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

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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. Despite the enormous literature on black-white inequality and its historical trends, few studies have analyzed black-white differences in intergenerational mobility. Understanding the rate of convergence in economic status for blacks and whites over generations is of particular significance given the historical legacy of slavery and the fact that state sanctioned racial segregation existed even as recently as two generations ago. A question of obvious interest is whether or not blacks and whites in more recent generations enjoy the same opportunities for economic success despite differences in family background. 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 handful of studies in the literature have sought to examine black-white differences in intergenerational mobility.[1] This is primarily for two reasons. First, 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

[1] Notable exceptions are Hertz (2005), Hertz (2008) and Isaacs, Sawhill and Haskins (2008) who all use the PSID. 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.

the overall distribution.[2] Second, most intergenerational samples of black families are relatively small making it hard to make meaningful inferences about group differences.[3]

This study uses two alternative sets of measures that can be used to capture group differences in mobility with respect to the full distribution. The first is the transition probability of moving across specific quantile intervals of the income distribution over generations. Transition probabilities have been relatively underutilized in most recent work by economists studying intergenerational mobility. The second set of measures is designed to measure mobility by simply comparing the relative positions of parents and children in the income distribution of each respective generation. I refer to these measures as “directional rank mobility”. For example, a simple measure of upward mobility is an indicator for whether the child’s rank in the distribution is higher than the parents’ rank in the prior generation. Simple statistics that calculate the percent of individuals who experience upward or downward mobility for each racial group can then be easily calculated. For both the transition probabilities and the directional rank mobility measures, I build upon recent work by Bhattacharya and Mazumder (2007) who develop the distribution theory for the use of these estimators with continuous covariates.

New race-specific estimates of upward and downward intergenerational mobility are created using two data sources that contain large enough intergenerational samples of blacks with sufficient power to detect statistically significant differences. Specifically I use the National Longitudinal Survey of Youth (NLSY79) and several panels of the Survey of Income and Program Participation (SIPP) matched to administrative earnings data from the Social Security Administration, hereafter, “SIPP-SSA”. The NLSY contains a rich set of covariates of the

[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] 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).

children (test scores, non-cognitive measures) while the SIPP-SSA data includes many useful covariates of the parents (e.g. health, wealth, education). The two data sources in conjunction yield a new set of descriptive facts concerning intergenerational mobility differences and potential mechanisms that lead to these differences.

The key findings of the study are that blacks in recent decades are both substantially less upwardly mobile and substantially more downwardly mobile than whites. Should these patterns of mobility persist, the implications on the steady state distribution of income for blacks would be troubling. Instead of "regression to the mean", these results would instead imply that blacks would largely remain a permanent underclass. This study also attempts to make a first pass attempt to understand which factors are associated with the racial gaps in upward and downward mobility using a descriptive analysis. It appears that cognitive skills during adolescence as measured by military test scores are strongly associated with these gaps. The racial gaps in both upward and downward mobility are relatively small for those with median test scores. Rather than reflecting innate differences, a growing literature suggests that black-white differences in tests scores can be strongly affected by environmental influences.

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 likely inhibit the prospects for upward mobility of black children. In contrast I do not find that non-cognitive skills or family structure appear to play a significant role in explaining these intergenerational mobility gaps.

The rest of the paper proceeds as follows: section 2 presents the measures of mobility, section 3 describes the data, section 4 presents the main results without covariates, section 5 analyzes the effect 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 τ, conditional on the parent's income percentile (Y_0) being at or below s in the parent's income distribution[4]:

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

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.[5] 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 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.

[4] Bhattacharya and Mazumder (2007) 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.
[5] If one were to set up a traditional 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 τ is useful to parallel variations on the UP estimator that are introduced later.

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, this is not of much practical value. Bhattacharya and Mazumder (2007) show how the transition probability can be viewed as conditional on particular values of *x*, where *x* is a covariate of interest. They then show how one can estimate the marginal effect of changing *x* using nonparametric regression techniques and demonstrate that bootstrapping is a valid approach.[6] 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

Following Bhattacharya and Mazumder (2007), 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.[7]

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

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 τ enable one to measure the *amount* of the gain in percentiles across generations. Results will be shown for a range of values for τ and also as s is progressively increased. Bhattacharya and Mazumder show that the URM measure can also be calculated conditional on continuous covariates and nonparametric regressions can be used to estimate the effects of changing a covariate on upward mobility.

[6] 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.
[7] Bhattacharya and Mazumder (2007) refer to this measure as "UP".

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.[8]

The two measures may also produced biased measures of group differences depending on the properties of the group-specific distribution. For example, Bhattacharya and Mazumder (2007) show that since the white income distribution lies 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 to provide 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

[8] When making comparisons between population subgroups this is an unambiguous advantage to using the UP. However, Bhattacharya and Mazumder (2007) show that when using the full sample (i.e. pooling all subgroups), the UP 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.

mobility despite having several attractive features.[9] 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 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

[9] Exceptions include Bratsberg et al, 2006 and Aaronson and Mazumder, 2008. Some previous studies such as Zimmerman, 1992 have used an earlier NLS cohort of young men and women

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. There is also information on health status ("SF-12") and measures of height and weight. In addition to these variables, 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).[10] 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). Mazumder (2005) shows that the match rate between the 1984 SIPP and the SER data is extremely high and that selection does not appear to be a serious concern.[11] The SER data covers annual earnings over the period from 1951 to 2007, while the DER data is only available since 1978.

There are two aspects to using SER records that raise potential issues. The first is that some individuals who are working are not covered by the social security system and their earnings will be recorded as zero. Second, earnings in the SER data are censored at the maximum level of earnings subject to the social security tax. While in principle the DER data is not subject to either of these problems an examination of the data shows that the DER data actually shows higher rates of non-coverage than the SER data.[12] Since the non-coverage patterns

[10] 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.ces.census.gov/)

[11] Mazumder (2005) focused on children who were between the ages of 15 and 20, the vast majority of whom had social security numbers. The match rates for the current sample are somewhat lower because of the younger age range used. Similar but slightly lower (?) match rates are found between the SIPP and the DER.

[12] As far as I am aware this fact has not been previously documented. I took the full sample of men in the 1984 SIPP and compared their 1984 SER and DER records. The fraction of those with zero earnings in the DER but positive earnings in the SER was higher than the fraction of those with zero earnings in the SER but positive earnings in the DER.

are different in the two datasets I take the maximum of earnings in a year between the SER and DER to minimize the bias due to non-coverage. The SER data is first imputed based on CPS data from each year starting in 1978.[13]

In order to satisfy Census Bureau disclosure requirements and to maximize the sample size, I use quite liberal sample requirements. 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.[14] 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. Years of zero earnings are included in the average, however, 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.[15]

Parent earnings are averaged over all years between 1978 and 1986 to construct a measure of permanent earnings. For those who lived with their fathers at the time of the SIPP, the parent earnings are recorded as the fathers' earnings. The earnings of the mother are used for those children who were not living with their fathers. 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 marital histories.

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[13] This is done in the following manner. First the March CPS data is itself adjusted for topcoding based on the cell means by race and sex reported in Tables 3 and 7 of Larrimore et al (2008) who used the internal version of the CPS files. After making this adjustment, then mean values of CPS earnings of those above the SER topcode are calculated and are used to impute the SER data by cells based on race and education level (less than 16 years, 16 years, greater than 16 years) for individuals between the ages of 30 and 55.

[14] 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. The age restriction avoids using individuals who continued to live with their parents throughout adulthood. The results are not sensitive to restricting the age cutoff to 18. There is no lower bound on the age when living at home.

[15] As I discuss later the results are not sensitive to requiring sons to be at least 28 years old.

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 SIPP-SSA uses only sons and uses earnings for both generations. Unfortunately the SIPP-SSA only provides administrative earnings data for the individual and not for the spouse. Since there is no ideal way of dealing with selection of which women participate in the labor force, I only use men in the SIPP sample.[16] The restriction to sons is made because it is not possible to address labor supply as the outcome of interest. The NLSY79 covers individuals born between 1957 and 1964 while the SIPP sample covers those born over a 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 period in the SIPP. Finally, 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 is restricted to just whites and blacks. Table 1 provides some summary statistics for the two samples.

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 at all clear whether a similar bias would arise with respect to the measures utilized here and I do not consider the possible implications of age bias. In the NLSY, the mean age of the kids in 2001 (the middle year of the sample) is 39 which is ideal according to Haider and Solon (2006). In the SIPP-SSA sample, the mean age of the sons in 2005 (the middle year of the sample) is 33.

[16] I have also experimented with using women's earnings in the SIPP-SSA sample and comparing it to results using women's earnings with the NLSY and found that the results are very different while the comparable results for men are extremely similar.

4. Unconditional Estimates of Intergenerational Mobility

Upward Transition Probabilities (UTP)

I begin by presenting race-specific estimates of upward transition probabilities in Table 2.[17] 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 10th percentile, 84 percent exceed the 10th percentile as adults. Moving across the first row demonstrates the effect of raising τ, the percentile cutoff in the child's generation. For example, only about 40 percent of whites starting in the bottom decile exceed the 40th percentile. Moving down the columns shows the effect of raising the cutoff percentile in the parent generation. For example, among whites starting below the 40th percentile in the parent generation less than 60 percent exceed the 40th 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. This black-white gap in the probability of rising out of the bottom quintile is even higher at 27 percent.[18] Owing to the large samples in the NLSY, all of the estimated gaps in Table are highly statistically significant. Figure 1 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 1 which plots estimates from both datasets. The general pattern of large and statistically significant differences in point estimates is

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

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.

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. 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 less than 40 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. 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 20th 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 20th 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 baseline upward rank mobility estimator shows a much smaller black-white gap of about 10 percentiles.

Interestingly, using this measure, the estimates are now nearly identical across the two datasets as is apparent in figure 3. 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 τ. For example, if τ 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 4 plots the full set of estimates for the case where τ equals 0.2

Downward Rank Mobility (DRM)

In Table 5 and Figure 5 I present estimates of downward rank mobility. Using the simple measure (τ 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 τ. 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 τ =0.2 show somewhat different patterns across the income distribution depending on the dataset used as is shown in Figure 6. 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 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 7 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 7 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.[19] 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

[To be completed]

[19] 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.

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 data that may be extraordinarily difficult to obtain. 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 at least potentially important.

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.[20] 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-

[20] These are produced by using the bootstrap method. Bhattacharya and Mazumder (2007) show that the bootstrap method is a valid method of inference for these measures.

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.

Figures 8 through 14 show the results for upward mobility when using own education, father's education, AFQT scores, self esteem, the Rotter scale, having a single mother at age 14 and wealth as covariates. Figure 8 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.

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 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 Figure 10. 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, 2009) 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 Figures 11 and 12. 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 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 Figure 13, I use a simple dichotomous measure of family structure, namely whether the 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, this suggests that family structure does not play much of a role in accounting for the black-white gap in upward mobility. One caveat is that the NLSY has limited information on family structure over time.[21]

A 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, data on assets and liabilities are collected in the SIPP. Figure 14 shows how the upward transition probability out of the bottom quintile varies over distribution 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

[21] In future drafts I hope to use the SIPP-SSA data to investigate the role of family structure as it contains much more detailed data on the marital histories of the parents.

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. Figures 14 through 19 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 Figure 15. 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 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. Figure 16 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 (Figure 17) 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 figures 18 and 19, 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. Figure 20 shows that there is little difference in the prospects for downward mobility among blacks by family structure but that whites from single mother headed families are far more likely to be downwardly mobile. Finally, Figure 21 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 regression framework to estimate the mean black-white mobility gaps conditional on the covariates.[22] The results are shown in Table 7. 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

[22] 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.

include each covariate or include several simultaneously. The inclusion of the three parent generation 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 7 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. Discussion and Concluding Thoughts

[To Be Completed]

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

Percent of children exceeding their parents percentile range by the amount, τ

Parent percentile range	τ=0 Whites	τ=0 Blacks	τ=0 W-B	τ=0.1 Whites	τ=0.1 Blacks	τ=0.1 W-B	τ=0.2 Whites	τ=0.2 Blacks	τ=0.2 W-B	τ=0.3 Whites	τ=0.3 Blacks	τ=0.3 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	τ=0 Whites	τ=0 Blacks	τ=0 W-B	τ=0.1 Whites	τ=0.1 Blacks	τ=0.1 W-B	τ=0.2 Whites	τ=0.2 Blacks	τ=0.2 W-B	τ=0.3 Whites	τ=0.3 Blacks	τ=0.3 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

Percent of children at or below the bottom of their parents percentile range by the amount, τ

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												
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

Percent of children exceeding their parents *exact* percentile by the amount, τ

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
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	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
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	Percent of children below their parents *exact* percentile by the amount, τ											
	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	0.870	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	τ=0 Whites	τ=0 Blacks	τ=0 W-B	τ=0.1 Whites	τ=0.1 Blacks	τ=0.1 W-B	τ=0.2 Whites	τ=0.2 Blacks	τ=0.2 W-B	τ=0.3 Whites	τ=0.3 Blacks	τ=0.3 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

Percent of children exceeding their parents percentile range by the amount, τ

Parent percentile range	τ=0 Whites	τ=0 Blacks	τ=0 W-B	τ=0.1 Whites	τ=0.1 Blacks	τ=0.1 W-B
1 to 10	0.841	0.650	0.191	0.754	0.449	0.304
[N_w=197, N_b=676]	(0.031)	(0.020)	(0.040)	(0.035)	(0.021)	(0.042)
11 to 20	0.744	0.519	0.226	0.603	0.371	0.233
[N_w=468, N_b=1127]	(0.031)	(0.027)	(0.044)	(0.032)	(0.026)	(0.044)
21 to 30	0.711	0.458	0.253	0.602	0.353	0.249
[N_w=754, N_b=1449]	(0.029)	(0.031)	(0.043)	(0.031)	(0.032)	(0.043)
31 to 40	0.584	0.376	0.209	0.499	0.307	0.191
[N_w=1081, N_b=1640]	(0.028)	(0.038)	(0.047)	(0.029)	(0.034)	(0.044)
41 to 50	0.524	0.275	0.249	0.425	0.194	0.232
[N_w=1425, N_b=1767]	(0.027)	(0.044)	(0.053)	(0.027)	(0.036)	(0.046)

Parent percentile range	τ=0.2 Whites	τ=0.2 Blacks	τ=0.2 W-B	τ=0.3 Whites	τ=0.3 Blacks	τ=0.3 W-B
1 to 10	0.605	0.322	0.283	0.423	0.237	0.186
[N_w=197, N_b=676]	(0.039)	(0.021)	(0.043)	(0.039)	(0.019)	(0.019)
11 to 20	0.465	0.268	0.197	0.346	0.197	0.149
[N_w=468, N_b=1127]	(0.036)	(0.026)	(0.047)	(0.034)	(0.023)	(0.023)
21 to 30	0.469	0.250	0.220	0.359	0.159	0.200
[N_w=754, N_b=1449]	(0.032)	(0.029)	(0.041)	(0.030)	(0.022)	(0.022)
31 to 40	0.374	0.238	0.135	0.279	0.169	0.110
[N_w=1081, N_b=1640]	(0.029)	(0.032)	(0.043)	(0.027)	(0.030)	(0.030)
41 to 50	0.279	0.130	0.149	0.194	0.072	0.123
[N_w=1425, N_b=1767]	(0.025)	(0.034)	(0.044)	(0.022)	(0.026)	(0.026)

Panel B: Upward Rank Mobility

Parent percentile range	τ=0 Whites	τ=0 Blacks	τ=0 W-B	τ=0.1 Whites	τ=0.1 Blacks	τ=0.1 W-B
1 to 10	0.908	0.824	0.084	0.801	0.540	0.262
[N_w=197, N_b=676]	(0.026)	(0.019)	(0.033)	(0.032)	(0.023)	(0.040)
11 to 20	0.834	0.628	0.206	0.646	0.446	0.200
[N_w=468, N_b=1127]	(0.026)	(0.027)	(0.040)	(0.033)	(0.024)	(0.041)
21 to 30	0.776	0.496	0.281	0.664	0.408	0.255
[N_w=754, N_b=1449]	(0.026)	(0.030)	(0.040)	(0.032)	(0.032)	(0.048)
31 to 40	0.672	0.440	0.233	0.532	0.332	0.199
[N_w=1081, N_b=1640]	(0.025)	(0.039)	(0.048)	(0.027)	(0.037)	(0.047)
41 to 50	0.570	0.314	0.256	0.469	0.232	0.237
[N_w=1425, N_b=1767]	(0.026)	(0.044)	(0.052)	(0.029)	(0.043)	(0.052)

Parent percentile range	τ=0.2 Whites	τ=0.2 Blacks	τ=0.2 W-B	τ=0.3 Whites	τ=0.3 Blacks	τ=0.3 W-B
1 to 10	0.675	0.386	0.288	0.490	0.274	0.216
[N_w=197, N_b=676]	(0.033)	(0.021)	(0.040)	(0.043)	(0.018)	(0.043)
11 to 20	0.555	0.314	0.241	0.427	0.232	0.195
[N_w=468, N_b=1127]	(0.035)	(0.026)	(0.043)	(0.036)	(0.023)	(0.043)
21 to 30	0.536	0.279	0.257	0.411	0.190	0.221
[N_w=754, N_b=1449]	(0.030)	(0.029)	(0.041)	(0.033)	(0.025)	(0.042)
31 to 40	0.440	0.286	0.154	0.320	0.207	0.112
[N_w=1081, N_b=1640]	(0.027)	(0.033)	(0.043)	(0.027)	(0.033)	(0.041)
41 to 50	0.360	0.140	0.220	0.250	0.106	0.144
[N_w=1425, N_b=1767]	(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: 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

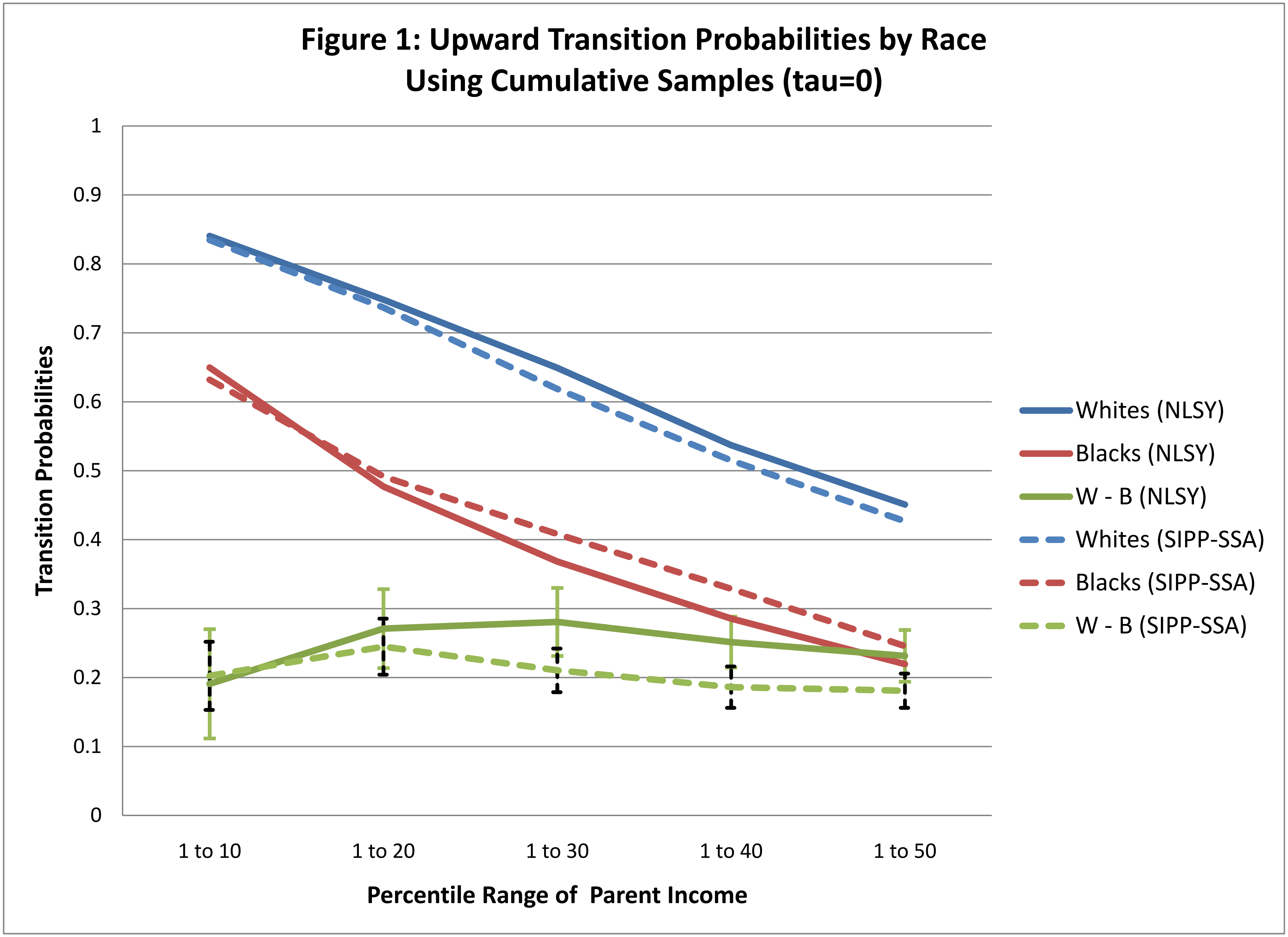


Figure 1: Upward Transition Probabilities by Race
Using Cumulative Samples (tau=0)
Transition Probabilities
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1 to 10
1 to 20
1 to 30
1 to 40
1 to 50
Percentile Range of Parent Income
Whites (NLSY)
Blacks (NLSY)
W - B (NLSY)
Whites (SIPP-SSA)
Blacks (SIPP-SSA)
W - B (SIPP-SSA)

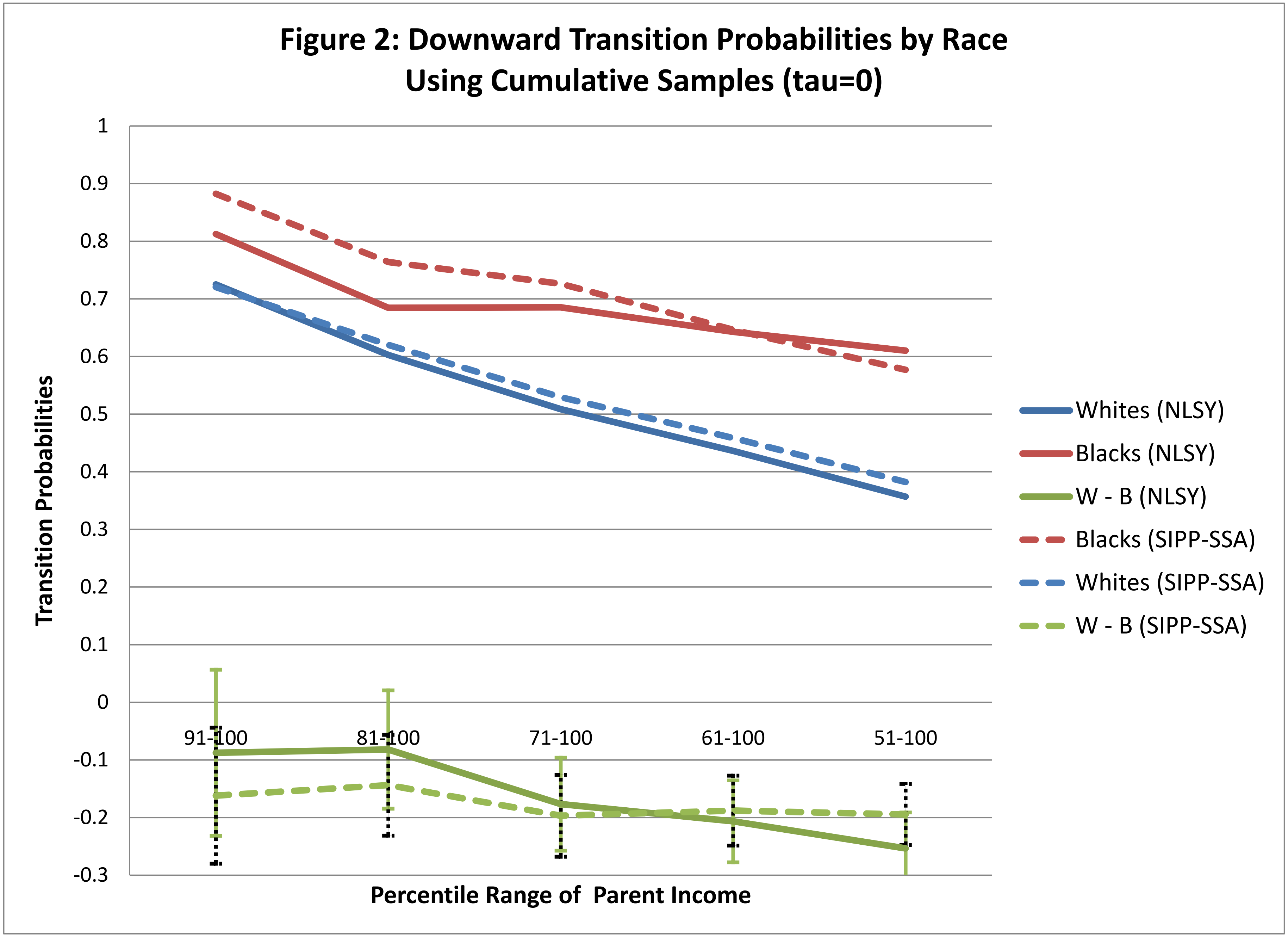


Figure 2: Downward Transition Probabilities by Race
Using Cumulative Samples (tau=0)
Transition Probabilities
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
91-100
81-100
71-100
61-100
51-100
Percentile Range of Parent Income
Whites (NLSY)
Blacks (NLSY)
W - B (NLSY)
Blacks (SIPP-SSA)
Whites (SIPP-SSA)
W - B (SIPP-SSA)

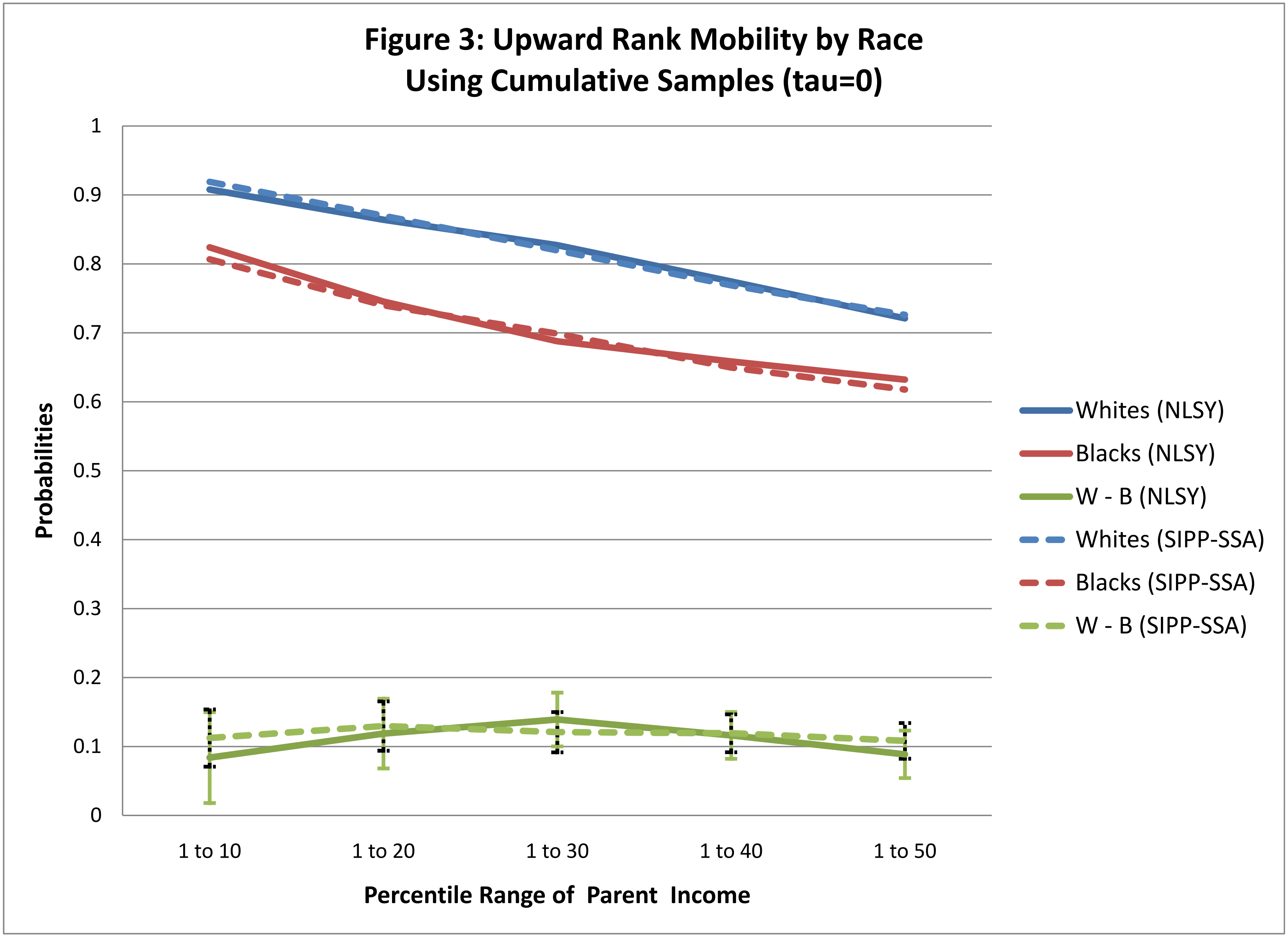


Figure 3: Upward Rank Mobility by Race
Using Cumulative Samples (tau=0)
Probabilities
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1 to 10
1 to 20
1 to 30
1 to 40
1 to 50
Percentile Range of Parent Income
Whites (NLSY)
Blacks (NLSY)
W - B (NLSY)
Whites (SIPP-SSA)
Blacks (SIPP-SSA)
W - B (SIPP-SSA)

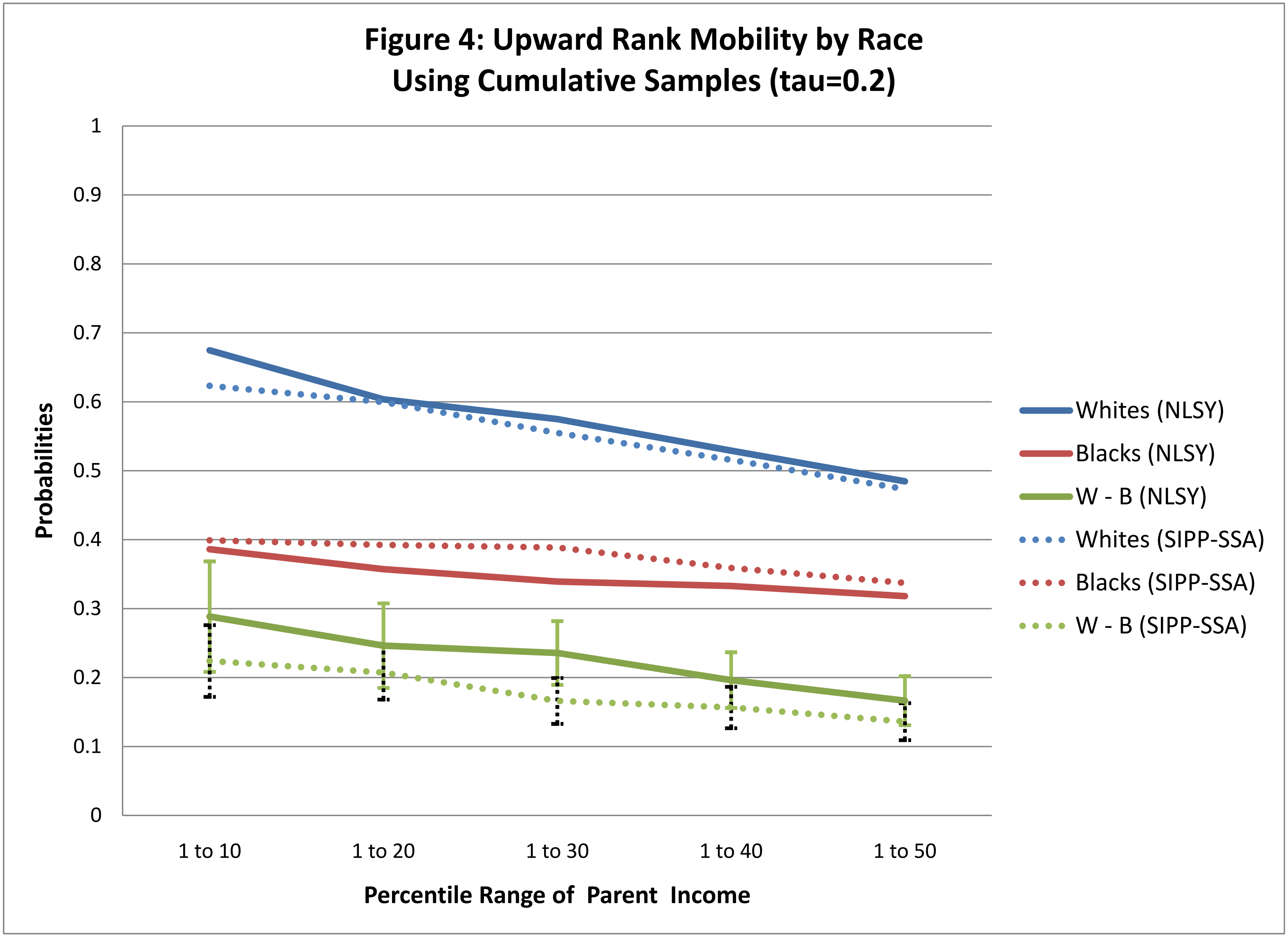


Figure 4: Upward Rank Mobility by Race
Using Cumulative Samples (tau=0.2)
Probabilities
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1 to 10
1 to 20
1 to 30
1 to 40
1 to 50
Percentile Range of Parent Income
Whites (NLSY)
Blacks (NLSY)
W - B (NLSY)
Whites (SIPP-SSA)
Blacks (SIPP-SSA)
W - B (SIPP-SSA)

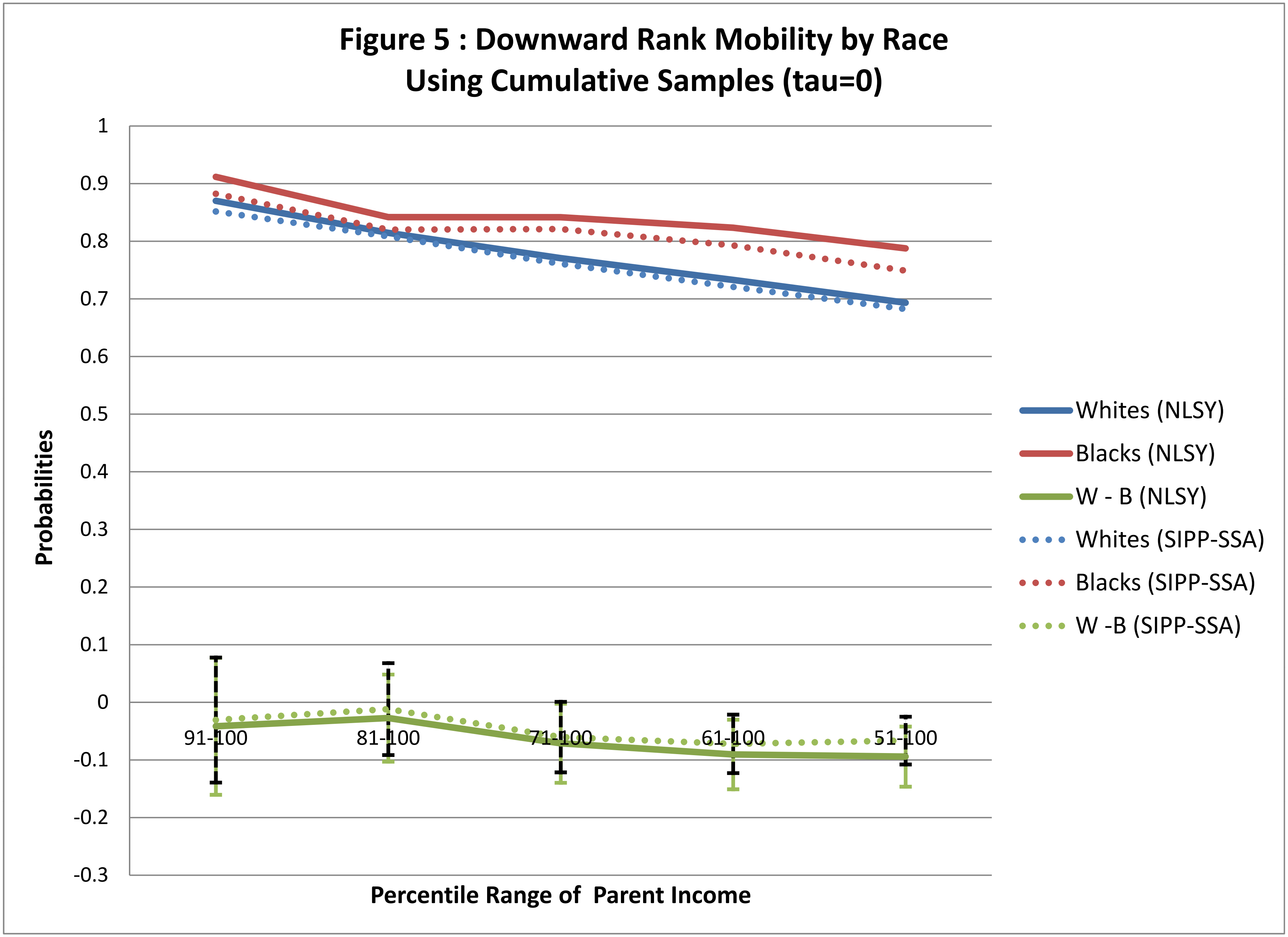


Figure 5 : Downward Rank Mobility by Race
Using Cumulative Samples (tau=0)
Probabilities
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
91-100
81-100
71-100
61-100
51-100
Percentile Range of Parent Income
Whites (NLSY)
Blacks (NLSY)
W - B (NLSY)
Whites (SIPP-SSA)
Blacks (SIPP-SSA)
W -B (SIPP-SSA)

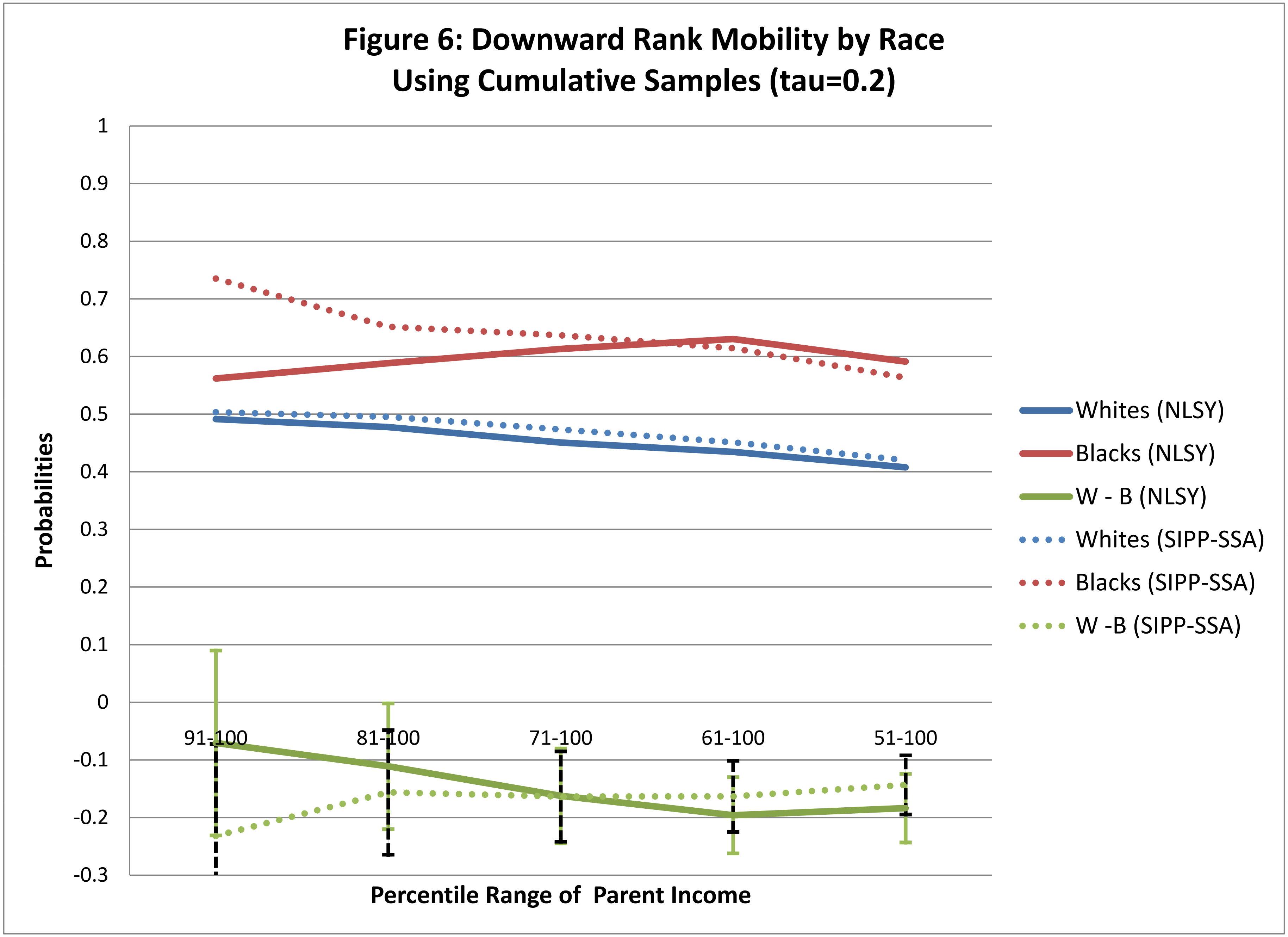


Figure 6: Downward Rank Mobility by Race
Using Cumulative Samples (tau=0.2)
Probabilities
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
91-100
81-100
71-100
61-100
51-100
Percentile Range of Parent Income
Whites (NLSY)
Blacks (NLSY)
W - B (NLSY)
Whites (SIPP-SSA)
Blacks (SIPP-SSA)
W -B (SIPP-SSA)

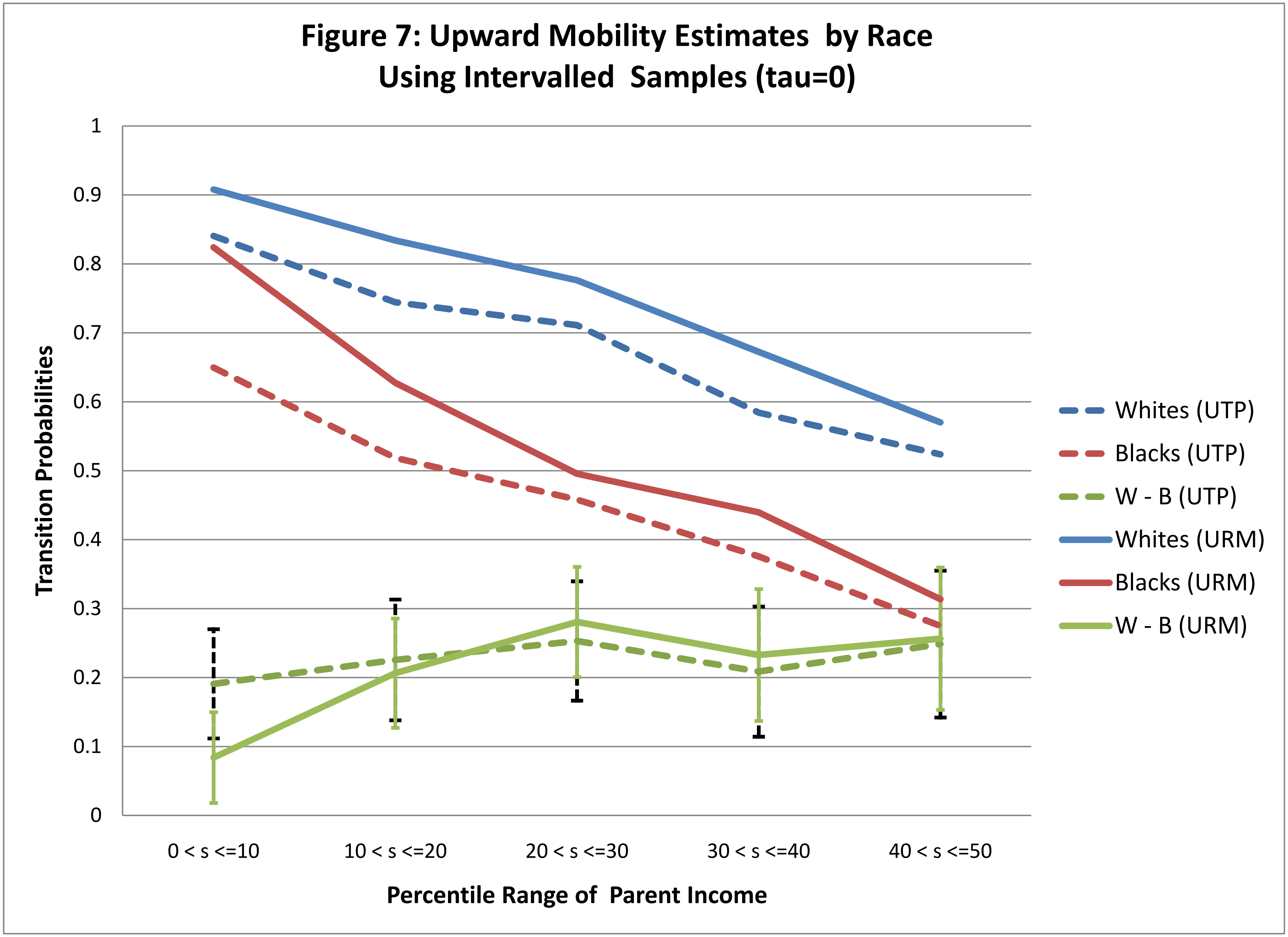


Figure 7: Upward Mobility Estimates by Race
Using Intervalled Samples (tau=0)
Transition Probabilities
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0 < s <=10
10 < s <=20
20 < s <=30
30 < s <=40
40 < s <=50
Percentile Range of Parent Income
Whites (UTP)
Blacks (UTP)
W - B (UTP)
Whites (URM)
Blacks (URM)
W - B (URM)

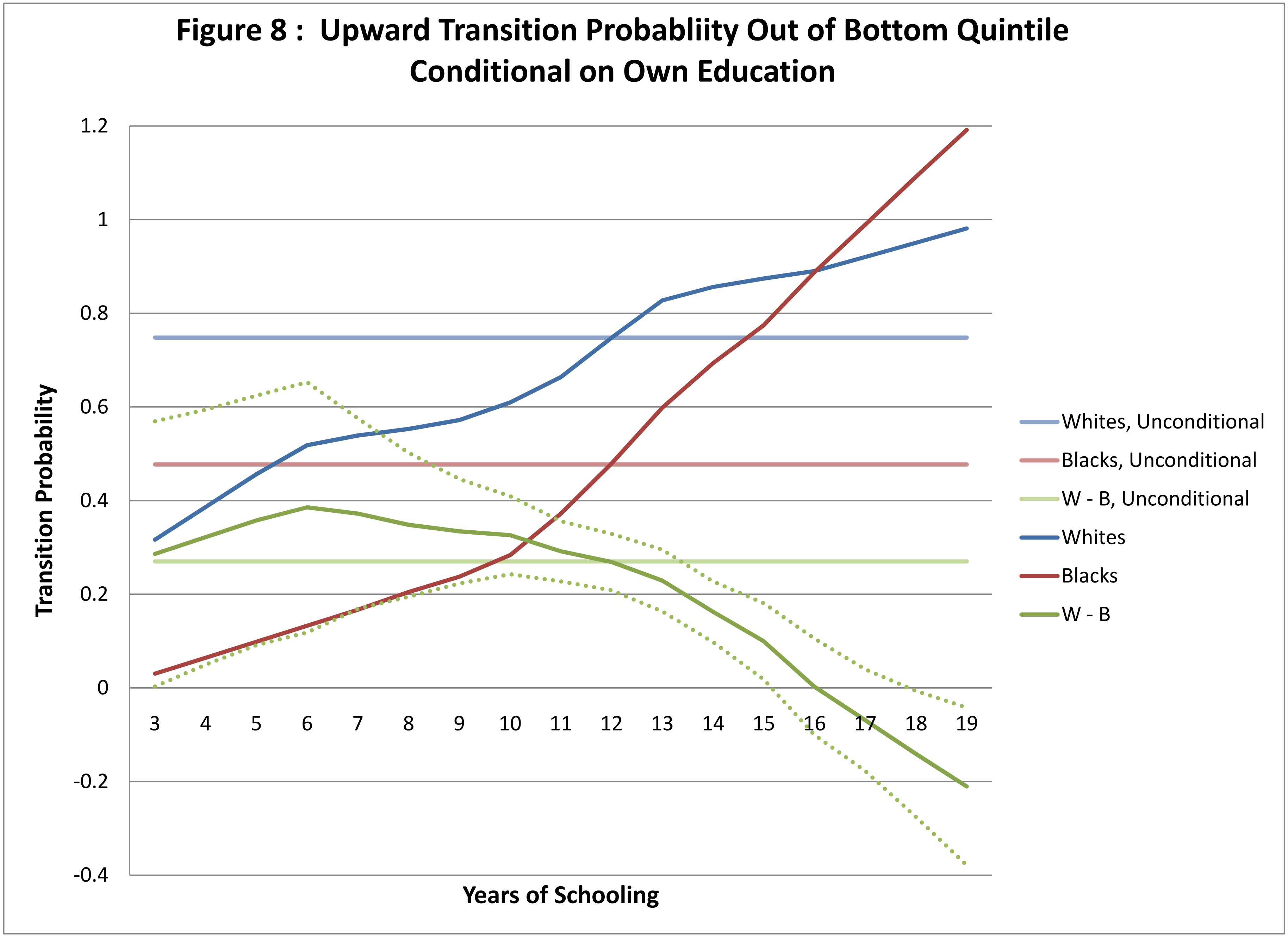


Figure 8 : Upward Transition Probabliity Out of Bottom Quintile
Conditional on Own Education
Transition Probability
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
Years of Schooling
Whites, Unconditional
Blacks, Unconditional
W - B, Unconditional
Whites
Blacks
W - B

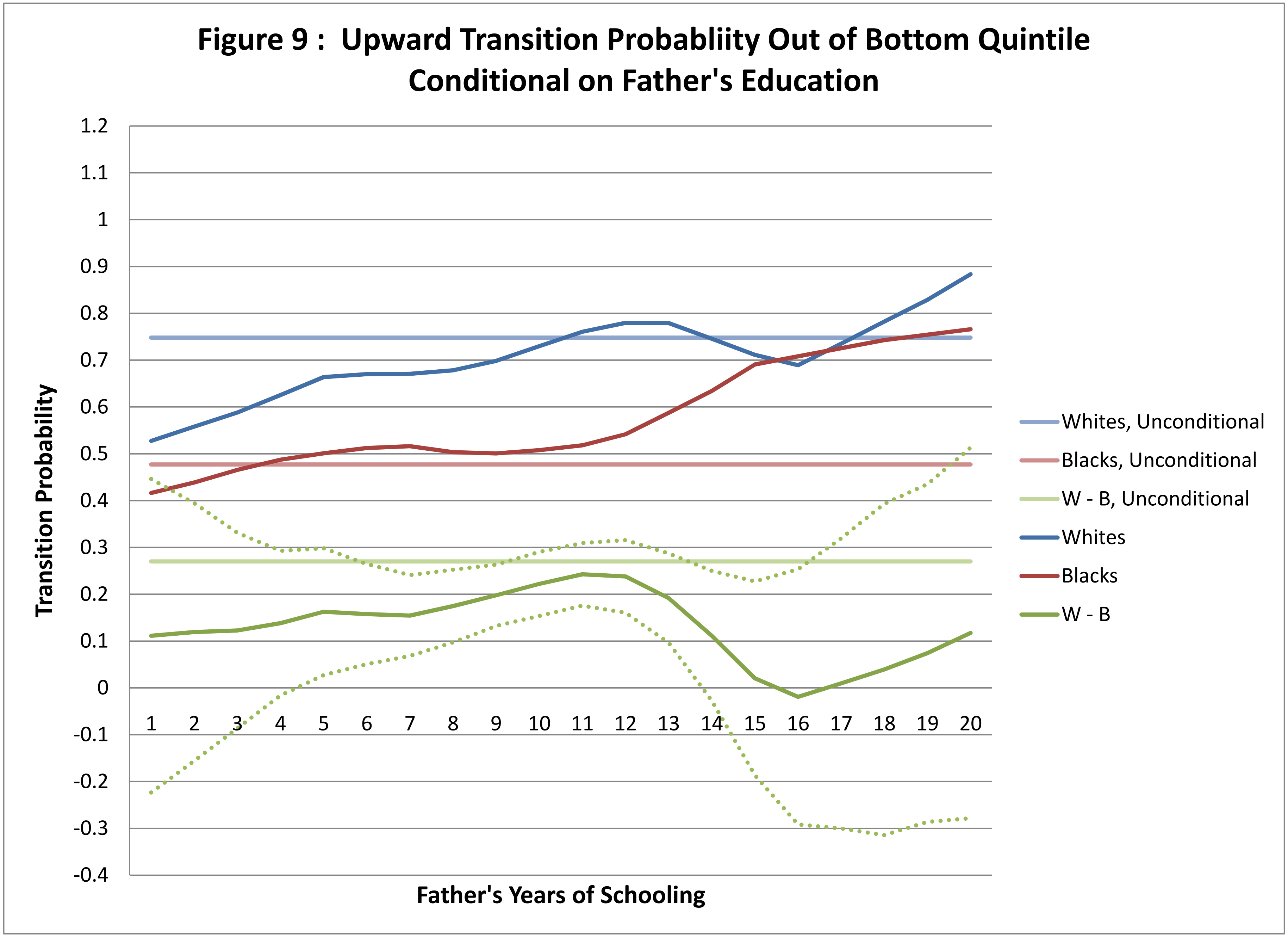


Figure 9 : Upward Transition Probabliity Out of Bottom Quintile
Conditional on Father's Education
Transition Probability
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Father's Years of Schooling
Whites, Unconditional
Blacks, Unconditional
W - B, Unconditional
Whites
Blacks
W - B

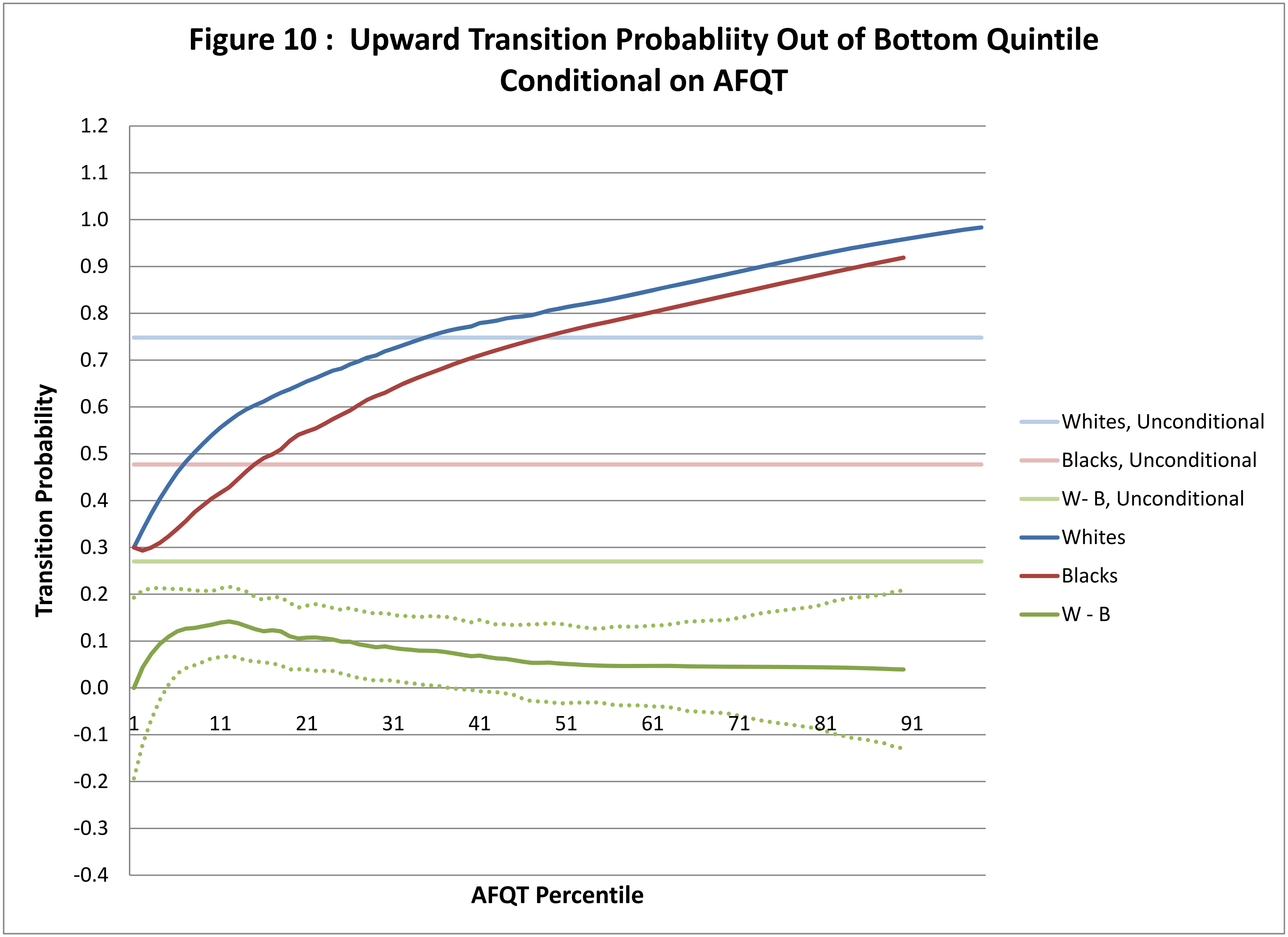


Figure 10 : Upward Transition Probabliity Out of Bottom Quintile Conditional on AFQT
Transition Probability
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
1
11
21
31
41
51
61
71
81
91
AFQT Percentile
Whites, Unconditional
Blacks, Unconditional
W- B, Unconditional
Whites
Blacks
W - B

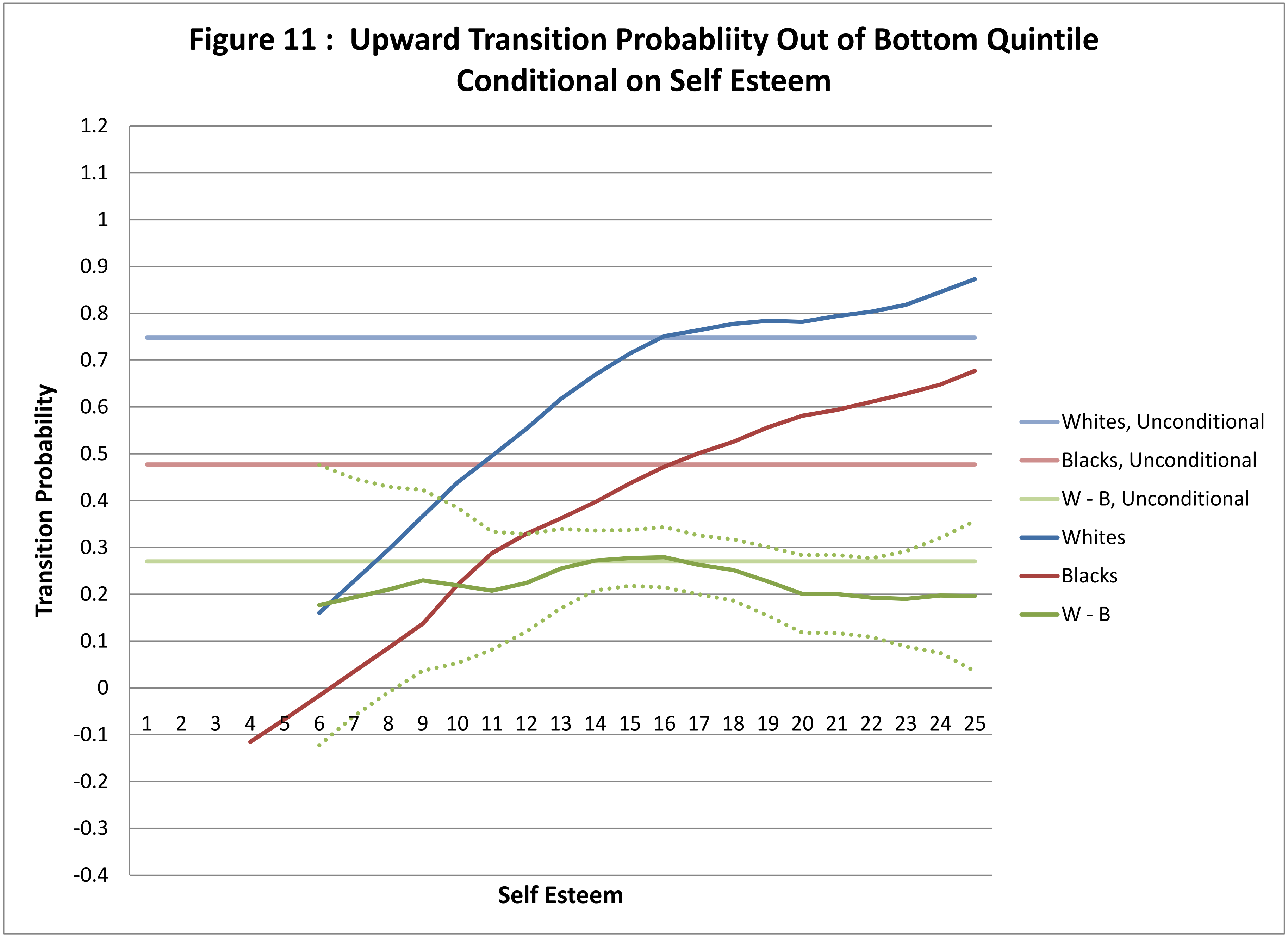
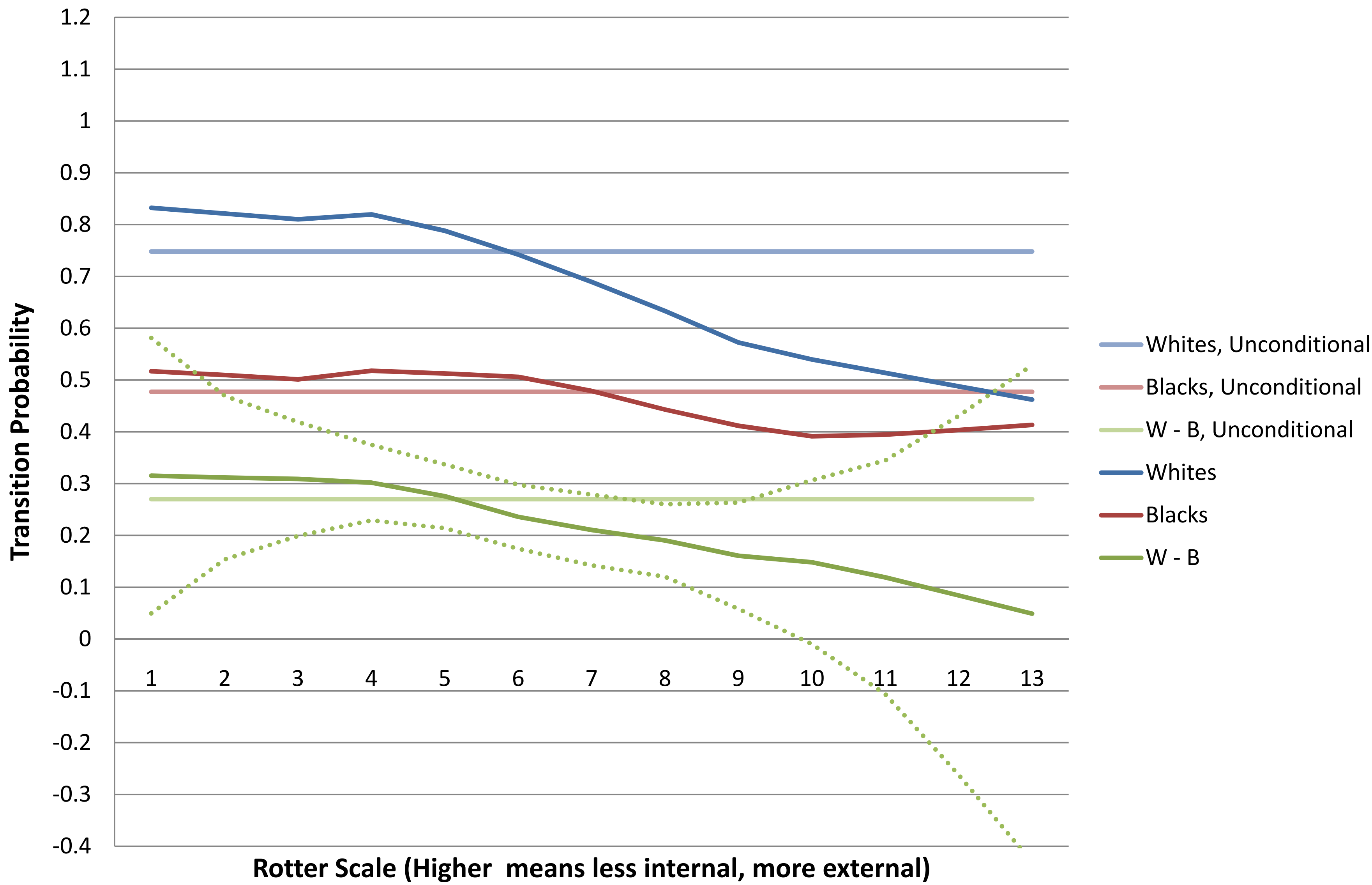


Figure 11 : Upward Transition Probabliity Out of Bottom Quintile Conditional on Self Esteem
Transition Probability
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Self Esteem
Whites, Unconditional
Blacks, Unconditional
W - B, Unconditional
Whites
Blacks
W - B

Figure 12 : Upward Transition Probabliity Out of Bottom Quintile Conditional on Rotter Scale



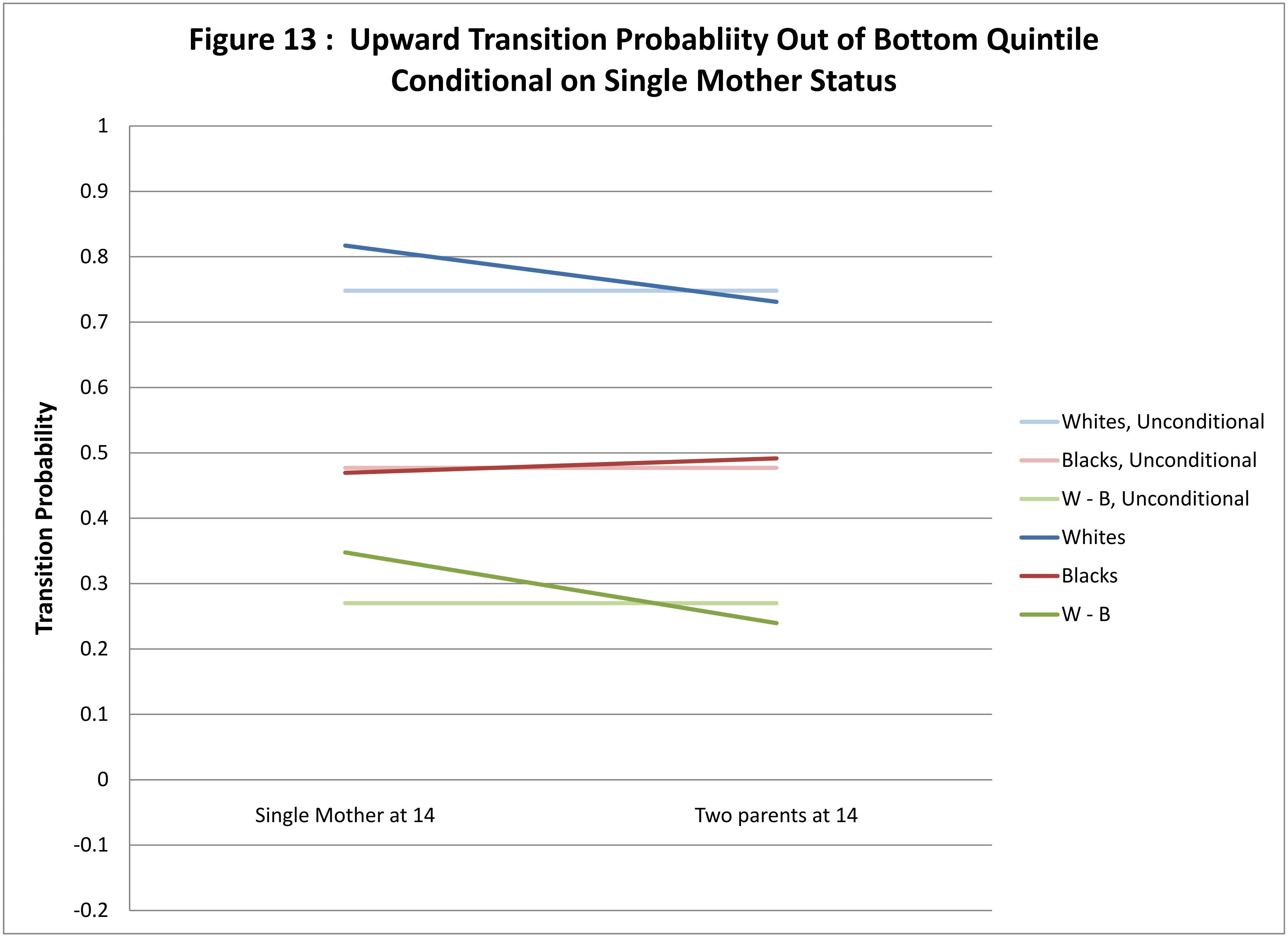
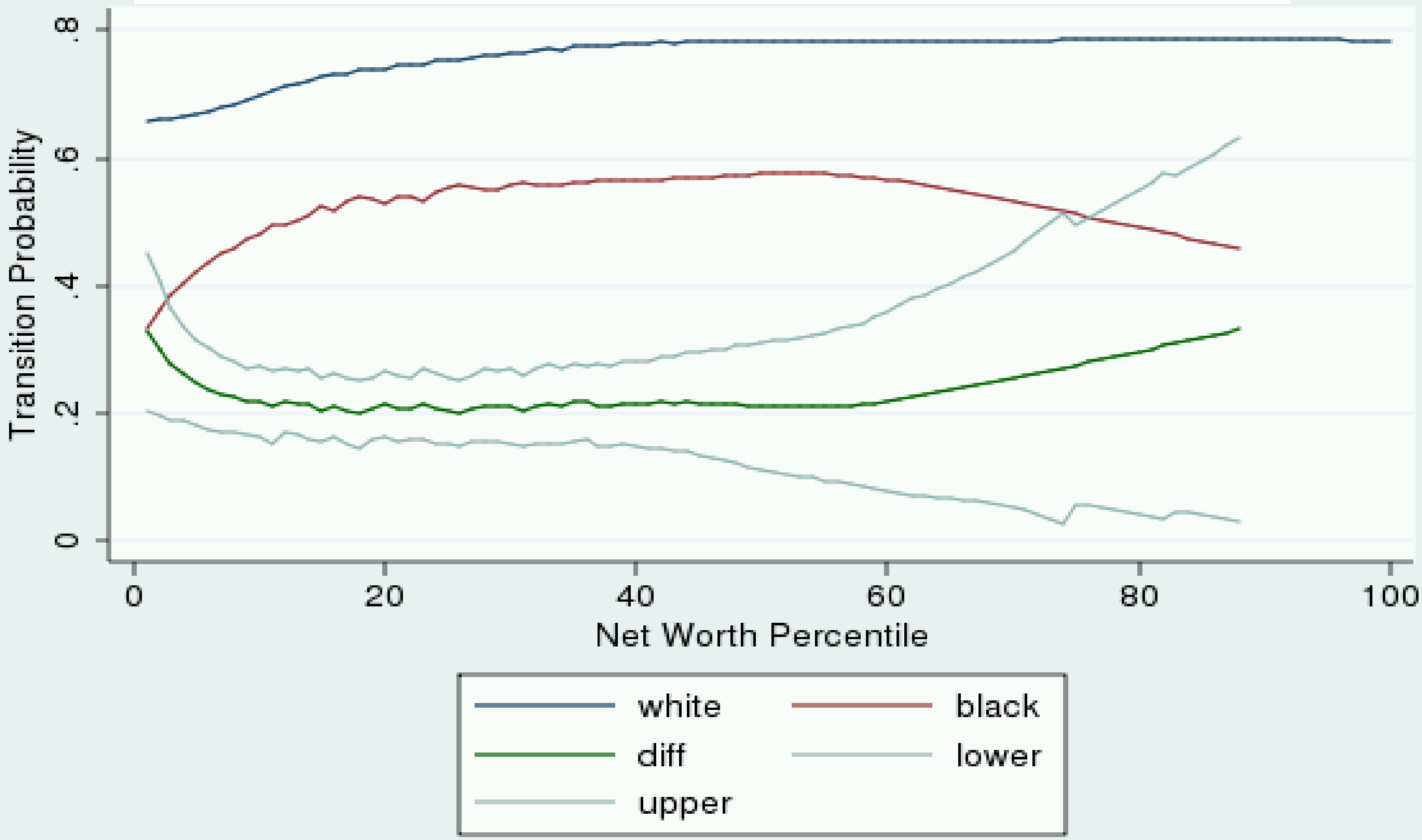


Figure 13 : Upward Transition Probabliity Out of Bottom Quintile
Conditional on Single Mother Status
Transition Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
Single Mother at 14
Two parents at 14
Whites, Unconditional
Blacks, Unconditional
W - B, Unconditional
Whites
Blacks
W - B

Figure 14: Upward Transition Probabliity Out of Bottom Quintile Conditional on Net Worth



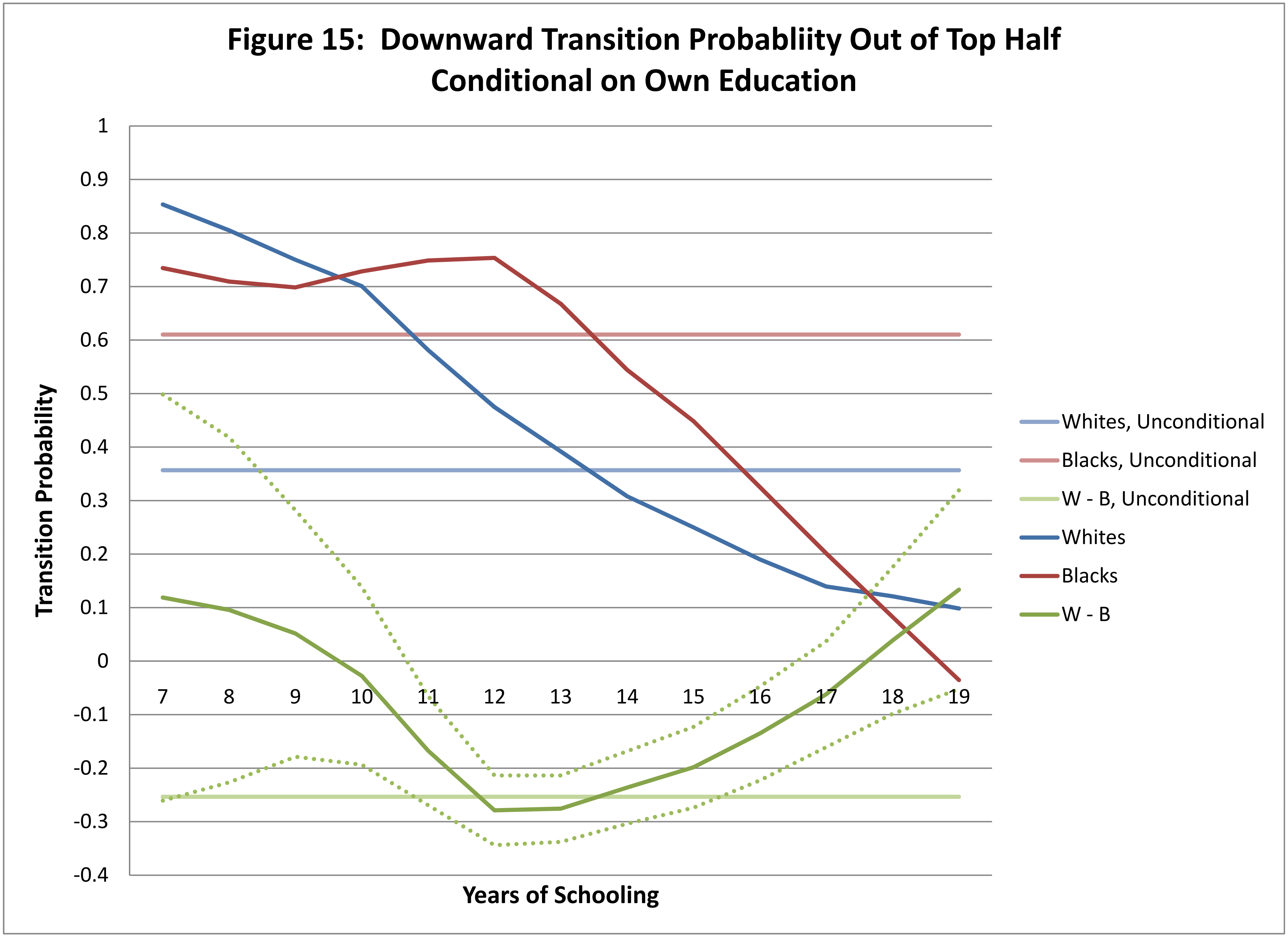


Figure 15: Downward Transition Probabliity Out of Top Half
Conditional on Own Education
Transition Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
7
8
9
10
11
12
13
14
15
16
17
18
19
Years of Schooling
Whites, Unconditional
Blacks, Unconditional
W - B, Unconditional
Whites
Blacks
W - B

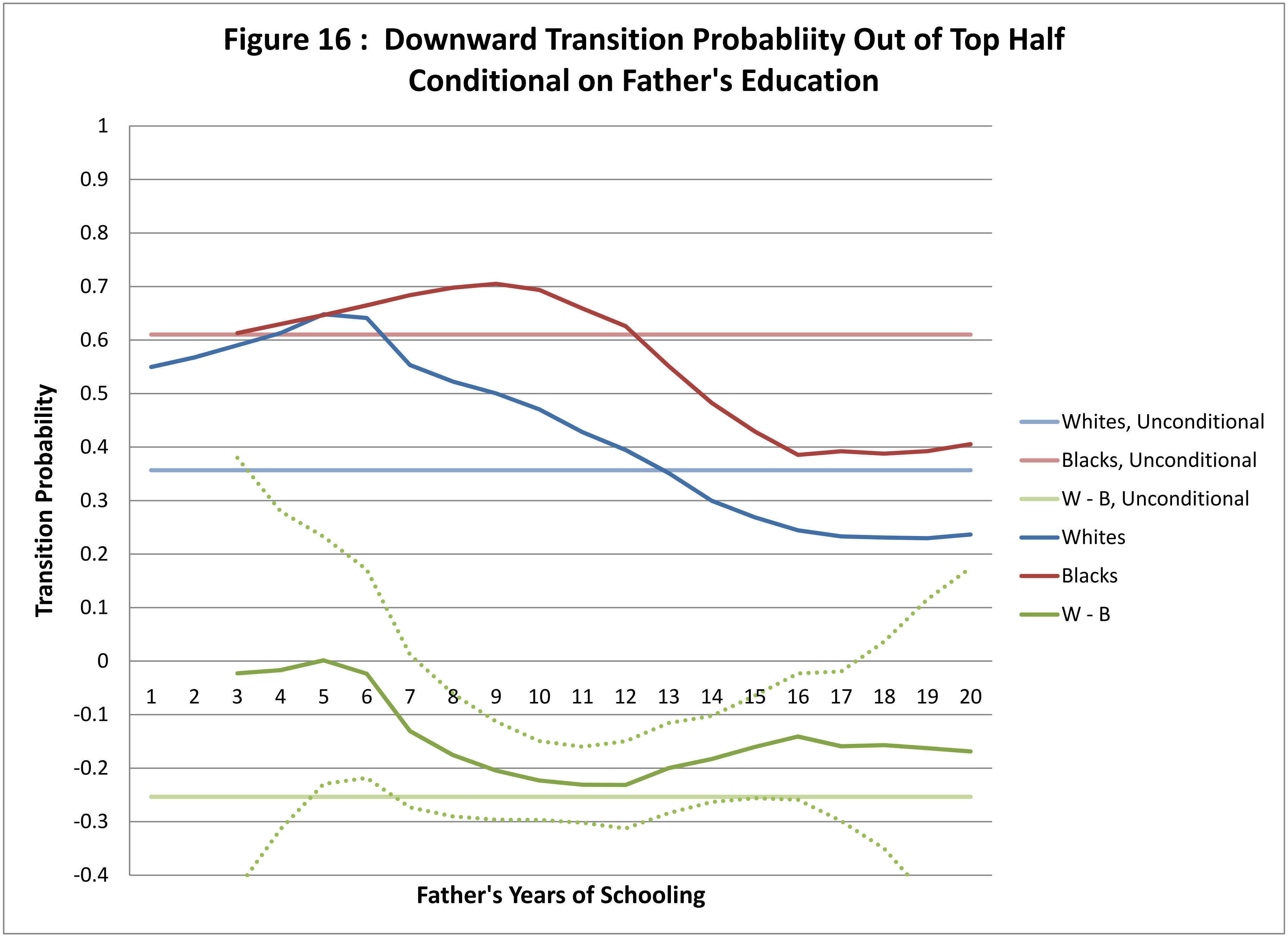


Figure 16 : Downward Transition Probabliity Out of Top Half Conditional on Father's Education
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Transition Probability
Father's Years of Schooling
Whites, Unconditional
Blacks, Unconditional
W - B, Unconditional
Whites
Blacks
W - B

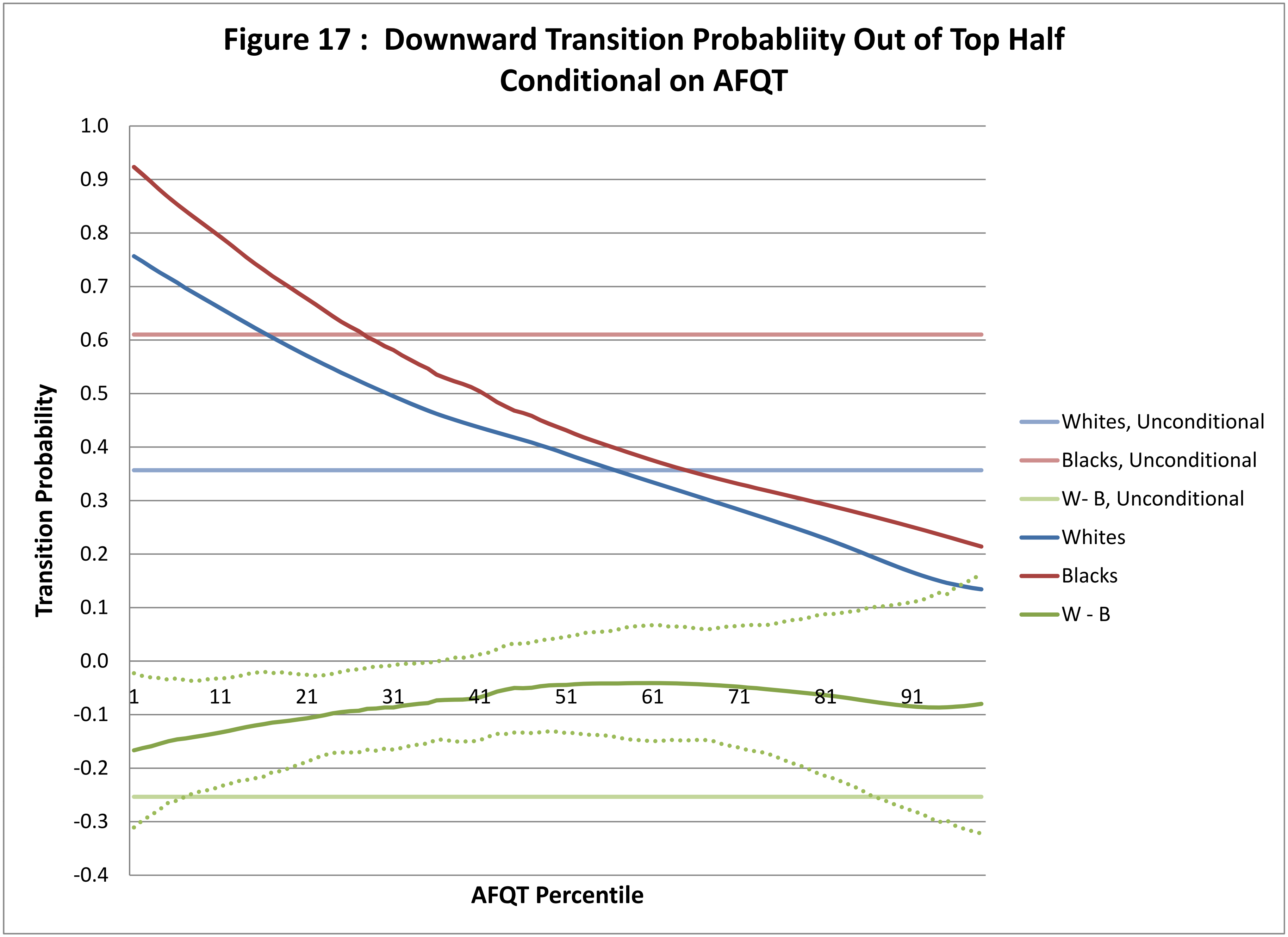


Figure 17 : Downward Transition Probabliity Out of Top Half Conditional on AFQT
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
1
11
21
31
41
51
61
71
81
91
Transition Probability
AFQT Percentile
Whites, Unconditional
Blacks, Unconditional
W- B, Unconditional
Whites
Blacks
W - B

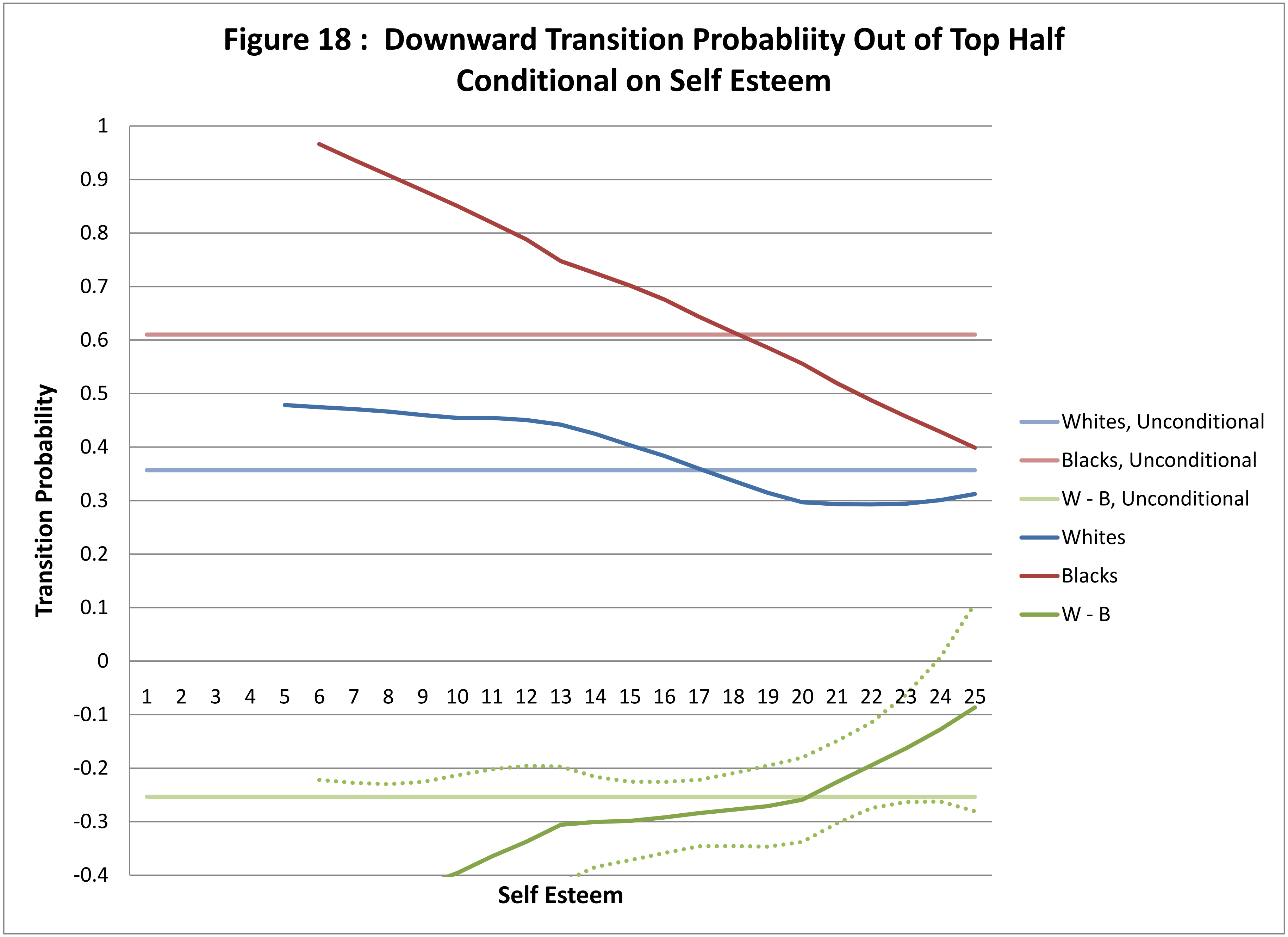


Figure 18 : Downward Transition Probabliity Out of Top Half Conditional on Self Esteem
Transition Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Self Esteem
Whites, Unconditional
Blacks, Unconditional
W - B, Unconditional
Whites
Blacks
W - B

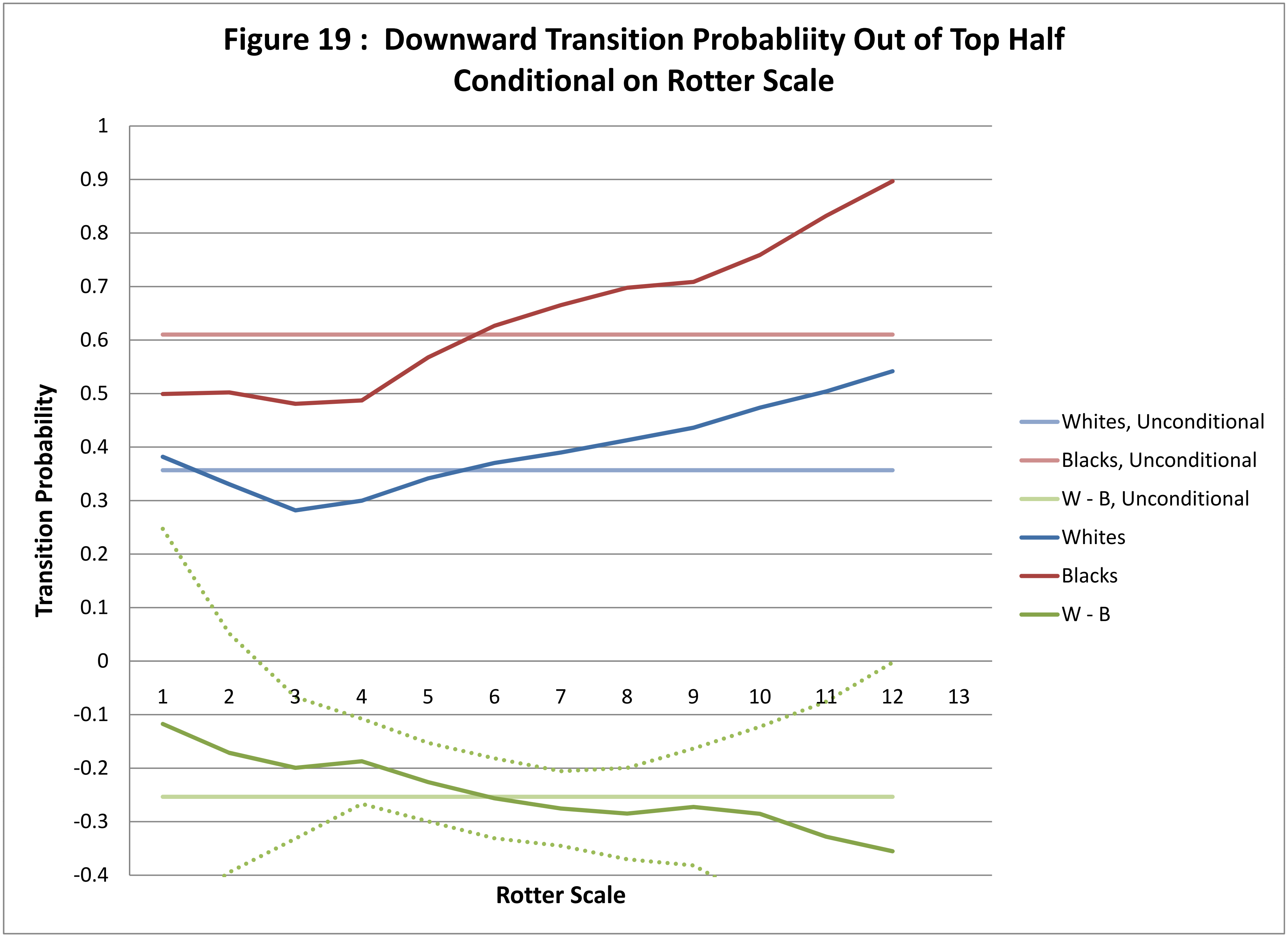


Figure 19 : Downward Transition Probabliity Out of Top Half
Conditional on Rotter Scale
Transition Probability
Rotter Scale
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1 2 3 4 5 6 7 8 9 10 11 12 13
Whites, Unconditional
Blacks, Unconditional
W - B, Unconditional
Whites
Blacks
W - B

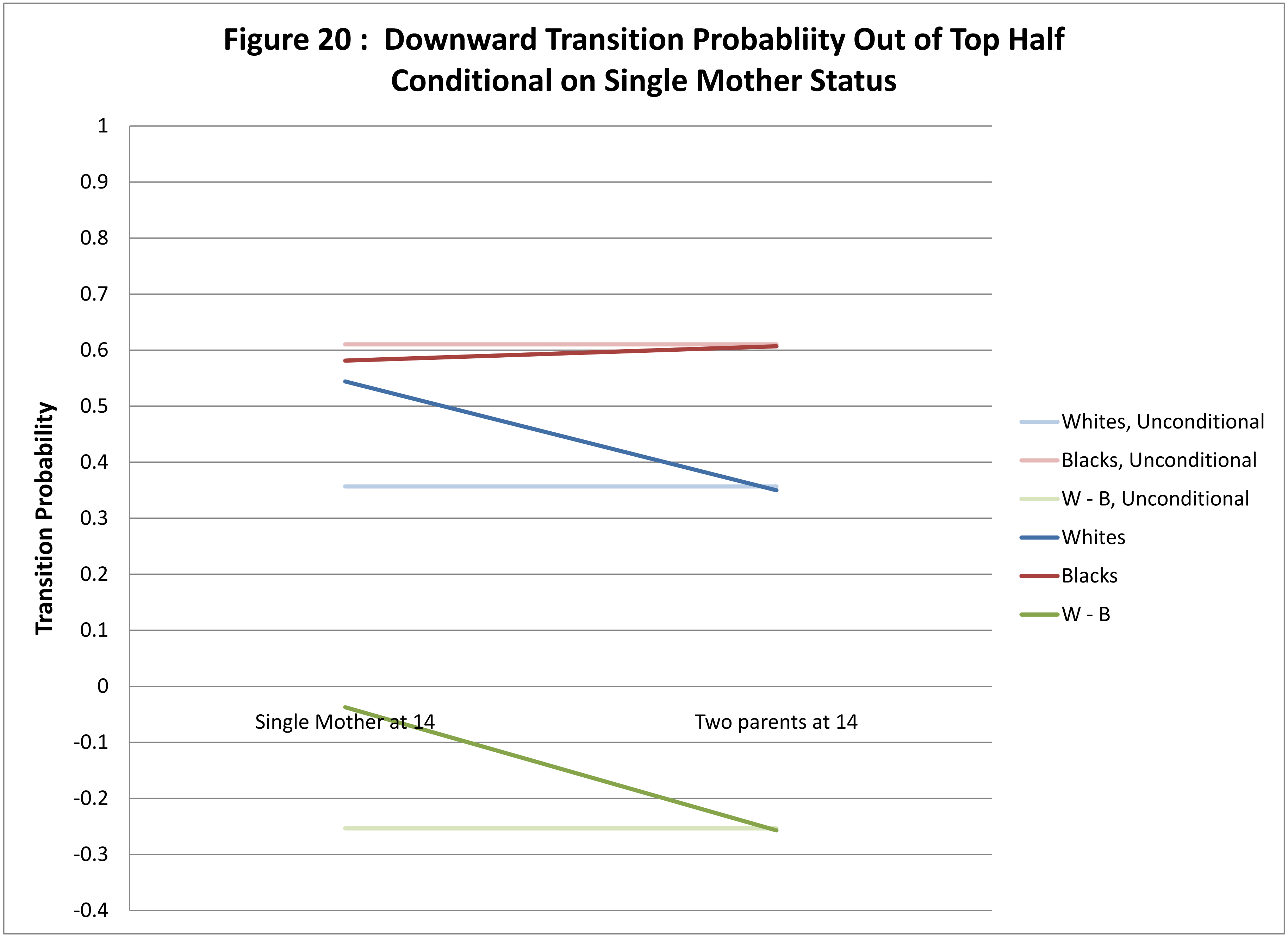


Figure 20 : Downward Transition Probabliity Out of Top Half
Conditional on Single Mother Status
Transition Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
Single Mother at 14
Two parents at 14
Whites, Unconditional
Blacks, Unconditional
W - B, Unconditional
Whites
Blacks
W - B

Figure 21: Downward Transition Probabliity Out of Top Half Conditional on Net Worth