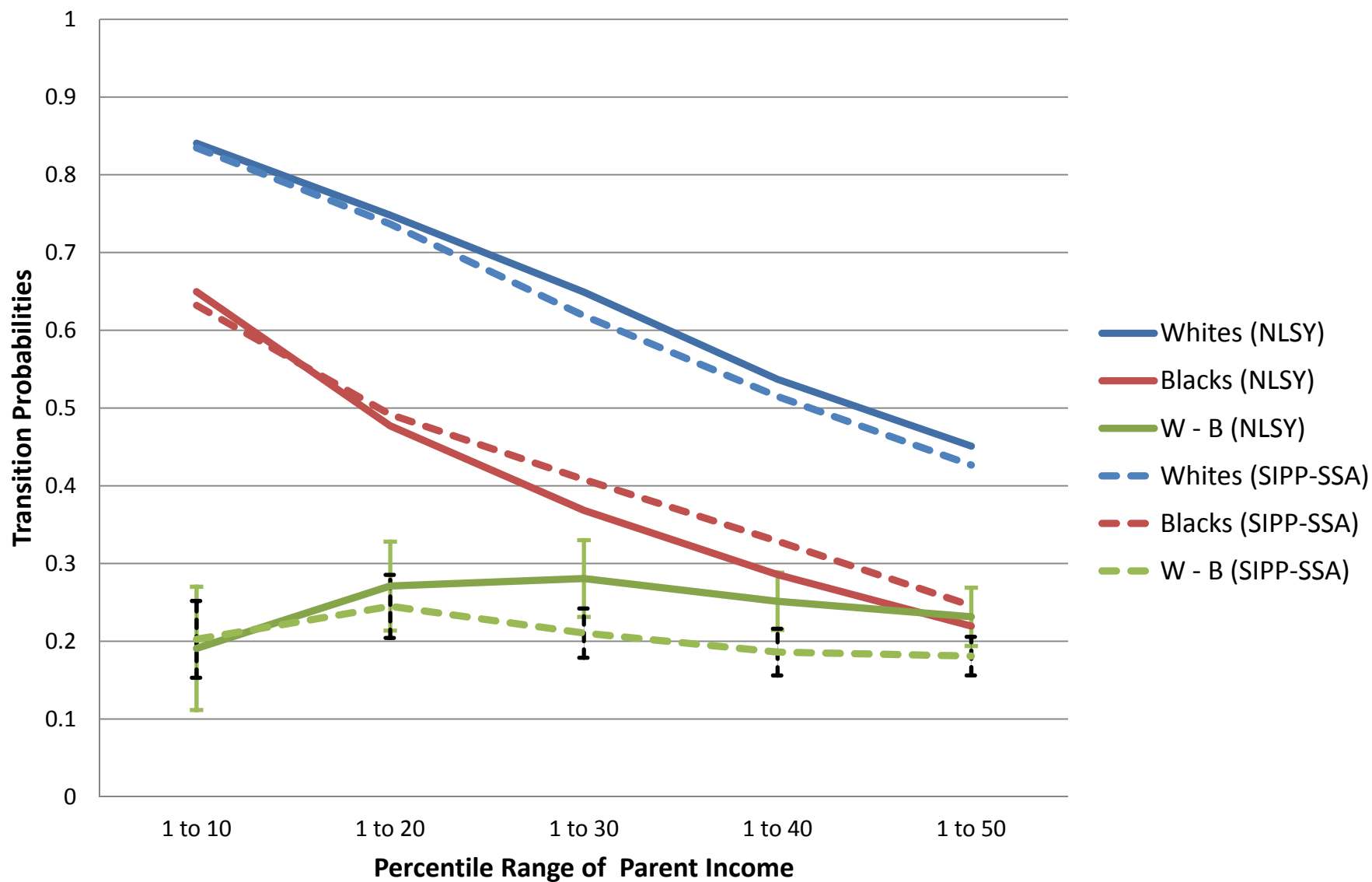
Figure 3: Downward Transition Probabilities by Race Using Cumulative Samples (tau=0)
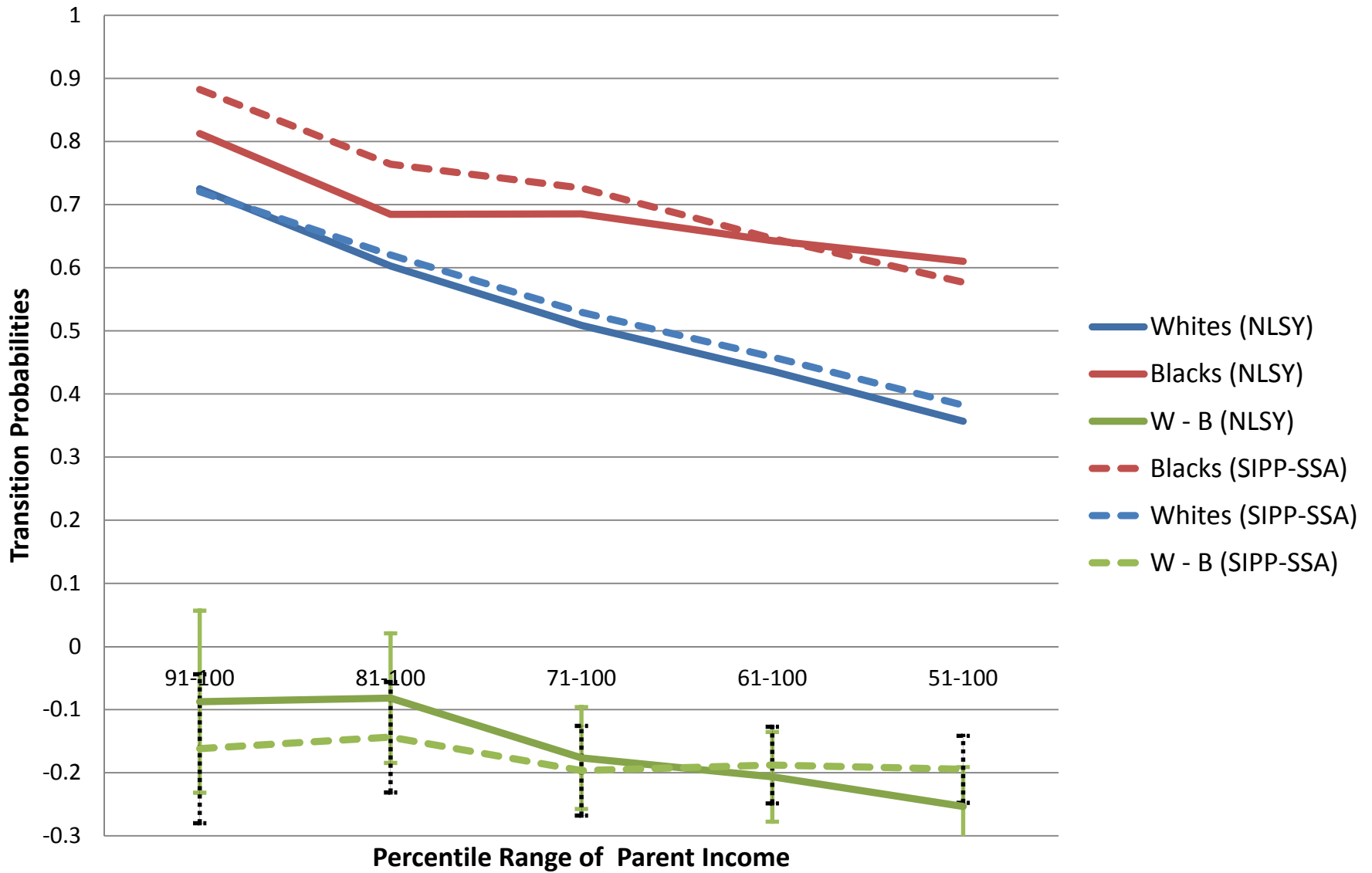
Figure 4: Upward Rank Mobility by Race
Using Cumulative Samples (tau=0)
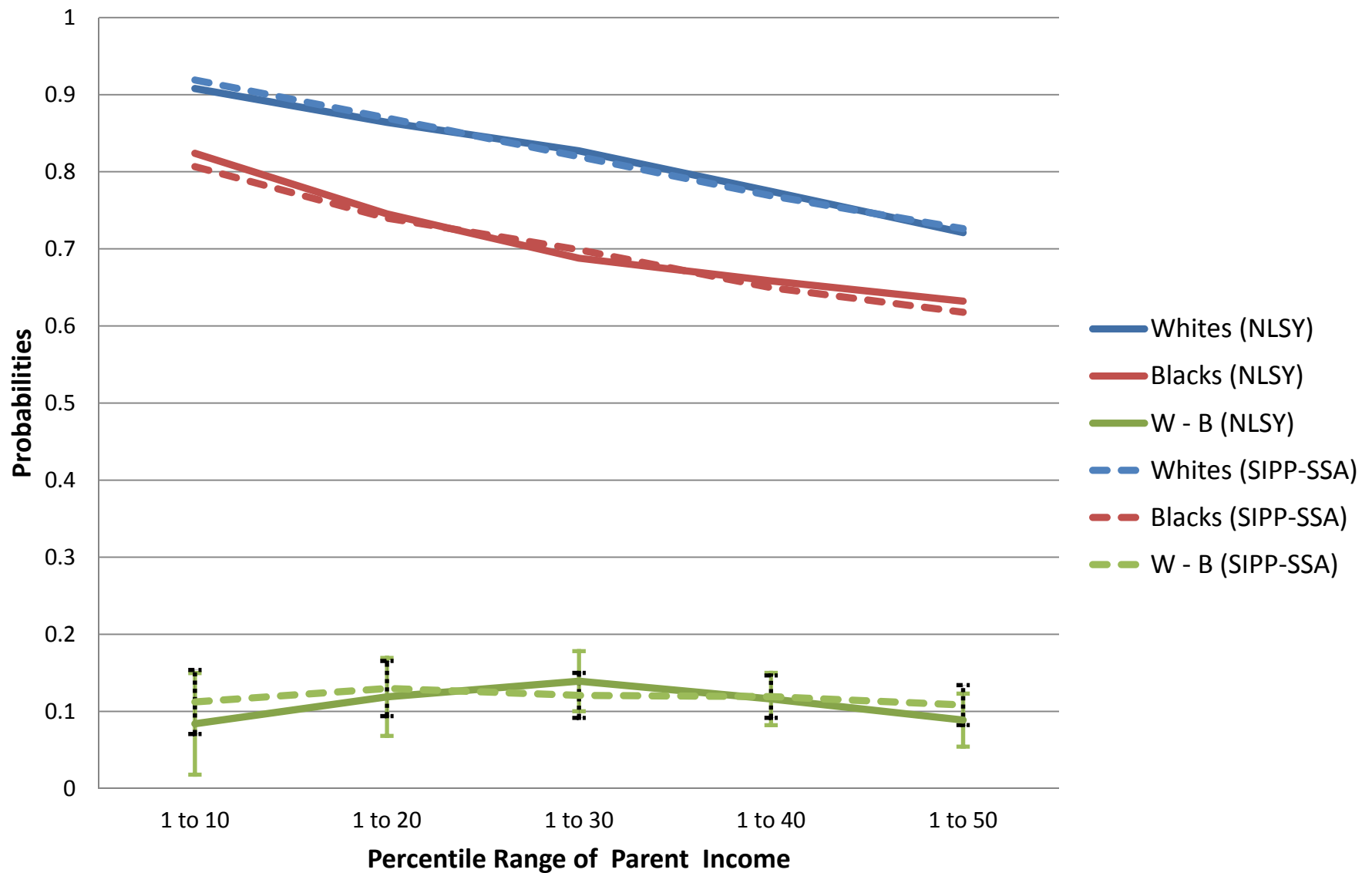
Figure 5: Upward Rank Mobility by Race Using Cumulative Samples (tau=0.2)
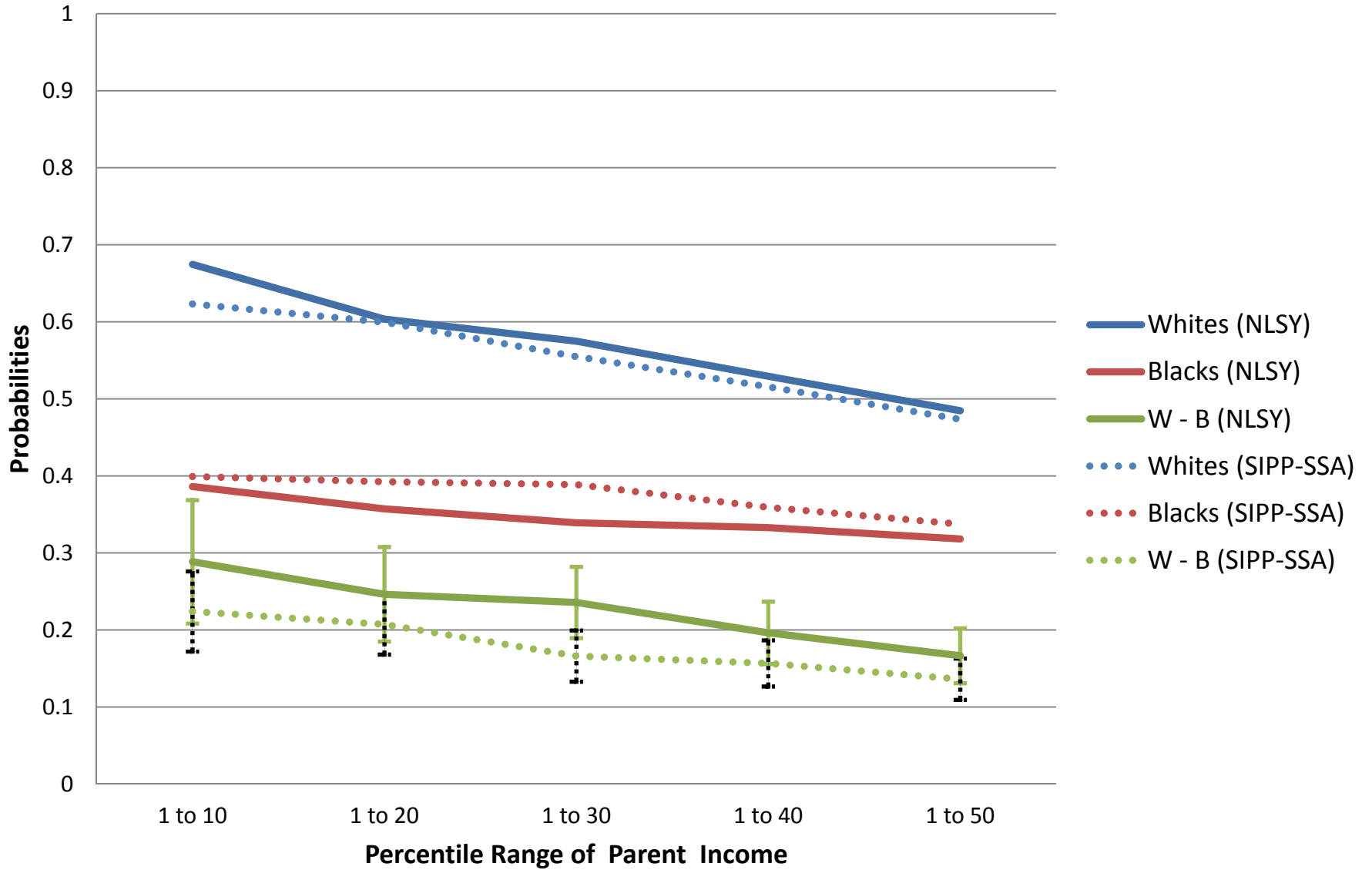
Figure 6 : Downward Rank Mobility by Race
Using Cumulative Samples (tau=0)
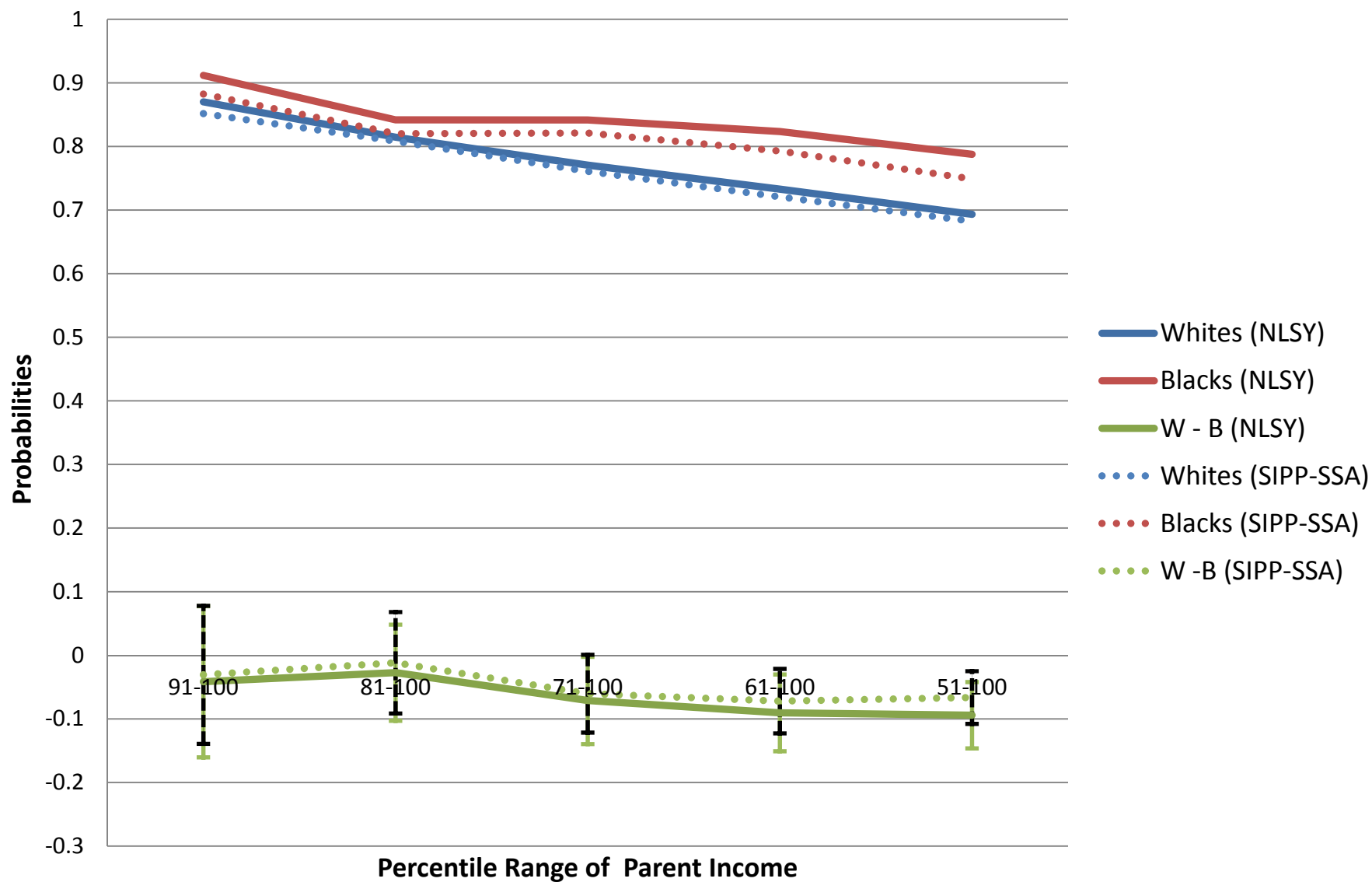
Figure 7: Downward Rank Mobility by Race
Using Cumulative Samples (tau=0.2)
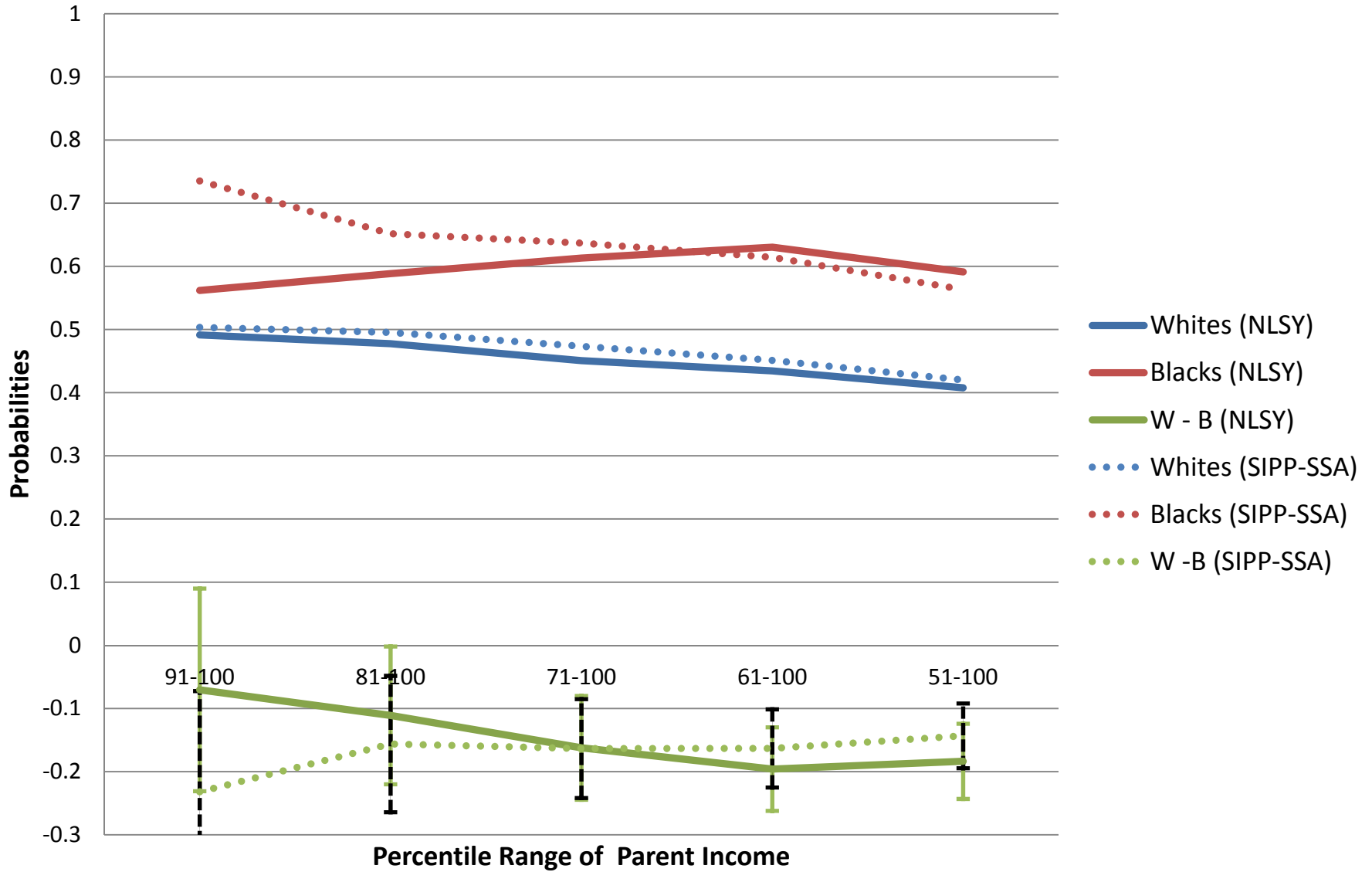
**Figure 8: Upward Mobility Estimates by Race Using Intervalled Samples (tau=0)**

# Figure 9: Upward and Downward Transition Probability Estimates Conditional on Covariates (NLSY)



**A: Upward Transition Probability Out of Bottom Quintile Conditional on Own Education**
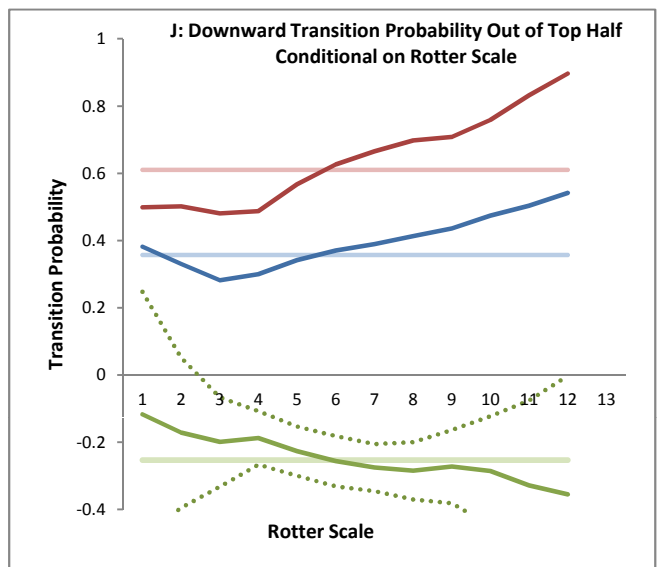
**B: Downward Transition Probability Out of Top Half Conditional on Own Education**

**C: Upward Transition Probability Out of Bottom Quintile Conditional on Father's Education**

**D: Downward Transition Probability Out of Top Half Conditional on Father's Education**

**E: Upward Transition Probability Out of Bottom Quintile Conditional on AFQT**

**F: Downward Transition Probability Out of Top Half Conditional on AFQT**

Legend:
Whites — Blacks — W-B
Whites, Unconditional — Blacks, Unconditional — W-B, Unconditional

**Figure 9: Upward and Downward Transition Probability Estimates Conditional on Covariates (NLSY)**



G: Upward Transition Probability Out of Bottom Quintile Conditional on Self Esteem

H: Downward Transition Probability Out of Top Half Conditional on Self Esteem

I: Upward Transition Probability Out of Bottom Quintile Conditional on Rotter Scale

J: Downward Transition Probability Out of Top Half Conditional on Rotter Scale

K: Upward Transition Probability Out of Bottom Quintile Conditional on Single Mother Status

L: Downward Transition Probability Out of Top Half Conditional on Single Mother Status

Legend:
Whites
Blacks
W-B
Whites, Unconditional
Blacks, Unconditional
W-B, Unconditional

Figure 10: Upward Transition Probabliity Out of Bottom Quintile Conditional on Childhood Family Structure, SIPP sample
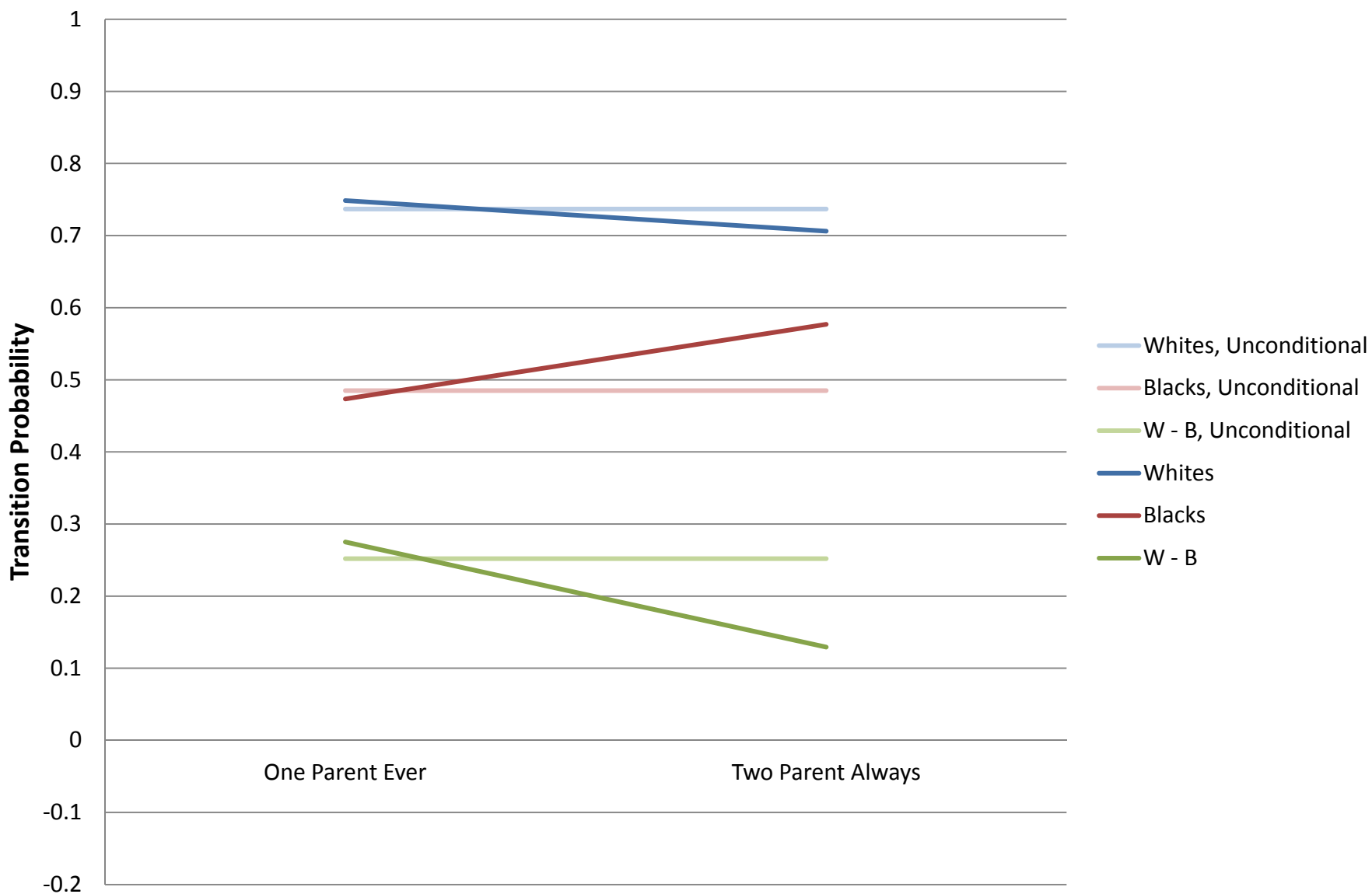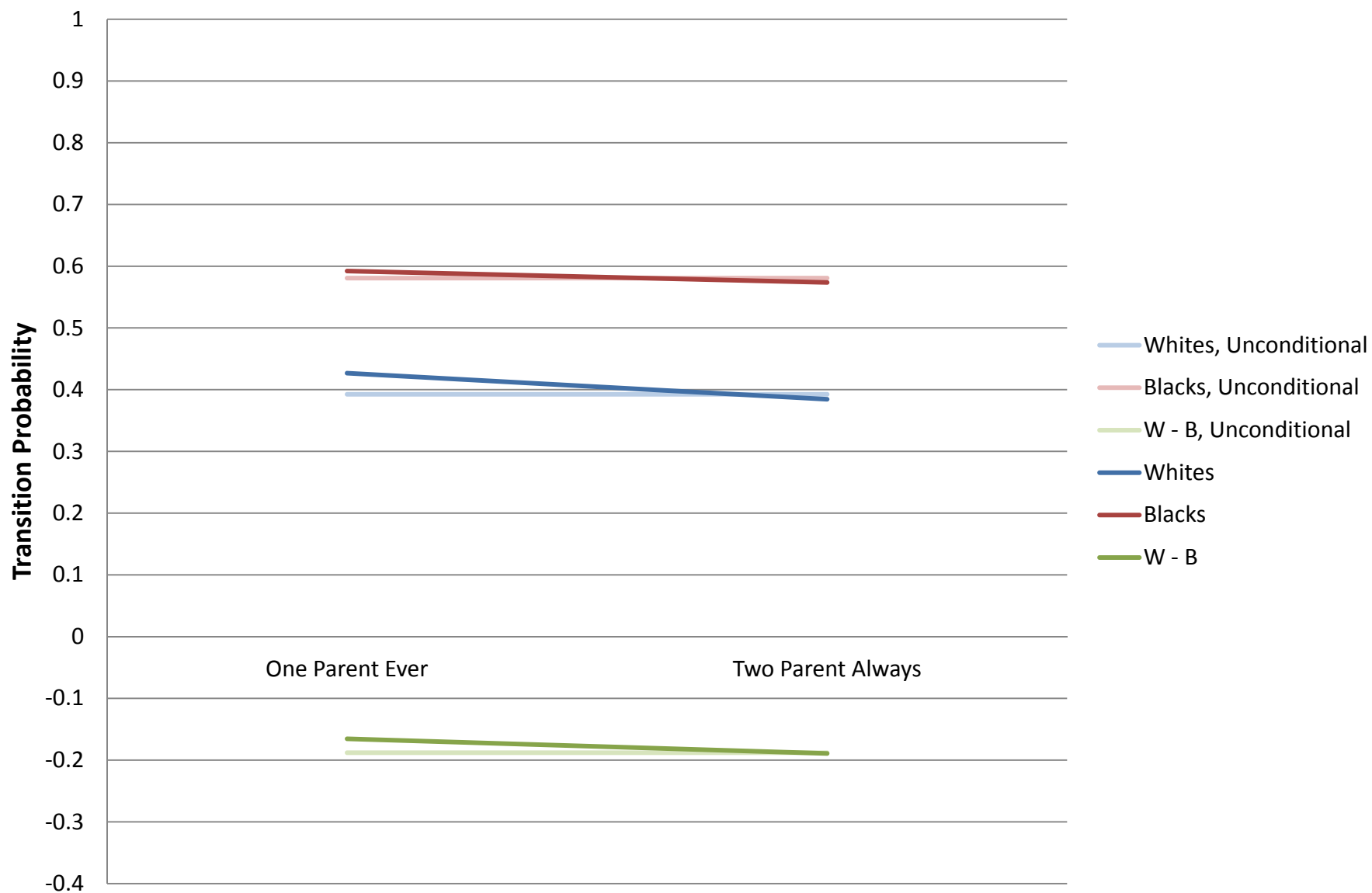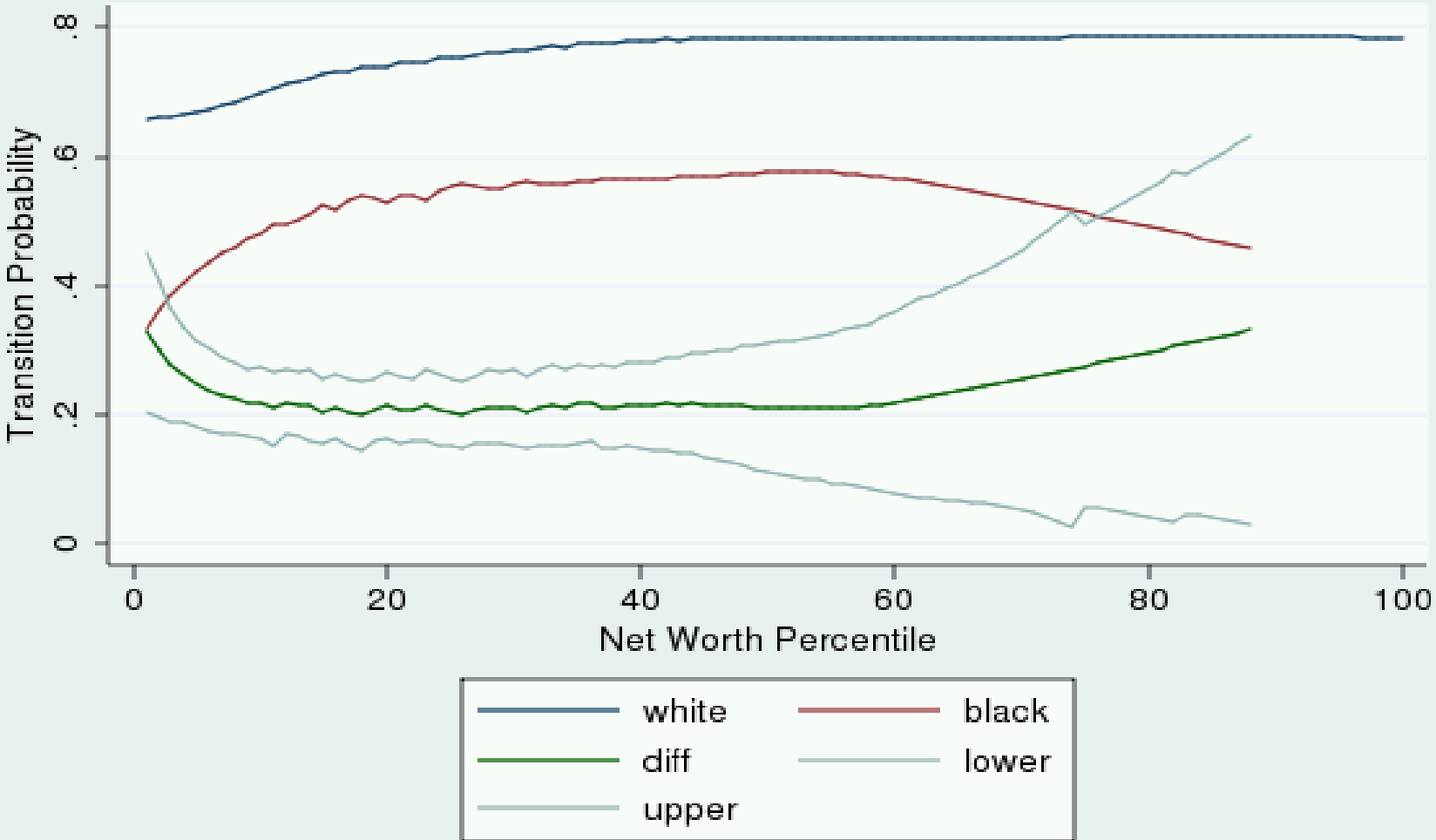
Figure 11: Downward Transition Probabliity Out of Top Half Conditional on Childhood Family Structure, SIPP sample

Upward Transition Probabiliy Out of Bottom Quintile
Conditional on Net Worth

Downward Transition Probability Out of Top Half
Conditional on Net Worth