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Ethnic and Racial Disparities in Saving Behavior*

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Abstract: Using data of households approaching retirement in the U.S., I find that the Whites' median saving rates are 9 percentage points larger than the Mexican Americans' rates (ethnic gap) and than the African Americans' rates (racial gap). Two-thirds of each gap correspond to changes in asset prices and a third to households' active decisions. Quantile decompositions show that differences in income and education explain most of the active saving gaps. This implies that wealth inequality is not attributable to differences in the distributions of active saving rates conditional on socio-economic characteristics. When retirement assets are included, the racial but not the ethnic gap in total savings disappears. The results suggest that reducing disparities in income, education and pension savings would help to reduce wealth inequality.
Keywords: African Americans, Mexican Americans, saving rates, wealth inequality
JEL Classification: D14, D31, E21, G11, J15

Resumen: Usando datos de hogares cercanos al retiro en Estados Unidos, encuentro que las tasas de ahorro medianas de los Blancos son 9 puntos porcentuales mayores que las de los Mexicanoamericanos (brecha étnica) y Afroamericanos (brecha racial). Dos tercios de cada brecha corresponden a cambios en los precios de los activos y un tercio a decisiones activas de los hogares. Las descomposiciones por cuantiles muestran que diferencias en ingreso y educación explican gran parte de las brechas en ahorros activos. Esto implica que la desigualdad de la riqueza no es atribuible a diferencias en las distribuciones de las tasas de ahorro activas condicionales a características socio-económicas. Cuando se incluyen los ahorros para el retiro, la brecha racial en los ahorros totales desaparece, pero no la étnica. Los resultados sugieren que reducir las disparidades en ingreso, educación y ahorro en pensiones contribuiría a reducir la desigualdad de la riqueza.
Palabras Clave: Afroamericanos, Mexicanoamericanos, tasas de ahorro, desigualdad de la riqueza

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1 Introduction

In recent decades, the U.S. has witnessed the demographic growth of ethnic and racial minority groups, especially Hispanics. These groups are particularly disadvantaged in terms of wealth and readiness for retirement. After the financial crisis of 2007-2008, the wealth gap with Whites has reached the highest peak of the last 25 years at least (Kochhar et al., 2011). The causes of such disparities and the instruments to reduce them need to be better understood. By looking at saving rates, it is possible to distinguish between household-driven versus market-driven mechanisms behind wealth inequality, necessary for the design of anti-poverty policies. If minorities do not have preferences about inter-generational transfers, they can increase lifetime utility by saving more and reallocating consumption across time.

The broad economic literature on racial and ethnic inequality has traditionally looked at income and, recently, at wealth. Whereas income is a good indicator of discrimination in the labor market, wealth is a more complete measure of the relative economic position of families. Given the limited evidence on ethnic and racial differences in saving rates, the goal of this study is to measure such differences and quantify the importance of their immediate sources.[1] I focus on older households (between 50 and 65 years old) since they own more wealth, save at a higher rate and need to finance their imminent retirement. There is evidence that the racial and ethnic wealth gaps grow with age (McKernan et al., 2013; Brown, 2016), and inheritances and inter vivos gifts are less important to explain the wealth disparities of older households.

In the US, Hispanics are considered as an ethnic group, a classification determined by culture or origin and independent of race. Thus, I distinguish between households self-identified as Hispanics (specifically, Mexican Americans), non-Hispanic Blacks and

[1] Blau and Graham, 1990; Wolff, 1992; Oliver and Shapiro, 1995; Menchik and Jianakoplos, 1997; Hurst et al., 1998; Barsky et al., 2002 study the racial wealth gap, whereas Gittleman and Wolff, 2004 and Altonji and Doraszelski, 2005 explore racial differences in saving rates. For a survey of the literature see Scholz and Levine (2004).

non-Hispanic Whites (hereafter "Blacks" or "African Americans" and "Whites").[2] With some exceptions (Smith, 1995; Even and Macpherson, 2003; Cobb-Clark and Hildebrand, 2006), ethnic inequality has received less attention in the economics literature than racial inequality.[3] This is striking, since Hispanics may also be financially disadvantaged, as the following quotation illustrates:

> *Not only do many Latinos work in low-wage industries, but the idea of accumulating funds for one's elder years doesn't always mesh with a culture that emphasizes individuals taking care of one another. "Retirement is a foreign concept for many Hispanic workers," [...]. "The focus is on providing for the extended family, and they expect their family to take care of them when they're no longer working." (Pessin, 2011, The Wall Street Journal).*

Income inequality is the most immediate explanation for wealth disparities across families. However, the Black-White wealth gap is considerably larger than the income gap and persist even within groups with the same permanent income level. In the standard life-cycle model (Modigliani and Brumberg, 1954), another main source of wealth inequality are saving rates.[4] The gaps in median saving rates are large: Whites save almost 9 percentage points (p.p.) more than Mexican Americans and Blacks. Given that saving rates differ within and across income levels (Dynan et al., 2004), the question is whether there are ethnic and racial differences in saving rates, conditioning on income. If that is the case, convergence in income may not lead to convergence in wealth.[5]

[2]The inadequacy of treating Hispanics as a single homogeneous group has been acknowledged in the more recent inequality literature (Cobb-Clark and Hildebrand, 2006). The breakdown in the data only allows to distinguish between Mexican Americans and Other Hispanics. In turn, the heterogeneity within Other Hispanics, with a lower representation in the dataset, renders less robust evidence. Thus, the main results for the ethnic gap correspond to Mexican Americans, which account of the majority of Hispanics living in the US. They may not necessarily explain the saving disparities for other Hispanic groups, identified explicitly when applicable.

[3]The sociological literature on ethnic wealth inequality includes Keister et al. (2015) and Brown (2016).

[4]The other two sources are inheritances or inter-generational transfers and ex-post rates of return to capital. Wolff and Gittleman (2014) estimate significant differences across groups in the likelihood of inheriting or receiving a gift (Whites, 25%; Blacks, 10% and Hispanics, 6%), but not in wealth transfers as a share of wealth.

[5]In the standard life-cycle model savings are proportional to permanent income. Saving rates can differ

In this study I decompose the gaps in saving rates at different quantiles using the recentered influence function regression from Firpo et al. (2009) and Fortin et al. (2011). I divide the saving differential in a part explained by group differences in observable characteristics ("explained gap" or "composition effect") and another resulting from differences in return to characteristics ("unexplained gap" or "structure effect").[6] One important contribution is to decompose both total and active saving rates. This allows to uncover dynamics hidden in the decompositions for the wealth stock that prevail in the existing literature. Following the standard practice, total saving rates are computed as the change in wealth divided by income using data from the Health and Retirement Study (HRS) for the periods 1992-1998 and 1998-2004.[7] Active savings are measured directly and reflect the household decision to use income for investment into new assets rather than for consumption. Passive savings are obtained as a residual between total and active savings. They capture differences in capital gains or in the evolution of asset prices, more influenced by market dynamics and portfolio composition. Another contribution is to compute the gaps in saving rates including Social Security (S.S.) and pensions. To the best of my knowledge, no comprehensive study on the racial and ethnic savings disparities has included these assets, which represent a substantial fraction of households' portfolios before retirement.

I find that differences in active and passive saving rates account for a third and two-thirds of the total saving gaps, respectively. Including S.S. and pensions, the ethnic gap shrinks and the racial gap practically disappears. This reflects the fact that S.S. has an almost universal coverage and equalizes saving rates. The benefits are more evident for African Americans, possibly due to job selection leading to higher pension coverage

with income after introducing heterogeneity in time preferences and in interest rates, and non-homothetic preferences.

[6] Other methods for quantile decompositions, such as Juhn et al. (1993) and Machado and Mata (2005), do not allow to compute the contribution of each covariate to the composition effect. The method by DiNardo et al. (1996) shares many of the advantages of Firpo et al. (2009), but the contribution of each covariate does not add up to to the aggregate composition effect, being more appropriate when the interest is only in a particular factor.

[7] By excluding more recent years, the results correspond to a relatively stable period, not contaminated by the abrupt wealth changes triggered by the 2007/08 financial crisis.

(Chiteji et al., 2006; Gouskova et al., 2010). Mexican Americans are less likely to work for employers who sponsor pension schemes or, even if eligible, are less likely to participate (Richman et al., 2012).

The decompositions uncover several novel findings. First, at the median, differences in observable characteristics explain about 80% of the gap in total saving rates both for Mexican and African Americans. At other quantiles, the ethnic gap is also explained mostly by the composition effect. For the racial gap, differences in coefficients (the structure effect) play a larger role at the upper middle of the distribution. Second, observable characteristics have an even larger contribution to the gap in active saving rates: 123% for the ethnic gap and 98% for the racial gap. This reflects that active savings depend more on utility maximizing behavior and retirement planning by the household and less on market dynamics (Chetty et al., 2014). By comparing the composition effects of the total and active saving gaps, it can be inferred that the large differences in passive savings are not fully explained by income and demographics.

Third, looking at the contributions of individual factors to the composition effect, total household income is the most important one followed by education. Capital income is particularly important at the upper middle of the distribution. Demographic characteristics (age, number of children), region of residence, and being born in U.S. or abroad typically do not have a significant and economically meaningful contribution. The latter suggests that individuals born in Mexico are not driving the Mexican American-White gap. Finally, with the inclusion of retirement assets, the saving gaps are no longer explained by household characteristics, consistent with the fact that S.S. benefits are similar across groups.

This paper contributes closely to the literature on ethnic and racial wealth inequality. Cobb-Clark and Hildebrand (2006) decompose the gaps in wealth levels following the semiparametric approach by DiNardo et al. (1996). They attribute most of the ethnic gap to Mexican Americans having lower educational attainment, being younger and having more children. For older households, I find that income and education are the main con-

tributors to the wealth gap. And when I look at saving rates, income matters even more than education and, after including S.S. and pensions, socio-demographics actually help to close the gap.

For the racial wealth gap, I estimate a larger contribution of differences in socio-economic characteristics than in Cobb-Clark and Hildebrand (2006), but similar to other studies. Barsky et al. (2002) find that earnings only explain two-thirds of the mean differences in wealth, and therefore do not rule out that the racial wealth gap is caused by differences in savings behavior. However, they do not include characteristics such as education or capital income in the decomposition. Altonji and Doraszelski (2005) find that almost the entire wealth gap for couples is explained by differences in characteristics when the White functions are used for the composition effect.[8] I interpret this as evidence that past saving rates do not have a role beyond income and demographics in explaining the racial wealth gap. Gittleman and Wolff (2004) examine the racial gap in saving rates and do not find significant differences at the median after conditioning on household characteristics. I find the same pattern at the lower middle but not at the upper middle of the savings distribution. Using a decomposition, I can further compute the detailed contribution of individual factors to the savings gap.

A better understanding of differences in wealth accumulation is necessary to guide policies aimed at reducing poverty and wealth inequality more in general. Even though reverse causality cannot be ruled out, the estimated relationships suggest that reducing inequality in income and education can help to lower ethnic and racial inequality in savings and wealth. The magnitude of the gaps in passive savings highlights the higher importance of portfolio composition and market-driven dynamics in driving wealth inequality. Disparities in asset prices and capital gains are twice as large as disparities in active savings and are not fully explained by differences in income and demographics.

[8] Since a smaller fraction of the wealth gap is explained using the Black functions, Altonji and Doraszelski (2005) suggest that Blacks may have lower saving rates. But the use of Black functions could be misleading because some values of the White characteristics are not observed among Blacks.

2 Household data and the definition of savings

2.1 Wealth and income data

In this study I use data from the HRS that surveys older households every two years since 1992. Even though the HRS is not appropriate to study savings for the entire age distribution, it has several advantages over other household surveys collecting wealth data. First, this data set allows focusing on savings adequacy for retirement because it collects information on households with at least one individual over 50 years old. This is relevant because as people approach retirement, they hold more types of assets, own more wealth and save faster. Second, it provides assets and income data of high quality, with a relatively low rate of item non-response and abnormally high retention rates compared to other aging studies (Banks et al., 2010). In particular, it provides the best household survey data available to calculate pension wealth, typically the largest asset on the household balance sheet. Third, the HRS oversamples Blacks and Hispanics at the rate 2:1 relative to Whites, which guarantees a reasonable sample size for the analysis of racial and ethnic differences.[9]

I classify the households into four non-overlapping groups based on the breakdown available in the data: Mexican Americans, Other Hispanics, non-Hispanic Blacks and non-Hispanic Whites. To cleanly distinguish between ethnicity and race, the racial comparisons are between White and Black households of non-Hispanic origin. Hispanics themselves are a diverse group from cultural, socioeconomic and genetic perspectives, and it is desirable to acknowledge those differences in the studies of inequality, as noted by Cobb-Clark and Hildebrand (2006). The "Other Hispanic" category in the HRS involves any household self-identified as Hispanic but not of Mexican origin. A finer classification within the Other Hispanic group based on the country of origin is not possible. Thus, this group will only be examined in the descriptive analysis of Section 3, since the sample size

[9]Residents of the State of Florida, an area with high density and number of older populations, were also oversampled.

is relatively small and there is substantial heterogeneity within group to draw any robust inference in a regression framework. I will refer to them explicitly when applicable, but otherwise are excluded from the main decomposition results for Hispanics in Section 4, which only reflect the behavior of Mexican Americans.

The fact that survey measures of ethnicity are based on self-reports raises the problem of potential selective ethnic attrition, more severe among third- and higher-generation Mexicans Americans (Duncan and Trejo, 2011). Mexican descendants that assimilate into U.S. society and marry with non-Hispanics are less likely to identify as Hispanics. But regardless of whether they are identifiable, mixed-ethnicity couples tend to have have higher education and earnings than Hispanic couples. For that reason, the sample is restricted to households where both spouses are in the same group.

The basic measure of net worth used to compute savings includes real wealth (main home equity, other real estate, vehicles and business) and financial wealth (Individual Retirement Accounts, stocks, mutual funds, checking and savings accounts, certificate of deposits, savings bonds, treasury bills, bonds, and other assets, less other debts). Longitudinal data on private pension wealth and S.S. wealth are estimated with information derived from the HRS. Private pensions include all the Defined Benefit (DB) account balances plus the Defined Contribution (DC) values at the expected age of retirement. For S.S. I use the estimates corresponding to full retirement age (FRA). Appendix B has more details of how these variables are constructed.

The measure of income corresponds to the last calendar year and includes household earnings, pensions and annuities, government transfers, capital income, and other income from insurance, pension, and inheritance. To compute saving rates including S.S. and pensions, it is necessary to account for employer contributions in the measure of total income. Thus, I add to total household income the fraction of the respondent and spouse earnings corresponding to employer contributions to DB and DC plans and to S.S.. This fraction is measured as the cost to employers for DB and DC plans and for S.S. as percentages of total compensation. The data is taken from the Employer Costs for Em-

ployee Compensation, produced by the Bureau of Labor Statistics. All wealth and income measures are expressed in 2004 dollars, deflated using the NIPA implicit price index for personal consumption expenditures.

The sample used for this study is restricted to households with the same head and spouse over the relevant period (1992-1998 or 1998-2004). This is a common requirement adopted in the literature to ensure that wealth changes are not driven by changes in family composition. I further drop observations for households that were in the sample but were not interviewed in a particular wave, and observations with missing income or wealth. Also, I drop households where the head's age was below 50 or above 65 years old in 1998 and in 2004 and where the head or the spouse reports to be claiming S.S.. Finally, I exclude households where the spouses are of a different race or ethnicity. See Appendix B for more details on the sample selection. I use the HRS household level weights only for the descriptive statistics.[10]

2.2 Saving rates

The saving rate is defined as the ratio between savings and the income earned during the relevant period. The conceptually most appropriate measure of savings is the one given by the difference between disposable personal income and consumer expenditures, where both measures are obtained directly. By defining real income for household i, Y_{is}, as the sum of the return on non-human wealth between $s-1$ and s ($r_{is-1}W_{is-1}$), after-tax earnings (E_{is}), and transfers from the family and the government (TR_{is}), household savings can be expressed as:

$$Y_{is} - C_{is} = r_{is-1}W_{is-1} + E_{is} + TR_{is} - C_{is} \tag{1}$$

[10]For this study there is purely exogenous stratification because the HRS stratifies on the regressors only (i.e. race and ethnicity) and not on the dependent variable (i.e. wealth or savings rate). Thus, the usual estimators are consistent even if weights are not used.

where C_{is} is total consumption and r_{is-1} is the real after-tax rate of return on non-human wealth between $s-1$ and s.

However, there are practical difficulties to implement such approach using survey data. In particular, measuring consumption is a very time-consuming process and so it is not typically available in most surveys. Thus, the approach that I follow here is the one feasible with HRS data and the most common in the empirical literature.[11] It consists on computing savings as the difference in net worth between two time periods ($W_{is} - W_{is-1}$), which is referred as realized savings. Wealth at the end of period s is defined as

$$W_{is} = W_{is-1}(1 + r_{is-1}) + TR_{is} + E_{is} - C_{is} \tag{2}$$

where $W_{is-1}(1 + r_{is-1})$ is net worth (exclusive of human wealth) at the beginning of period s. The equivalence of the two definitions of savings is verified since in equation (1) capital income is added to total household income to the extent that it is included in r. Based on the wealth definition from (2), the total saving rate can be expressed as $(W_{is} - W_{is-1})/Y_{is}$. I compute it as the ratio between the 1998-1992 and 2004-1998 changes in wealth and the sum of total income over each six year period.

In the present study I examine both total and active savings to shed light into different aspects of the racial and ethnic differences in wealth accumulation. Realized savings, that is, changes in household wealth, can differ sharply from active savings, or current income that households do not spend but save. The active saving measure, which intends to measure flows of money into and out of different assets, is the more similar to the traditional saving measure of income minus consumption. It is more appropriate to analyze the supply of loanable funds for new investment and therefore is useful to study the effect of a redistribution of income on economic growth (Dynan et al., 2004). I also compute passive savings, reflecting the change in the price of the asset or capital gains that households do not realize and spend. A measure of total savings that includes

[11] See Juster et al. (1999) for a detailed description of these approaches.

capital gains is the more appropriate concept to study the ex-post adequacy of saving for retirement.

The HRS asks specific questions about active savings for those components where capital gains are more important, such as housing, investment in real estate other than the primary residence, business, IRAs, and stocks. For those assets, capital gains are obtained as a residual –it is the difference between realized and active savings. Net transfers into the household, such as inheritances and gifts from family and friends and changes in assets resulting from household members moving out or into the family, can only be considered when computing aggregate savings. Since the form of these transfers and changes in assets resulting from changes in family composition is not known, it is not possible to allocate them to particular assets nor to decompose them between active savings and capital gains. Appendix B describes how saving rates were computed.

Measurement error

There are three main sources of measurement error in the estimates of saving rates. The first source relates to the approach used to compute savings as the difference in net worth between two time periods. The quality of data on assets and income is lower in their longitudinal dimension due to the misreporting of asset balances and the absence of longitudinal imputations. This may lead to spurious wave-to-wave changes, much larger than actual changes if measurement error is not correlated across waves (Venti and Wise, 1998). Since both realized and active savings are measured with error, the problem becomes even bigger for capital gains obtained as a residual.

Second, as in most household surveys, the full range of the wealth distribution is not readily captured and saving rates will mirror this problem. Since wealthier households are more reluctant to be interviewed, sample selection may not be random (Smith, 1995; Banks et al., 2010). Even when families are interviewed, they may not be willing to report large amounts of assets, such as stocks. Also, it is difficult to calculate the net value of assets with complex financial structures, such as business, where the complexity increases

with the value.

Third, even when pension and S.S. data is the better collected to date in a survey, still measurement errors are large (Venti and Wise, 1998). The lack of knowledge about the characteristics of their pension plans implies that respondents have trouble classifying them as DB or DC. And if they classify their DC pension plan as DB, then the corresponding balance is zero for that wave. Measurement error in S.S. data seems more acute in imputed observations for respondents that could not be matched to S.S. earnings data.

Measurement error in the dependent variable results in savings models having lower explanatory power (as measured by the adjusted R^2) than wealth models. OLS estimates will be still consistent, although not as precise as with perfect data. Even when measurement error in the dependent variable is generally more innocuous than in the regressors, I do implement several procedures to alleviate its impact. First, I rely on the "RAND HRS 2008 Income and Wealth Imputations" that impute missing values using a method consistent across waves, mitigating the problem of random non-response.[12] Second, I perform the decompositions for the median and other quantiles of the dependent variable since they are less sensitive to the presence of outliers than the mean. Third, given the potentially larger error in the measurement of specific assets, such as pensions and S.S., I restrict the analysis to total saving rates. No decompositions are estimated for individual assets. In the case of S.S. wealth, I use data at the respondent level, which is more consistent across waves than data at the household level. Finally, I limit the decompositions to group differences in total and active saving rates. The larger measurement error in passive savings renders more difficult the estimation of behavioral functions.

3 Ethnic and racial differences in saving rates

In this section I present the descriptive analysis of group differences in wealth levels and saving rates. For that purpose, when considering Hispanics I will distinguish between

[12] March 2011. See at: http://hrsonline.isr.umich.edu/index.php?p=avail.

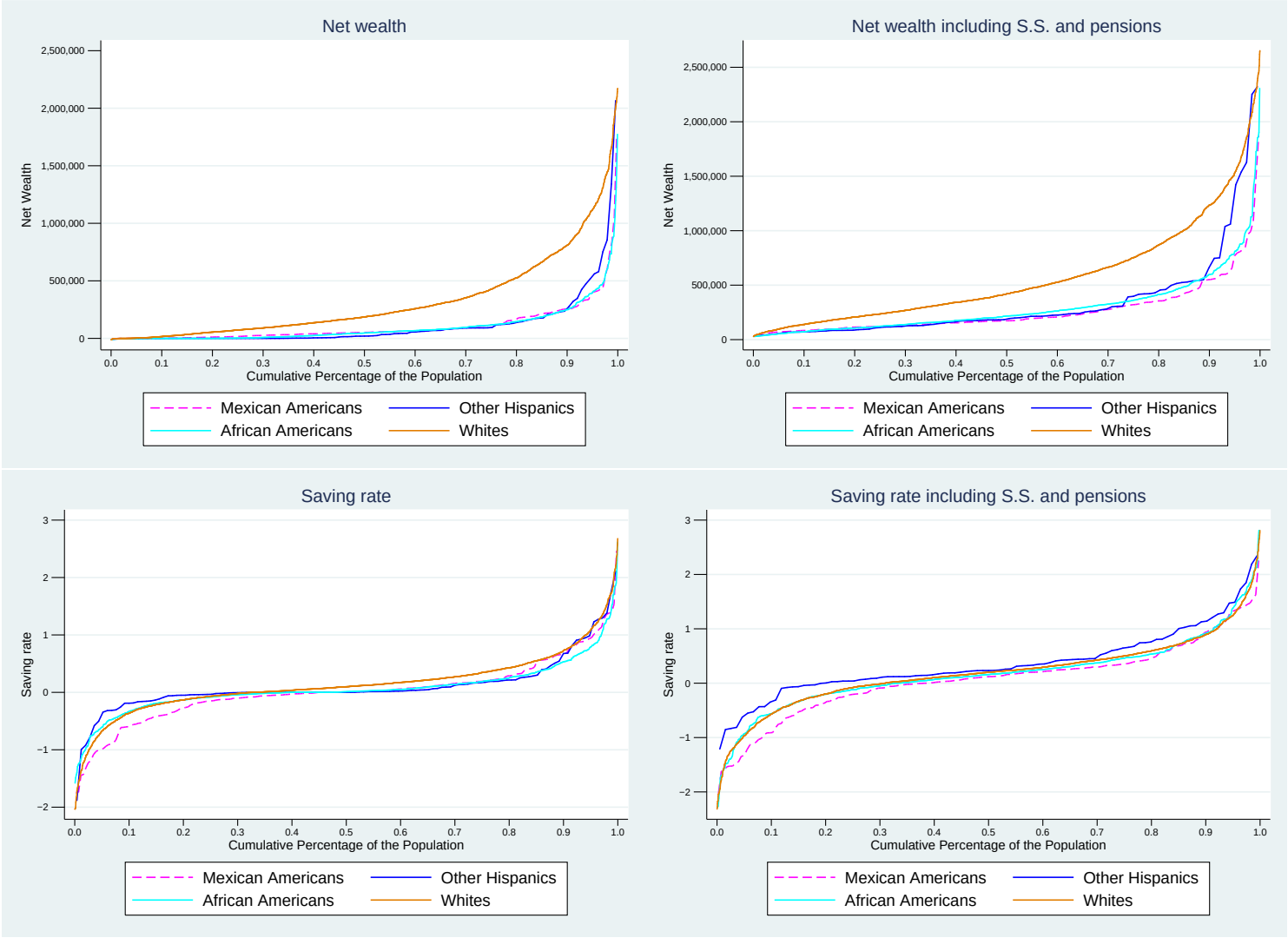
those of Mexican origin and Other Hispanics.

Differences in wealth levels, portfolio composition and saving rates

I start comparing the unconditional distribution of wealth and saving rates across groups. Figure 1 shows the corresponding inverse cumulative distribution function (cdf) or quantile function. There is a similarly large gap in wealth levels between Hispanics and Whites and between African Americans and Whites, and these differences generally widen at higher quantiles. The Mexican and African Americans' median wealth ($56 and $44 thousand) correspond to the 21th and 18th percentile of the White distribution. At the top, Other Hispanics are relatively more represented than Mexican and African Americans, which is the counterpart of the high wealth inequality within that group. A large gap in saving rates is also observed across groups. At the median, the saving rates of the three minority groups are close to zero, near the 35th percentile of the White distribution (the White median rate is 10.5%). At the bottom of the distribution Mexican Americans' saving rates are the lowest and at the top African Americans save less. The differences are larger at the tails than at the center of the distribution, but the tails may be partly capturing measurement error and outliers. Including S.S. and pensions, there are relatively more gains for Other Hispanics, since their saving rates become actually higher than Whites' throughout the entire distribution. Differences between Blacks and Whites disappear. In turn, the median saving rate of Mexican Americans only reaches the 44th percentile of the White distribution.

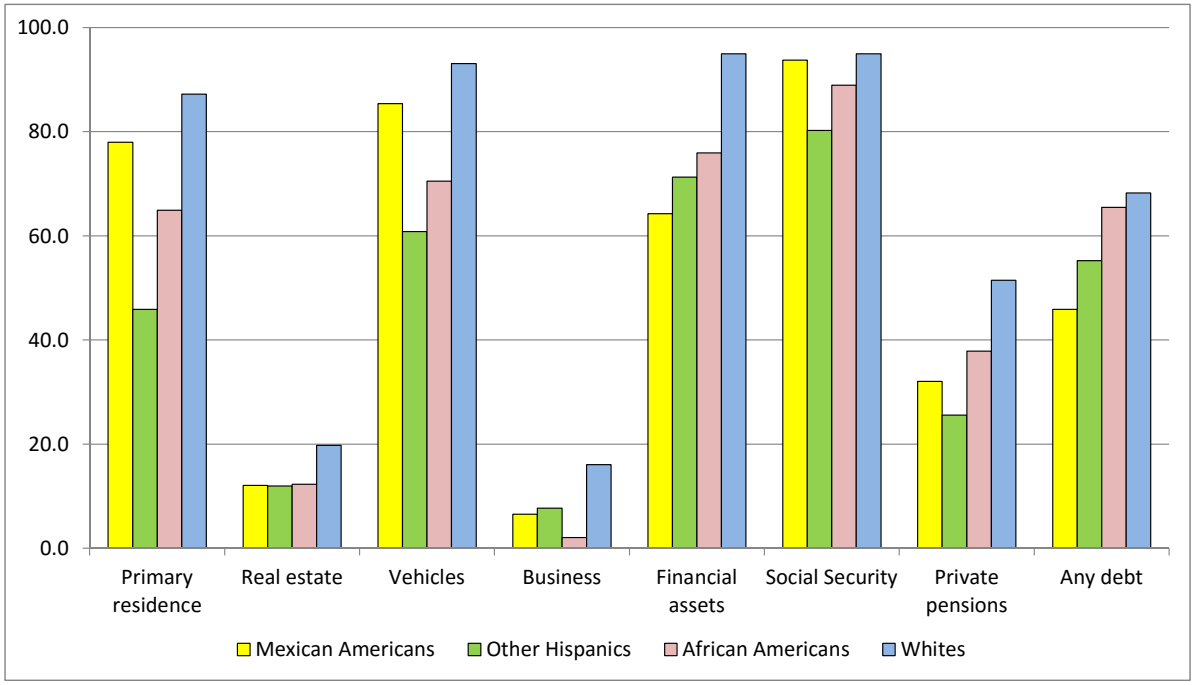
It is also useful to examine disparities in portfolio composition that may affect total saving rates via rates of return. Figure 2 and Figure 3 show groups differences in access to individual assets and in the importance that each asset has in total net wealth, conditional on ownership. The wider gaps are in terms of asset ownership. Hispanics and Blacks are less likely than Whites to have a business or real estate other than the primary residence. Differences in the holdings of financial assets are smaller, but most of the financial wealth held by Hispanics and Blacks consists on checking and savings accounts;

Figure 1: Quantile functions of net wealth and saving rates by ethnic and racial group



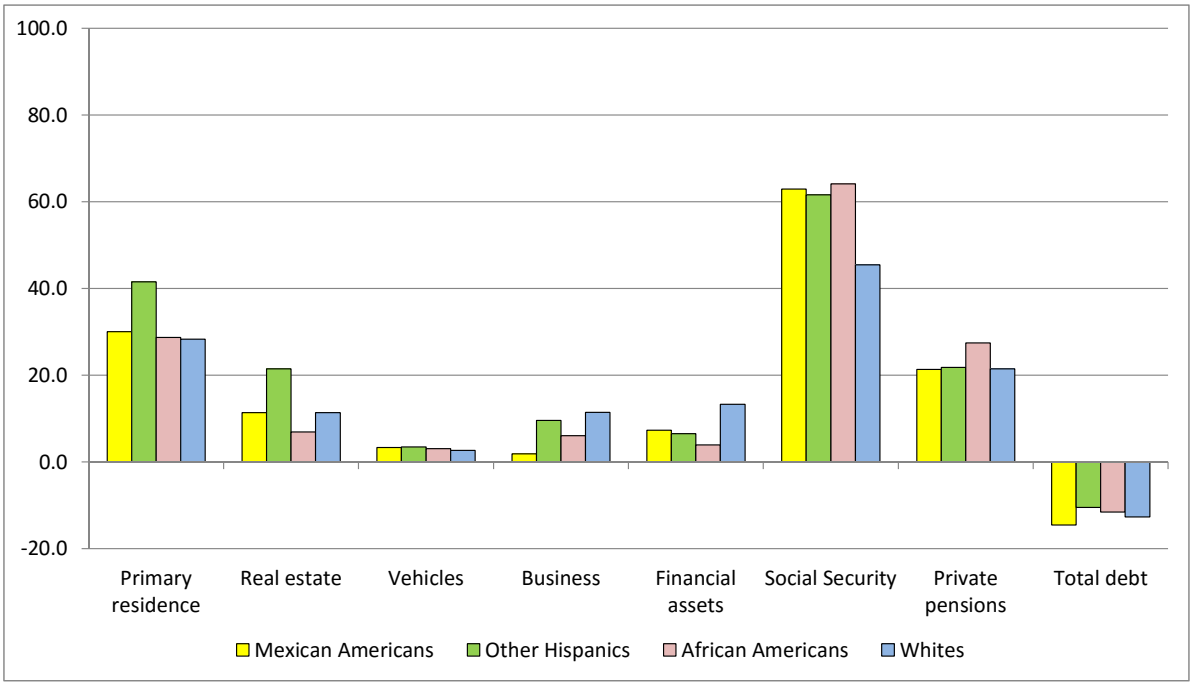
Notes. The plot represents the empirical quantile function of households' net wealth in 1998 and 2004 and of total saving rates in 1992-1998 and 1998-2004, before and after including S.S. and pensions. Wealth values are in thousands of 2004 dollars. Sample consists of HRS households whose head and spouse were the same between 1992-1998 (1998-2004) and were not claiming S.S. during those years and the head was between 50 and 65 years old in 1998 (2004). Households with mixed-ethnicity couples are excluded. The top and bottom 2 percent of total wealth and of total saving rates are dropped.

Figure 2: Percentage of households with each asset or debt, 2004



Notes. Sample consists of HRS households whose head and spouse were the same and were not claiming S.S. between 1998 and 2004 and whose head was between 50 and 65 years old in 2004. Households with mixed-ethnicity couples are excluded. Net financial assets include IRA/Keogh accounts, stocks, checking and saving accounts, CDs, government bonds, Treasury bills and bonds. All data are weighted using the HRS household weights for 2004.

Figure 3: Average asset or debt share in household net wealth, 2004



Notes. See notes to Figure 2. The shares are estimated for households that own the corresponding asset. The top and bottom 2 percent of each asset share in total wealth in 1998-2004 are dropped.

very few have stocks, bonds or other savings accounts such as IRAs or Keoghs. Mexican Americans are relatively less disadvantaged in terms of home ownership. The smallest gap is found in S.S.: Around 90% of Mexicans, Blacks and Whites and 80% of Other Hispanics have S.S. in 2004. Private pensions are less widespread; only half of Whites have a pension and that fraction reduces to 32% for Mexican Americans and to 26% for Other Hispanics. Finally, note that Hispanics, but not Blacks, are less likely to hold any form of debt than Whites.

The gap in holdings of assets and debts, conditional on ownership, is comparatively smaller than in participation. One exception is the low business share in total wealth of Mexican Americans and Blacks. The disparities in the holdings of financial assets are also large; their value represent only 6-8% of Hispanics' and Blacks' total wealth, around a half of the Whites' fraction. On the other hand, Other Hispanics' share of business and real estate is much larger than for the other groups. In turn, S.S. represents a much higher fraction of total wealth for Hispanics (55-60%) and Blacks (58%) than for Whites (38%). Many minority households hold very few assets and depend on S.S. to complement their savings. In the case of Blacks, the share of pensions is slightly higher than for other groups, consistent with the evidence in Chiteji et al. (2006).

Table 1 shows the mean and 25th, 50th and 75th percentiles of savings and saving rates by ethnicity and race for 1992-1998 and 1998-2004. Wealth change is computed as the difference in wealth holdings between the last and the first year of each period. Following the standard practice, mean saving rates are computed as the ratio between average savings and average income over the six years, whereas the quantiles are computed for the ratio of savings over income. In general, the gaps in means between minorities and Whites are typically larger than in medians, both for total savings and total saving rates. This reflects the extreme positive distribution of wealth accumulation within Whites. Between 1992 and 1998, the differences with Whites in the distribution of wealth change and total saving rates are significant for the three minority groups. In the following period, total saving rates increase and are significantly larger than the 1992-1998 rates. Since

Table 1: Saving rates by ethnicity and race

	Mexican Americans					Other Hispanics					African Americans					Whites			
		Percentile					Percentile					Percentile					Percentile		
	Mean	25th	50th	75th		Mean	25th	50th	75th		Mean	25th	50th	75th		Mean	25th	50th	75th
1992-1998																			
Wealth change	−4.0	−27.5	0.0	25.0	***	0.1	−10.1	0.0	7.4	***	10.9	−14.8	0.1	29.7	***	68.5	−20.7	22.0	122.6
Total sav. rate	−2.5	−22.1	0.0	20.0	***	0.1	−5.2	0.0	6.8	***	5.0	−9.7	0.1	15.9	***	17.9	−8.9	7.9	33.3
Real assets	−5.0	−17.6	0.0	14.6	**	−0.5	−5.1	0.0	4.3	*	2.8	−7.3	0.0	9.5	**	3.6	−7.5	1.8	12.8
Financ. assets	2.6	−2.0	0.0	2.6	***	0.5	−1.6	0.0	1.6	***	2.2	−2.3	0.0	3.6	***	14.2	−2.5	2.9	20.0
Active	1.9	−5.9	1.0	13.3		2.2	−7.6	0.0	8.1	**	−0.3	−6.8	0.0	9.2	***	4.0	−6.5	3.3	14.9
Passive	−0.5	−18.7	0.0	17.8	***	−2.6	−13.1	0.0	10.0	***	7.0	−7.4	0.0	15.5	***	17.3	−7.9	5.6	30.9
Net transfers	−3.8	0.0	0.0	0.0	***	0.5	0.0	0.0	0.0	***	−1.3	0.0	0.0	0.0	***	−3.3	0.0	0.0	0.0
Total+SS+Pens	−10.3	−20.7	8.3	33.0	**	14.0	−6.4	11.9	35.0		8.5	−18.2	11.1	37.3	**	19.3	−13.5	17.0	46.9
Social Security	5.4	3.0	6.7	17.0	***	6.6	3.2	8.1	14.7	***	5.5	3.0	7.4	14.6	***	4.3	2.1	4.8	9.4
Pensions	−7.7	0.0	0.0	0.0		7.1	0.0	0.0	5.7		−3.6	−2.3	0.0	1.7		−2.7	−5.2	0.0	6.2
Nr. of obs.	144		186			76		111			550		694			2,117		2,475	
1998-2004																			
Wealth change	32.8	−15.2	7.7	48.3	***	85.9	0.0	9.4	78.7		29.1	−13.0	1.7	44.0	***	102.7	−19.4	37.6	175.6
Total sav. rate	15.1	−10.1	5.0	40.1		38.3	0.0	6.5	48.3		11.5	−7.8	1.9	22.7	***	23.2	−7.2	11.1	39.4
Real assets	11.5	−7.1	1.8	21.7		26.5	0.0	2.0	38.1		7.8	−2.5	1.3	16.2	***	15.3	−2.3	6.6	23.2
Financ. assets	3.7	−1.5	0.0	4.6		11.8	−0.4	0.0	8.6		3.6	−3.6	0.0	4.4	***	7.8	−5.5	1.5	15.6
Active	−3.5	−19.5	−0.2	8.2	***	4.4	−3.5	0.0	10.6		0.3	−9.1	0.9	9.7	***	4.1	−7.4	3.5	15.6
Passive	19.2	−9.1	6.9	43.2		36.6	−1.4	3.2	39.1		12.7	−7.2	1.4	23.4	***	23.7	−5.5	9.4	38.2
Net transfers	−0.6	0.0	0.0	0.0	***	−2.7	0.0	0.0	0.0	***	−1.5	0.0	0.0	0.0	***	−4.7	−0.4	0.0	0.0
Total+SS+Pens	19.9	−19.6	20.1	66.3		57.0	14.3	42.9	90.3	***	28.6	−7.8	25.0	61.6		28.2	−5.2	22.4	57.4
Social Security	8.9	6.5	16.8	25.8	***	12.3	7.9	15.4	31.7	***	12.6	7.3	15.3	29.5	***	7.8	5.0	9.6	16.7
Pensions	−0.5	−4.5	0.0	0.0		8.4	−5.2	0.0	1.6		6.9	−5.8	0.0	5.2		−1.0	−8.0	0.0	7.1
Nr. of obs.	98		114			55		71			316		396			1,397		1,616	

Notes. Sample consists of HRS households whose head and spouse were the same and were not claiming S.S. between 1998 and 2004 and whose head was between 50 and 65 years old in 2004. Households with mixed-ethnicity couples are excluded. The top and bottom 2 percent of total saving and income are trimmed to compute mean rates. The change in wealth is in millions of 2004 dollars. Mean saving rates equal the ratio of mean savings over mean annual income earned during the same period. Percentile saving rates are computed for the ratio of saving over income. Real assets comprise main home equity, real estate, vehicles and business. Financial assets include IRA/Keogh accounts, stocks, checking and saving accounts, CDs, government bonds, Treasury bills, bonds, and other savings minus debt. Active saving is the sum of net flows of money saved in individual assets. Passive saving is the difference between total change in wealth and active savings. S.S. wealth is computed assuming claiming at full retirement age. Pension wealth includes DB values at expected age of retirement and DC/Combination account balances.
*, **, *** difference in the distribution with Whites significant at 10, 5 and 1 percent level (based on the Mann-Whitney two-sample statistic).

they increase more for Hispanics, the ethnic differences in the distribution become insignificant.

The breakdown of saving rates by asset type shows that the mean gaps in 1992-1998 are driven mainly by saving differentials in financial assets, especially large at the top end of the distribution. This is consistent with minorities' limited access to financial markets. The evolution of financial assets partly explains the lower gaps in mean saving rates in the second period. The fall in stock prices from 2000 to 2002 would have contributed to deteriorate the saving rates of Whites, who have a higher fraction of their wealth in stocks than Hispanics and Blacks. Savings in real assets also helped to close the ethnic gap but increased the racial gap. Hispanics live in areas where the boom in house prices that started in the mid-90s and lasted until their collapse in 2007 was more pronounced (Kochhar et al., 2011).

The decomposition between active and passive saving rates and net transfers shows that passive savings are responsible for the large mean gaps in the first period, especially among Hispanics. As a result of the evolution of house and stock prices in 1998-2004, passive savings explain the reduction in ethnic disparities in total savings. The persistence of a significant racial gap in passive savings confirms that Blacks did not benefit by the evolution of the housing market prices as much as Hispanics. This departs from Gittleman and Wolff (2004), who compute higher average rates of return to capital for African Americans than for Whites during 1984-1994, but acknowledge that the finding must be period-specific. In the first period, differences in active saving rates are smaller than in passive savings. For Mexican Americans, active savings are actually higher than for Whites at the 25th percentile and than for the other minority groups at the median. In the second period, Mexican Americans' active savings decline, especially at the 25th percentile, and differences with Whites become significant. This could reflect some rebalancing behavior given their unusually high passive savings. In both periods, net transfers out of income are negative but small in general.

When S.S. and pensions are included, in the first period the mean and median

differences with Whites become smaller for Blacks and Other Hispanics, but larger for Mexican Americans.[13] In the second period, the racial gap disappears thanks to the higher Blacks' savings in private pensions. But the most benefited are Other Hispanics, who save 29p.p. more than Whites at the mean and 21p.p. more at the median. Even though the Mexican Americans' mean gap declined in 1998-2004, still some differences remain, especially at the mean. In both periods, saving rates on S.S. are significantly larger for the three minority groups than for Whites. Given the low ownership rates (see Figure 2), median saving rates on pensions are zero for all groups, even for Whites.

Differences in wealth levels and saving rates by household characteristics

In Table 2, I summarize median saving rates in 1992-1998 and 1998-2004 by household characteristics. At the median, the saving rates of Hispanics (1.4 to 1.6p.p.) and Blacks (0.5p.p.) represent between 5% to 15% of the White saving rate (10.6p.p.). Including retirement assets, the savings differences narrow, reflecting the equalizing effect of S.S.. Mexican Americans' saving rates increase to 17.3p.p., which closes the gap to around 80% of the White saving rate (22.6p.p.). In turn, the median gap closes to 85% for African Americans and to 168% for Other Hispanics.

Then I examine the persistence of saving differences within income groups. For Other Hispanics and Blacks, the gaps in saving rates become wider at the lowest income quartile. For Mexican Americans, the gap in saving rates is surprisingly larger at the top of the distribution. Dynan et al.'s (2004) finding that saving rates increase with income is observed only among Whites.[14] Hispanics and Black households at the top half of the income distribution have lower saving rates than those in the 25th-50th percentile. Moreover, high income Mexican households have negative saving rates. These findings suggest that the gaps cannot be fully attributed to Blacks and Hispanics being less represented at

[13] The mean saving rate including S.S. and pensions does not equal the sum of the individual components displayed in Table 1 given the different trimming used for the saving rate excluding those assets.

[14] I do not distinguish between the 50th-75th income quartile and the upper quartile due to the small number of observations for Hispanics in that range.

Table 2: Median saving rates by household characteristics

	Total Saving Rate			
	Mexican Americans	**Other Hispanics**	**African Americans**	**Whites**
All non-retired households	1.4	1.6	0.5	10.6
incl. S.S. & Pensions	17.3	37.9	19.3	22.6
Income quartile				
$<$ 25th	0.5	0.0	0.0	1.2
25th - 50th	4.6	16.9	3.4	6.8
$>$ 50th	-2.6	13.7	2.7	14.8
Education of head				
No high school diploma	1.1	0.0	0.0	2.3
High school graduate	-1.6	13.7	0.0	10.1
College/postcollege grad.	32.4	2.4	5.5	16.1
Age of head				
50 - 54 years old	4.9	1.4	-13.4	9.5
55 - 59 years old	2.4	1.4	0.0	10.7
60 - 65 years old	0.0	0.0	5.2	11.4
Number of children				
2 or less	2.4	1.6	0.0	12.1
3 or more	0.6	1.5	1.9	9.1
Marital status of head				
Married	3.6	2.8	1.6	12.2
Single	0.0	1.4	0.4	6.0
Birthplace of head				
US born	0.0	1.6	0.5	10.3
Foreign born	4.9	1.6	0.0	17.3
US region				
Northeast + Midwest	17.7	1.4	0.0	10.0
South	2.4	2.8	1.1	9.2
West	-0.1	21.8	0.1	16.3

Notes. The table shows the median values of total saving rates in 1992-1998 and 1998-2004 by household characteristics. Sample consists of HRS households whose head and spouse were the same and were not claiming S.S. between 1998 and 2004 and whose head was between 50 and 65 years old in 2004. Households with mixed-ethnicity couples are excluded. All variables are described in Appendix B. Data is weighted using HRS household weights for 1998 and 2004.

high income levels.

The racial gap tends to decline monotonically with education, being wider among households with no high school diploma and smaller among those with college or post-college degree. For the ethnic gap, Mexican Americans with high school degree have

the wider gap with Whites since their median saving rate is negative. In turn, Whites' and Blacks' saving rates increase as households get older, consistent with the prediction of the life-cycle model that households should save more as they approach retirement. The opposite pattern is observed for Mexican Americans. In unreported results I find that whereas White wealth increases monotonically with age, for Hispanics and Blacks aged between 55 and 59 wealth levels are higher than for the younger and older groups. Land and Russell (1996) have already shown that wealth peaks at earlier ages for minorities. This contrasts with the finding in Cobb-Clark and Hildebrand (2006) that Mexicans are poorer because they are younger than Whites: Their wealth does not increase monotonically with age and younger Mexicans actually save more.

The remaining characteristics included in Table 2 have little explanatory power. The ethnic and racial gaps do not become substantially smaller when the sample is split by the number of children, marital status or birthplace; the gaps result from differences within categories. Mexican Americans born abroad save at a faster rate than the US born. In contrast, Other Hispanics born in US are accumulate wealth at the same rate as those born abroad. The higher saving rates are observed in the West for Other Hispanics and in the Northeast and Midwest for Mexican Americans.

4 Decomposing ethnic and racial gaps

In this section I examine if the ethnic and racial gaps remain after controlling for income and other household characteristics. This requires that not only the intercept of the savings function but also the slope with respect to the controls (income, education, etc.) should be allowed to vary across groups. Thus, I decompose the saving gaps distinguishing between differences resulting from coefficients (structure effect) and from characteristics (composition effect). The decompositions of the ethnic gap will only be performed for Mexican Americans; Other Hispanics are excluded hereafter from the empirical results due to the low sample size.

4.1 The RIF-regression approach

I follow the approach developed by Firpo et al. (2009), based on a recentered influence function (RIF) regression. This method allows to perform quantile decompositions and shares some desirable features of the Oaxaca-Blinder procedure for the mean.

I perform the decomposition for an outcome variable S (wealth or saving rates), which depends on some observable (X_i) and unobservable (ν_i) characteristics:

$$S_{gi} = h_g(X_i, \nu_i) \qquad for\ g = W, H \tag{3}$$

where the subindex g represents the two groups, for instance, Whites (W) and Hispanics (H), the subindex $i = 1, ..., N$ denotes individuals and $h_g(.,.)$ is the savings structure of group g. I assume conditional independence, i.e. $D_g \perp \nu_g \mid X_g$, where D_g is the indicator for group g. This implies that the distribution of the unobserved explanatory variables in the determination of savings is the same across Hispanics and Whites, conditioning on the observed variables.

What would happen to the gap in saving rates if Hispanics were given the White functions but retained their own characteristics? To address that I examine the difference in the distributions of the saving rates between the two groups, F_{S_W} and F_{S_H}, by looking for instance at the 0.50-quantiles of such distributions, $Q_{0.50}$. The difference in saving rates measured at the median can be expressed as:

$$\begin{aligned} \triangle_O^{0.5} &= Q_{0.50}(F_{S_W}) - Q_{0.50}(F_{S_H}) \\ &= [Q_{0.50}(F_{S_W}) - Q_{0.50}(F_{S_C})] + [Q_{0.50}(F_{S_C}) - Q_{0.50}(F_{S_H})] \\ &= \triangle_X^{0.50} + \triangle_Y^{0.50} \end{aligned} \tag{4}$$

where F_{S_C} is the counterfactual distribution that would have prevailed under the savings structure of Whites, but with the Hispanics' distribution of observed and unobserved characteristics, i.e. $S_W \mid D_H = 1 \overset{d}{\sim} F_{S_C}$. $\triangle_X^{0.50}$ denotes the composition effect, that is, the effects

of changes in the distribution of X, keeping $h_W(.,.)$ constant.[15] In turn, $\triangle_Y^{0.50}$ denotes the savings structure effect, that is, the effects of changes from $h_W(.,.)$ to $h_H(.,.)$, keeping the distribution of $X \mid D_H = 1$ constant. In other words, it reflects how the conditional distribution of savings, $F(S/X)$, changes across groups.

If the relationship between savings and the regressors were linear, the average counterfactual saving rate that would prevail if Hispanics accumulated wealth under the saving structure of Whites would be $E[X_H \mid D_H = 1] \cdot \beta_W$, where β_W is the coefficient on earnings estimated in the White sample. But when the relationship is not linear, the decomposition based on a linear regression is biased (Barsky et al., 2002).[16] I follow Firpo et al.'s (2009) parametric method to reweigh the sample and estimate the counterfactual saving rate, $E[X_H \mid D_H = 1] \cdot \hat{\beta}_C$, using the counterfactual coefficients, $\hat{\beta}_C$. This approach allows to further divide the contribution of each covariate into the composition and structure effects.

The counterfactual distribution is constructed using weighting functions, which are the inverse probabilities of being in group g given D_g:

$$\omega_W(D_W) \equiv \frac{D_W}{1-p} \qquad \omega_H(D_H) = \frac{D_H}{p} \qquad \omega_C(D_W, X) = \left(\frac{p(X)}{1-p(X)}\right)\frac{D_W}{p} \tag{5}$$

where p is the probability that individual i is Hispanic and $p(x) = Pr[D_H = 1 \mid X = x]$ is the conditional probability that an individual i is Hispanic given $X = x$. The first two reweighting functions transform quantiles of the marginal distribution of S into quantiles of the conditional distribution of S_g given $D_g = 1$. The third transforms the 0.50-quantile of the marginal distribution of S into the 0.50-quantile of the counterfactual distribution of S_W given $D_H = 1$.

[15] The assumption of conditional independence ensures that $\triangle_X^{0.50}$ only captures changes in the distribution of X rather than in the joint distribution of (X, ν).

[16] Even though a regression is the best linear approximation for a given distribution of covariates, this approximation may change when such distribution changes. Thus, even if the structure effect does not change, β_W and β_H may be different just because they are estimated for different distributions of covariates and the underlying relationship is non-linear.

The RIF-regression method proposed by Firpo et al. (2009) provides a linear approximation to a non-linear functional of the distribution of $S_g \mid D_g$. It is similar to a standard regression where the dependent variable S is replaced by the recentered influence function (RIF) of the median. The influence function corresponding to an observed outcome S for the 0.50-quantile, $Q_{0.50}(F_S)$, is defined as $\text{IF}(S;Q_{0.50}) = (0.50 - \mathbf{1}\{S \leq Q_{0.50}\}) \,/\, f_S(Q_{0.50})$, where $\mathbf{1}\{\cdot\}$ is an indicator function, $f_S(\cdot)$ is the density of the marginal distribution of S, and $Q_{0.50}$ is the population 0.50-quantile of the unconditional distribution of S. The recentering consists on adding the 0.50-quantile to the influence function; therefore the RIF can be written as:

$$\text{RIF}(S;Q_{0.50}) \quad = \quad Q_{0.50}(F_S) + \text{IF}(S;Q_{0.50}) \tag{6}$$

The estimation of the RIF requires computing the sample median, $\hat{Q}_{0.50}$, and the density at the median, $\hat{f}\left(\hat{Q}_{0.50}\right)$, using kernel methods. The reweighted estimates of the sample median are defined as follows:

$$\begin{aligned} \hat{Q}_{g;0.50} &= \arg\min_Q \sum_{i \in G} \hat{\omega}_g^*(D_{gi}) \cdot \mid S_i - Q \mid, \qquad g = H, W \\ \hat{Q}_{C;0.50} &= \arg\min_Q \sum_{i \in G} \hat{\omega}_C^*(D_{gi}) \cdot \mid S_i - Q \mid \end{aligned} \tag{7}$$

where $\hat{Q}_{g;0.50}$ is the median for the F_{S_g} distributions and $\hat{Q}_{C;0.50}$ is the median for the counterfactual distribution F_{S_C}. The weighting functions are estimated from (5) as functions of $\hat{p} = N^{-1}\sum_{i=1}^{N} D_{Hi}$ and $\hat{p}(X)$, an estimator of the true probability of being Hispanic given X, modeled as a logit. By plugging the estimates $\hat{Q}_{0.50}$ and $\hat{f}\left(\hat{Q}_{0.50}\right)$ into equation (6), it is possible to obtain an estimation of the RIF for each observation i, $\widehat{\text{RIF}}\left(S_i;Q_{g;0.50}\right)$.

Once the RIF is computed, the next step is to run regressions of the RIF on the vector of covariates. In the simplest approach, the conditional expectation of the $\text{RIF}(S;Q_{0.50})$ can be modeled as a linear function of the explanatory variables,

$$\mathbb{E}\left[\text{RIF}(S;Q_{0.50}) \mid X\right] = X\beta + \varepsilon \tag{8}$$

where the parameters β can be estimated by OLS. The linear approximation allows to compute partial effects of a single regressor on the functional being approximated, $Q_{0.50} = Q_{0.50}(F_S)$.

The coefficients estimated from the RIF-regressions are:

$$\hat{\beta}_{g,0.50} = \left(\sum_{i \in G} \hat{\omega}_g^* (D_{gi}) X_i \cdot X_i' \right)^{-1} \cdot \sum_{i \in G} \hat{\omega}_g^* (D_{gi}) \widehat{\text{RIF}} \left(S_i; Q_{g;0.50} \right) \cdot X_i, \quad for\ g = H, W \quad (9)$$

$$\hat{\beta}_{C,0.50} = \left(\sum_{i \in G} \hat{\omega}_C^* (D_{Wi}, X_i) X_i \cdot X_i' \right)^{-1} \cdot \sum_{i \in G} \hat{\omega}_C^* (D_{Wi}, X_i) \widehat{\text{RIF}} (S_i; Q_{C;0.50}) \cdot X_i \quad (10)$$

where $\hat{\beta}_{g,0.50}$ is the regression coefficient for group g and $\hat{\beta}_{C,0.50}$ is the regression coefficient when White data is reweighted to have the same distribution of X as Hispanics.

Finally, the effect of changes from $D_W = 0$ to $D_W = 1$ on the 0.50-quantile can be decomposed into the estimated composition and structure effects, $\hat{\triangle}_X^{0.50}$ and $\hat{\triangle}_Y^{0.50}$, defined as:

$$\hat{\triangle}_X^{0.50} = \left(E[X_W | D_W = 1] - E[X_W | D_W = 0] \right) \hat{\beta}_{W;0.50} + \hat{R}_X^{0.50} \quad (11)$$

$$\hat{\triangle}_Y^{0.50} = E[X_H | D_H = 1] \left(\hat{\beta}_{C;0.50} - \hat{\beta}_{H;0.50} \right) + \hat{R}_Y^{0.50} \quad (12)$$

where the White sample is reweighted to mimic the Hispanic sample. In the structure effect in (12) the difference $\hat{\beta}_{C;0.50} - \hat{\beta}_{H;0.50}$ is used instead of $\hat{\beta}_{W;0.50} - \hat{\beta}_{H;0.50}$. The latter may be contaminated by differences in the distribution of X between Whites and Hispanics, whereas the former solely reflects differences in the saving structures. $\hat{R}_X^{0.50} = E[X_H | D_H = 1] \left(\hat{\beta}_{W;0.50} - \hat{\beta}_{C;0.50} \right)$ is the specification (approximation) error given by the difference between the explained gap across the standard and the reweighted RIF-regression decompositions. It results from the fact that the RIF-regression approach provides a first-order approximation to the composition effect. When that approximation is accurate because the linear model is well specified, the error is expected to be small. The term $\hat{R}_Y^{0.50} = \left(E[X | D_W = 1] - E[X | D_W = 0] \right) \hat{\beta}_{C;0.50}$ is the reweighting error correspond-

ing to the difference between the unexplained gap across the standard and the reweighted RIF-regression decompositions. This term should be close to zero when the reweighting functions are consistently estimated.

I also use this framework to perform a detailed decomposition of the effect of individual predictors, such as income or education, to the composition effect. The non-error term in equation (11) equals the sum of the contribution of each covariate:

$$\left(\overline{X}_W - \overline{X}_C\right)\hat{\beta}_{W;0.50} = \sum_{k=1}^{K} (\overline{X}_{Wk} - \overline{X}_{Ck})\hat{\beta}_{Wk;0.50} \tag{13}$$

where $\overline{X}_{gk}$ and $\hat{\beta}_{gk;0.50}$ represent the k^{th} element of $\overline{X}_g$ and $\hat{\beta}_g$ respectively. The contribution of the k^{th} covariate to the composition effect is given by the term $\left(\overline{X}_{Wk} - \overline{X}_{Ck}\right)\hat{\beta}_{Wk;0.50}$.[17]

One limitation of the decomposition approach is that the identification of the composition and structure effects is guaranteed under two potentially problematic assumptions (Fortin et al., 2011). First, there should be an overlap in the supports of the distributions of characteristics for Hispanics (or Blacks) and Whites. The overlapping support assumption will be violated, for instance, if very high income values are only observed for Whites. This hinders the comparison of saving rates at higher quantiles, where is more plausible that the decompositions are out of the support. Second, there should be no systematic differences in omitted characteristics between groups (ignorability), even if the error term is correlated with some covariates. There are several omitted variables that can be correlated with race/ethnicity and saving rates after conditioning on observable characteristics, including financial literacy (Lusardi, 2005), length of the planning horizon and risk-aversion (Scholz and Levine, 2004) and conspicuous consumption (Charles et al., 2009). These two assumptions are hard to test and it should be noted that their violation could affect the ability to identify separately the structure and composition effects.

A recurrent issue in the literature is that more is explained if coefficients from

[17] I do not estimate the detailed structure effects because they are not very informative: The individual predictors present a large volatility and depend arbitrarily on the choice of the omitted group when the explanatory variables are categorical (Oaxaca and Ransom, 1994).

Whites are used as reference groups to predict wealth for Blacks than the other way around (Altonji and Doraszelski, 2005). Here I only examine the counterfactual that uses the White coefficients as reference in equation (11), as in Barsky et al. (2002). Using Hispanics (or Blacks) as the reference group corresponds to an alternative counterfactual: What would happen to the gap in saving rates if Whites were given Hispanic (or Black) saving structures but retained their own characteristics? The problem is that reweighting the Hispanic (or Black) sample to mimic the White sample results in a large error, which is related to the lack of common support. Ultimately, the election of the counterfactual is dictated by the research question. In the presence of an assimilation or catch-up process, minorities are more likely to adopt the White saving rate whereas the opposite is less likely.

4.2 Empirical application

To perform the decompositions, I pool the saving rates of the two periods. The choice of regressors is based on theoretical considerations and empirical evidence of characteristics that are relevant for household savings decisions. Following the literature on racial wealth inequality, I control for the logarithm of family income, a proxy for permanent income computed for each period as the average over 1994, 1996 and 1998 and over 2000, 2002 and 2004.[18] To allow for non-linearities in the relationship between saving rates and permanent income, I use restricted cubic splines with four knots, more flexible than polynomials.

In addition, I control for a restricted cubic spline of the age of the household head to allow for different marginal effects at different ages. I also include the number of children in the household, which affects savings directly via consumption needs and more indirectly through its effect on the subjective probability to leave a bequest and to

[18] A spurious negative correlation between saving rates, where income enters in the denominator, and income may arise if measured income differs from lifetime income when the former contains transitory components and there is measurement error. Dynan et al. (2004) find that a simple average of current income eliminates much of its transitory effects, being a good proxy for permanent income.

receive support from children after retirement. And I include dummies for: i) the head's and the spouse's educational attainment, which is seen as a proxy for permanent income, is correlated with tastes towards savings and affects the ability to plan for retirement; ii) marital status, which captures differences between married and single households in their savings capacity; iii) birthplace, which accounts for differences in labor market skills and economic opportunities between U.S. and foreign born households; and iv) region of residence, using three dummies based on the statistical regions from the U.S. Census Bureau (Northeast and Midwest, South, West).[19] I also include among the covariates an indicator for period 1998-2004 to control for any aggregate time effects. To avoid that the choice of the omitted category influences the estimated effects, all categorical regressors are normalized following the "averaging approach" from Yun (2005). See Appendix B for variables' definitions and Table A.1 for summary statistics. Standard errors are calculated using bootstrapping methods with 200 replications, clustered at the family level.

The "unexplained component" can be interpreted as the treatment effect of ethnicity on saving rates. Despite this parallel with the program evaluation literature, the decomposition results do not have a causal interpretation. For causal inference it is critical that each household be potentially exposable to any of the causes (Holland, 1986) and race or ethnicity is not a choice or a manipulable action in general. Nix and Qian (2015) find that race change in US was a widespread phenomenon between 1880 and 1940, responding to strong social, economic and political incentives for Blacks to "pass" for Whites. Liebler et al. (2014) find that 1 percent of Blacks changed to White and 5 percent changed from Hispanic to non-Hispanic in 2000 and 2010. But even if individuals may change their race or ethnicity, my results can be interpreted as capturing the association between ethnic/racial self-identity and savings. If the interest were in studying the effect of enslavement, discrimination or language barriers on saving decisions, then it becomes important to understand what drives the changes in ethnic/racial identity. Besides,

[19] I pool Northeast and Midwest because the low number of Mexican Americans in the Northeast may lead to violate the overlapping support assumption.

note that the measure of the ethnic savings gap based on self-reported ethnicity rather than on the birthplace of the individual and his ancestors may be overestimated if the better off, higher-generation Hispanics do no self-identify as such (Duncan and Trejo, 2011). However, it is not obvious how this selective ethnic attrition will affect the decomposition results, given that it will also bias downwards all Hispanic indicators of socioeconomic progress.

4.3 Decomposition results

Median differentials between Mexican Americans and Whites

Table 3 reports the results of decompositions in the wealth and savings gaps between Mexican Americans and Whites. Table A.2 and Table A.3 show the RIF-regression models estimated for median wealth and saving rates from equation (8), with the coefficients given by (9) and (10). The first column in Table 3 shows that 113% of the median gap in wealth levels (USD 140 thousand) is explained by the composition effect. The wealth structure effect, i.e. the return to the characteristics, is small and not significant. The interpretation of the composition effect is that if Mexican Americans retained their income and demographics but had the same wealth function as Whites, then the median wealth gap will be 13% higher. This suggests that, given their endowments, Mexican Americans are not accumulating less wealth than Whites: Differences in income and demographics fully account for the ethnic gap. Using a similar set of regressors, Cobb-Clark and Hildebrand (2006) estimate a slightly smaller contribution of the composition effect, around 88-89% of the median gap between Mexican Americans and Whites.

Direct examination of saving rates shows large unconditional gaps. At the median, the total and active saving rates are 9p.p. and 2.5p.p. larger for Whites than for Mexican Americans. This implies that passive savings are responsible for more than two-thirds of the ethnic gap in accumulation of wealth out of income. These gaps are mostly explained by differences in household characteristics: The composition effect accounts for 77% of the gap in total saving rates and for 123% of the gap in active saving rates. It is striking that

Table 3: Median regression decompositions of the Mexican Americans to Whites gaps in wealth and saving rates

							Including S.S. and Pensions			
	Level of wealth		Total saving rate		Active saving rate		Level of wealth		Total saving rate	
	(1)		(2)		(3)		(4)		(5)	
Total gap	140,256		0.087		0.025		266,575		0.044	
	(7,087)		(0.013)		(0.007)		(15,017)		(0.043)	
Composition effect	159,047	(113%)	0.067	(77%)	0.031	(123%)	245,534	(92%)	0.009	(20%)
	(20,237)		(0.017)		(0.009)		(30,784)		(0.026)	
Structure effect	1,819	(1%)	0.048	(55%)	−0.066	(−261%)	−40,201	(−15%)	0.101	(231%)
	(32,524)		(0.049)		(0.024)		(86,631)		(0.094)	
Specification error	22,390	(16%)	0.010	(11%)	0.004	(18%)	44,451	(17%)	−0.006	(−15%)
	(12,843)		(0.010)		(0.005)		(20,958)		(0.016)	
Contributions to the composition effect by component										
Income	69,571	(50%)	0.053	(60%)	0.022	(89%)	118,106	(44%)	0.010	(22%)
	(11,751)		(0.010)		(0.006)		(19,404)		(0.015)	
Education	66,682	(48%)	0.026	(30%)	0.013	(50%)	112,324	(42%)	0.031	(71%)
	(9,651)		(0.010)		(0.006)		(18,856)		(0.016)	
Demographic charact.	19,903	(14%)	0.006	(7%)	0.004	(14%)	20,198	(8%)	−0.003	(−7%)
	(7,723)		(0.005)		(0.003)		(16,367)		(0.009)	
Birthplace	−2,628	(−2%)	−0.014	(−16%)	−0.005	(−18%)	−12,214	(−5%)	−0.020	(−45%)
	(7,405)		(0.009)		(0.006)		(13,012)		(0.013)	
Region of residence	5,842	(4%)	−0.003	(−4%)	−0.003	(−13%)	8,298	(3%)	−0.008	(−18%)
	(5,236)		(0.005)		(0.003)		(5,737)		(0.007)	
1998-2004	−323	(−0%)	−0.001	(−1%)	0.000	(1%)	−1,177	(−0%)	−0.001	(−3%)
	(890)		(0.002)		(0.001)		(2,637)		(0.003)	

Notes. The table reports the RIF-regression decompositions of the median differences in wealth levels and saving rates between Mexican Americans and Whites, using the White coefficients as reference. The difference between the total gap and the sum of the composition and structure effects and the specification error is the reweighting error. Household data is from the HRS for the period 1992-2004. Saving rates are defined as the ratio of saving over six times income during the same period. Total saving is the change in net wealth between 1992 and 1998 and between 1998 and 2004. Active saving is the sum of net flows of money saved in individual assets. Passive saving is the difference between total change in wealth and active savings. Sample consists of HRS households whose head and spouse were the same and were not claiming S.S. between 1998 and 2004 and whose head was between 50 and 65 years old in 2004. Households with mixed-ethnicity couples are excluded. The observations for the two periods are pooled and fixed-effects for the second period are included (1998-2004). Income is a restricted cubic spline with four knots of (log) household income (as of 1998 and 2004 for the wealth models and as of 1994-1998 and 2000-2004 for the saving rates models); education are dummies for the head and the head's spouse education level (no high school diploma, high school graduate and college/postcollege graduate); demographic characteristics include a restricted cubic spline in age, number of children, and dummies for head's marital status; birthplace is an indicator for being U.S. or foreign born; and region of residence are dummies for the statistical regions defined by the US Census Bureau (Northeast and Midwest, South, West). In the decompositions including retirements assets, household income is adjusted for earnings corresponding to employer contributions to DB and DC plans and to S.S.. Categorical regressors are normalized using an "averaging approach" (Yun, 2005). Percent of total variation in parentheses, next to the estimated output. Bootstrapped standard errors (200 reps.) are in parenthesis.

the composition effect explains more of the gap in active than in total saving rates. One possibility is that, whereas active savings are more likely to reflect conscious households' "choices", total savings are also affected by "chance" through exogenous shocks to asset prices.[20] Differences in coefficients between groups, holding characteristics constant, do not have a significant contribution to the gap in total saving rates but have a large and negative contribution to the gap in active saving rates. Thus, differences in the return to characteristics actually reduce the active savings gap: If Whites had the same income and demographics as Mexican Americans but retained their functions, then differences in active saving rates will be smaller.

When S.S. and pensions are included, the unconditional wealth gap goes up by USD126 thousand; however, as a fraction of the median wealth level it declines from 106% to 76%. The gap in total saving rates decreases by 4p.p., which as a fraction of the median saving rate represents a reduction from 128% to 23%. The contribution of the composition effect also declines: Differences in endowments explain 92% of the gap in total wealth and are not significant for the gap in saving rates. The reduction in the relative size of the gaps and the lower role of the composition effect after including retirement assets is the counterpart of the equalizing effect of S.S. wealth across households. Given the almost universal coverage of S.S., differences in observable characteristics matter less to account for disparities in wealth and in saving rates. The estimated structure effects remain not significant both for the decompositions of wealth in levels and of saving rates.

The contributions of single set of predictors to the composition effect is summarized at the bottom of Table 3.[21] Between 44% and 50% of the gap in wealth levels is explained by income and between 42% and 48% by education. Cobb-Clark and Hildebrand (2006) estimate a similar contribution for education but a smaller for income (10-21%). The larger income contribution estimated here may reflect the flexibility of the

[20] Venti and Wise (1998) propose the 'chance' versus 'choice' framework to understand the sources of wealth dispersion.

[21] Each factor's contribution is the sum of the contributions of all the corresponding covariates. For example, the contribution of education adds up the six education dummies for the head and the head's spouse.

cubic spline transformation and the better quality of the HRS income measure relative to the SIPP measure used in their study.[22] In the decompositions for saving rates, the contribution of income is even larger (60%) and education still has an important role (30%), but both are more important to explain differences in active saving rates (89% and 50%). As noted earlier, this could reflect that total savings are capturing price dynamics that are outside of households' control. Demographic characteristics explain 14% of the wealth gap excluding retirement assets, slightly less than in Cobb-Clark and Hildebrand (2006), who attribute 20-30% of the gap to the fact that Mexican Americans have more young children and heads who are younger. Region of residence is not significant. Being born in US or abroad does not play a differential role either, despite the differences in labor market skills and economic opportunities. Possibly the stronger incentives faced by Mexican immigrants to save - either in the host country or to send remittances to the home country - offset the assimilation effects experienced by those born in the US. Moreover, even if born abroad, older Hispanics may have also been largely exposed to US institutions. This is in line with Cobb-Clark and Hildebrand (2006), who decompose the wealth differences between Mexicans born abroad and in the US and find that they can be explained by income and background characteristics.

Median differentials between African Americans and Whites

Table 4 presents the decomposition results for African Americans. In comparison to Table 3, the smaller specification errors (except in the decomposition of saving rates including retirement assets) indicate that the linear model provides a more accurate approximation for the racial than for the ethnic gap. The first column shows that 93% of the median gap in wealth levels (USD 139 thousand) is explained by differences in observable characteristics between Whites and Blacks. This implies that almost the whole racial gap in wealth levels will disappear if Blacks were given White functions but retain their

[22]The SIPP captures less wage and salary income and substantially less property income than the Current Population Survey (CPS), the official source of income statistics for the U.S., and as a result underestimates total CPS income (Czajka, 2009).

Table 4: Median regression decompositions of the African Americans to Whites gaps in wealth and saving rates

							Including S.S. and Pensions			
	Level of wealth		Total saving rate		Active saving rate		Level of wealth		Total saving rate	
	(1)		(2)		(3)		(4)		(5)	
Total gap	148,411		0.088		0.028		233,368		0.010	
	(7,028)		(0.008)		(0.008)		(14,868)		(0.020)	
Composition effect	138,692	(93%)	0.070	(80%)	0.028	(98%)	190,537	(82%)	−0.013	(−133%)
	(12,671)		(0.010)		(0.005)		(18,132)		(0.016)	
Structure effect	−11,598	(−8%)	0.017	(19%)	0.000	(1%)	20,779	(9%)	0.017	(172%)
	(10,168)		(0.011)		(0.010)		(17,802)		(0.024)	
Specification error	−631	(−0%)	−0.003	(−4%)	0.000	(1%)	1,567	(1%)	0.010	(105%)
	(6,204)		(0.005)		(0.002)		(8,025)		(.011)	
Contributions to the composition effect by component										
Income	71,616	(48%)	0.054	(62%)	0.020	(73%)	120,276	(52%)	−0.007	(−68%)
	(7,372)		(0.010)		(0.005)		(12,853)		(0.016)	
Education	31,638	(21%)	0.015	(17%)	0.007	(27%)	51,758	(22%)	0.010	(98%)
	(10,971)		(0.007)		(0.004)		(29,299)		(0.015)	
Demographic charact.	26,994	(18%)	−0.001	(−1%)	0.001	(2%)	13,107	(6%)	−0.018	(−187%)
	(11,224)		(0.008)		(0.005)		(27,625)		(0.015)	
Birthplace	−318	(−0%)	−0.002	(−2%)	−0.001	(−2%)	−821	(−0%)	−0.002	(−21%)
	(769)		(0.002)		(0.001)		(1,206)		(0.002)	
Region of residence	8,565	(6%)	0.003	(3%)	0.000	(1%)	5,565	(2%)	0.004	(40%)
	(2,368)		(0.003)		(0.001)		(2,815)		(0.004)	
1998-2004	197	(0%)	0.000	(0%)	0.000	(1%)	653	(0%)	0.001	(7%)
	(451)		(0.001)		(0.000)		(1,074)		(0.001)	

Notes. The table reports the RIF-regression decompositions of the median differences in wealth levels and saving rates between African Americans and Whites, using the White coefficients as reference. The difference between the total gap and the sum of the composition and structure effects and the specification error is the reweighting error. Household data is from the HRS for the period 1992-2004. Sample restrictions, savings definitions and the predictors are the same as in Table 3. Percent of total variation in parentheses, next to the estimated output. Bootstrapped standard errors (200 reps.) are in parenthesis.

own characteristics. Thus, divergence in conditional wealth distributions is not driving the racial wealth gap, as suggested by some studies that estimate a smaller composition effect. In decompositions for the mean wealth gap, Blau and Graham (1990) estimate a similar contribution of the composition effect for singles (96.6%) but smaller for married couples (73.6%). Cobb-Clark and Hildebrand (2006) only explain 45% of the median racial gap, whereas the remaining 55% corresponding to the wealth structure effect is not significant. Here the estimated structure effect is small and not significant either.

The table also shows a large unconditional gap in saving rates of 8.8p.p. and in active saving rates of 2.8p.p., similar to the corresponding ethnic gaps. As in the case of the wealth gap, most of these large differences in saving rates can be explained by differences in observable characteristics. The explained fraction of the gap in total saving rates is 80%, 18p.p. lower than in active saving rates, more influenced by households' choices. The contribution of the structure effect is small and insignificant. This provides further evidence that African Americans do not present substantial differences in saving rates with Whites at the median that cannot be accounted by their income and demographic characteristics. This is in line with the findings in Gittleman and Wolff (2004), even though their estimates of the median racial gaps in total and active saving rates are non-existent or smaller (-6.6p.p. and 0.3p.p.). By adding retirement assets, I estimate an increase in the wealth gap of USD85 thousand, representing a decline from 113% to 66% relative to the median wealth level, and a decrease in the savings rate gap of 8p.p., which represents a decline from 129% to 5% relative to the median saving rate. The relative declines in the gaps after adding retirement assets are larger than for Mexican Americans. This suggests that Mexicans are saving relatively less for retirement, even compared to Blacks. The contribution of the composition effect to the wealth gap declines slightly, whereas it becomes negative for saving rates but not precisely estimated.

If wealth and savings differences between Blacks and Whites result mostly from differences in income and in observable characteristics, which factors matter more? Total household income plays the main role with a significant contribution that goes from

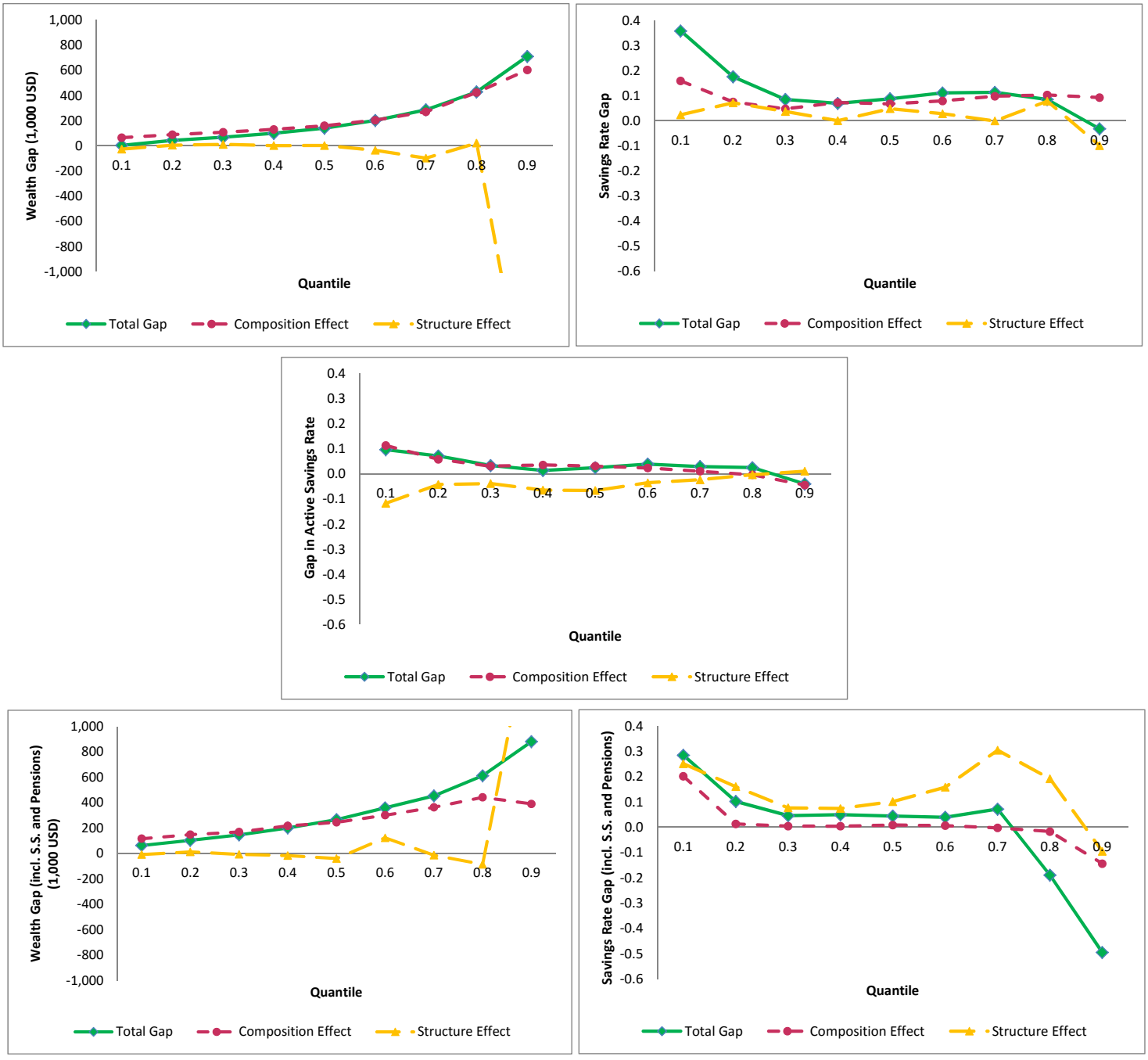
around 50% (wealth level) to 60-70% (saving rates). Education explains close to 20% of the gap in wealth levels and between 17-27% of the gaps in saving rates excluding retirement assets. As in the case of the ethnic gap, income and education are the only significant factors that explain racial differences in saving rates. The other factors that matter for the racial gap in wealth levels, excluding retirement assets, are demographic characteristics (18%) and region of residence (6%). Birthplace does not contribute to explain wealth differences between Whites and Blacks, which is not surprising since only 6.2% of the Blacks in the sample are born abroad. As noted already for Mexican Americans, Cobb-Clark and Hildebrand (2006) estimate a smaller income contribution to the gap in wealth levels (10%), and a more similar contribution for education (19%), demographics (6%) and region of residence (10%).

Decompositions of ethnic and racial gaps at various quantiles

In this section I show the ethnic and racial gaps at each decile of the wealth and savings distributions as well as the composition and structure effects. The tails of the distribution of saving rates may partly capture measurement error. For that reason, the most robust findings for saving rates are those between the 25th and 75th percentiles approximately. Figure A.3 and Figure A.4 summarize the specification and reweighting errors for the Mexican-White and Black-White decompositions. The specification error plotted in Panel A, $\hat{R}_X$, is small in both set of decompositions, suggesting that the linear model is well specified. The reweighting error plotted in Panel B, $\hat{R}_Y$, tends to increase at the top of the wealth distribution in both cases, an indicator that the reweighting factor may be less consistently estimated at that segment. For that reason, I will not draw any inference from the estimated structure effect at high percentiles. Since the reweighting error goes to zero in large samples, it is possible that the smaller Mexican sample explains why such error is slightly larger (in absolute terms) for the ethnic than for the racial decompositions of saving rates.

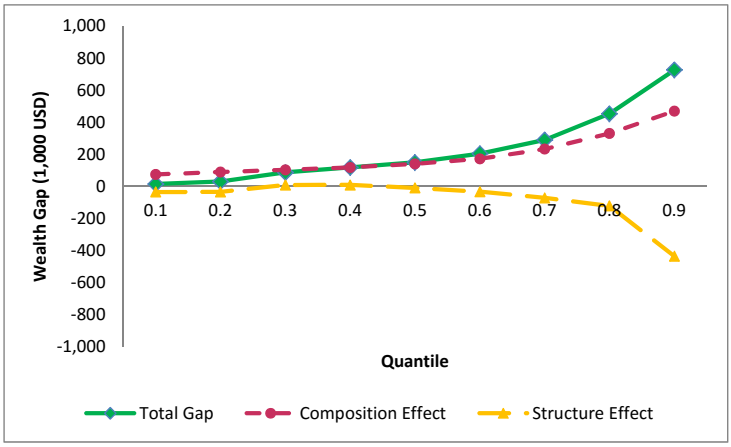
Figure 4 shows that the gap in wealth levels between Mexican Americans and

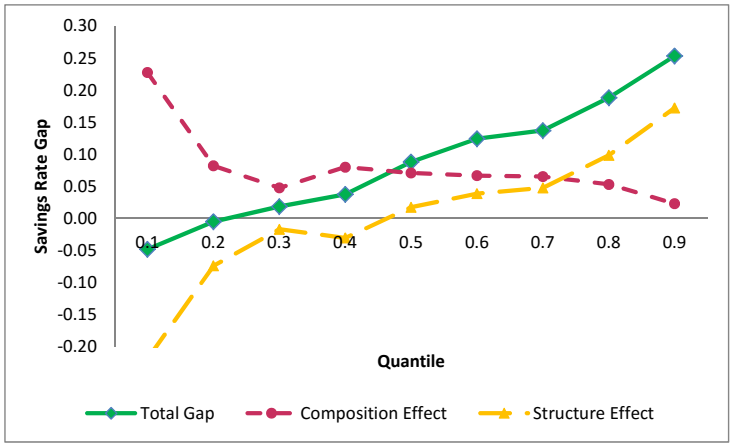
Figure 4: Quantile decomposition of the Mexican Americans to Whites gaps into composition and structure effects

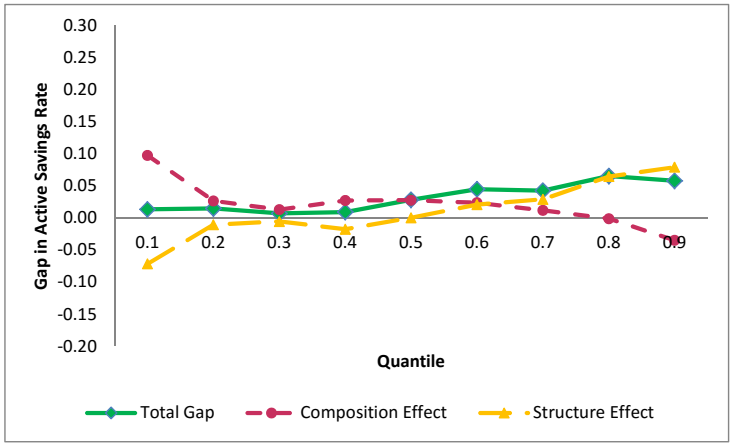


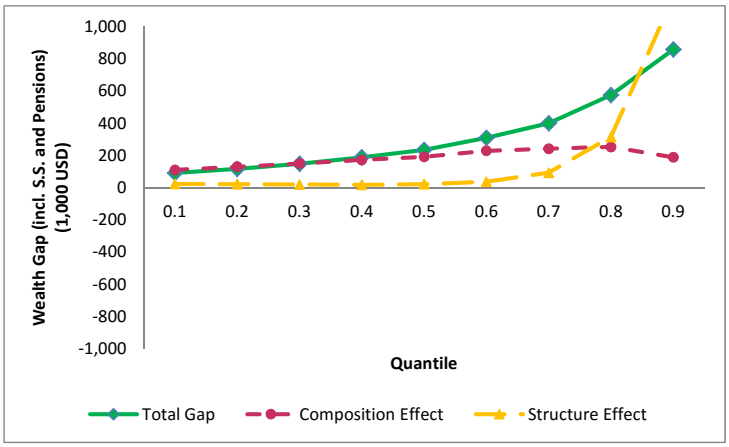
Notes. The figure shows the RIF-regression decompositions of quantile differences in wealth levels and saving rates between Mexican Americans and Whites, using the White coefficients as reference. The difference between the total gap and the composition and structure effects is the sum of the specification and reweighting errors. All specifications are the same as in Table 3.

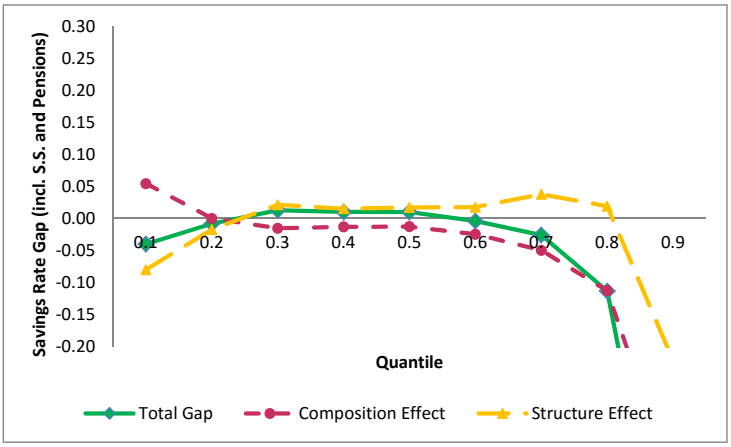
Figure 5: Quantile decomposition of the African Americans to Whites gaps into composition and structure effects











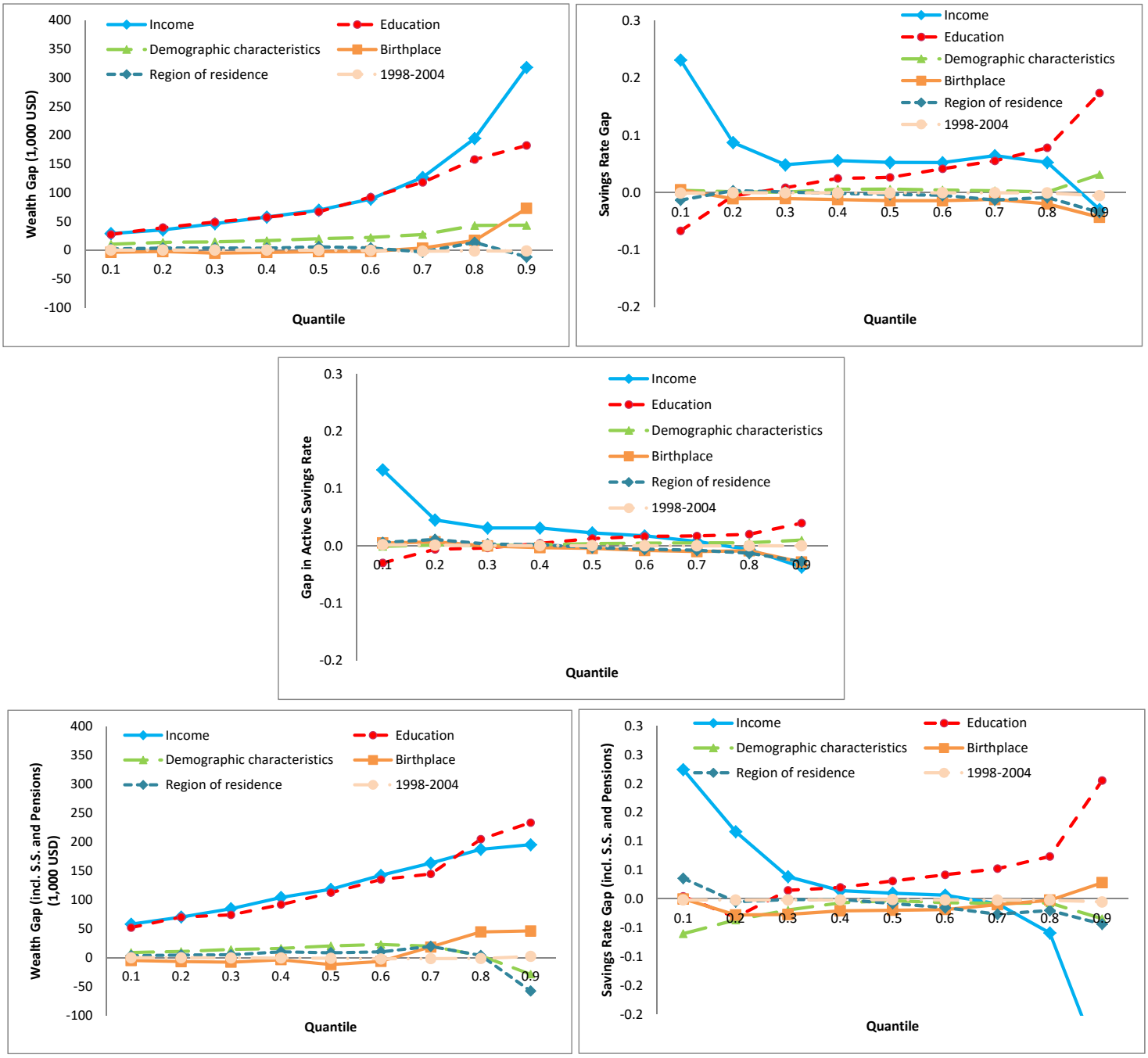
Notes. The figure shows the RIF-regression decompositions of quantile differences in wealth levels and saving rates between African Americans and Whites, using the White coefficients as reference. The difference between the total gap and the composition and structure effects is the sum of the specification and reweighting errors. All specifications are the same as in Table 4.

Whites is positively sloped since wealth differentials increase at higher quantiles of the distribution. Composition effects contribute to most of the these differences in wealth inequality, whereas the contribution of the structure effect is almost null up to the 80th percentile. The gap in saving rates is instead relatively flat at the middle of the distribution (between the 30th and 80th percentiles). In general, the composition effects also have a higher contribution to saving rates' inequality than the structure effects. After including retirement assets, the gap in saving rates narrows down considerably. The structure effect becomes more important than the composition effect that, except at the tails, has almost a null contribution. As noted earlier, this can be attributed to the equalizing effect of S.S. that reduces the importance of household characteristics to explain the savings gap.

Figure 5 shows the same estimates as in Figure 4 but for the racial gap. The gap in wealth levels presents a similar pattern as the ethnic gap and is also explained by composition effects. The gap in saving rates is positively sloped and this feature is captured by the structure effect, which is significant at every decile except at the median. In contrast, the composition effect is flat throughout the distribution, as it is for the ethnic gap. As a result, composition effects become relatively less important at the upper middle of the distribution. Thus, factors other than income and demographics may drive the racial differences in saving rates at higher quantiles. The inclusion of retirement assets revert that pattern: The saving rate gap becomes flatter and close to zero at the middle of the distribution and negative at the upper end.

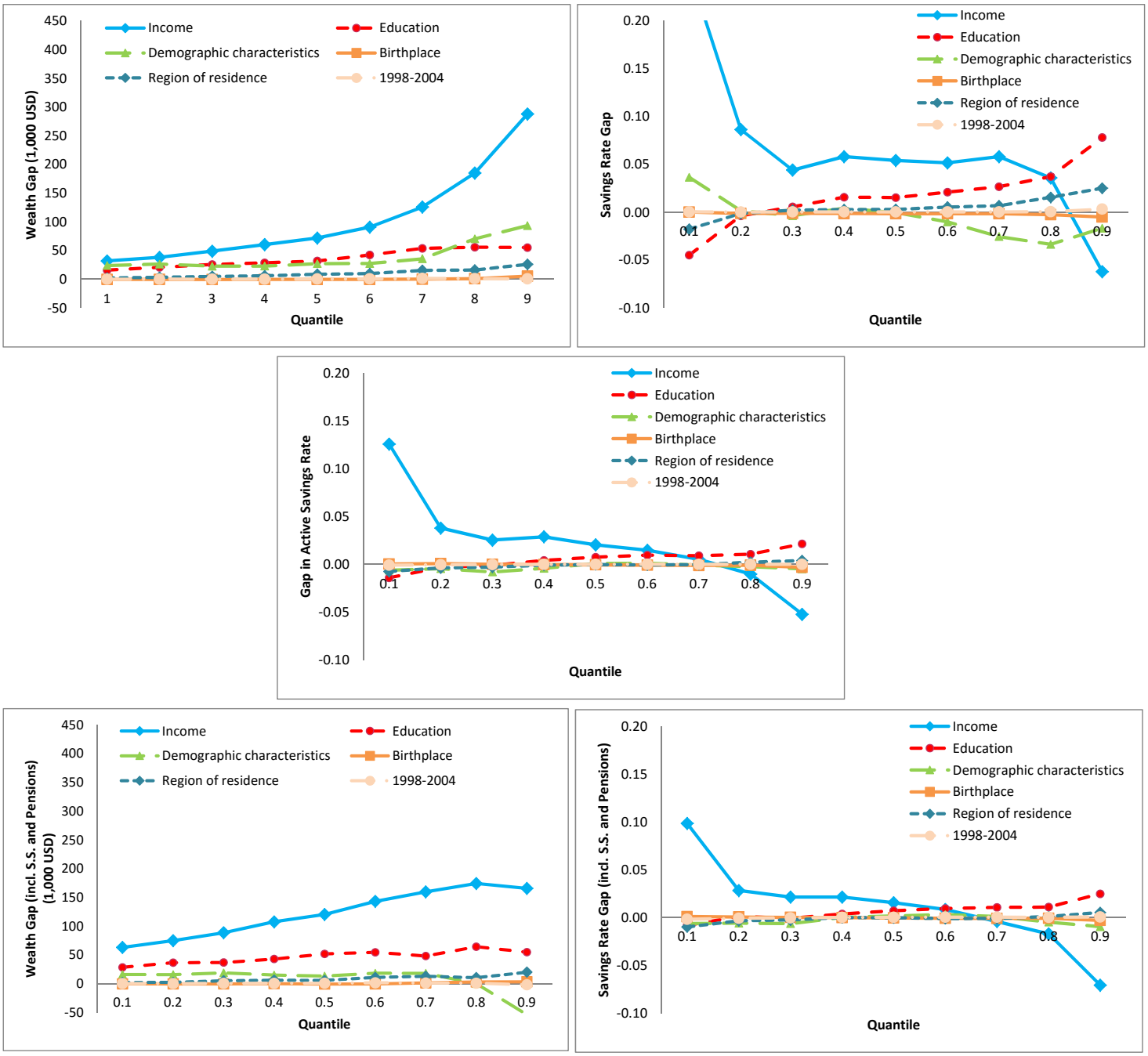
Figure 6 and Figure 7 divide the composition effect into the contribution of each set of covariates. As noted already for the median, the composition effects for the ethnic wealth gap in Figure 6 are dominated by income and education, with almost the same contribution up to the 70th percentile. The contribution of the remaining factors is comparatively much smaller. In the case of saving rates, income becomes more important relative to education, except at the top of the distribution where education has a higher contribution. With the inclusion of retirement assets, the contributions of income and education decline. The decline in the income contribution is particularly large for saving

Figure 6: Detailed quantile decomposition of composition effects for the Mexican Americans to Whites gaps



Notes. The figure shows the detailed decompositions of the composition effects corresponding to Figure 4.

Figure 7: Detailed quantile decomposition of composition effects for the African Americans to Whites gaps



Notes. The figure shows the detailed decompositions of the composition effects corresponding to Figure 5.

rates. This responds to the progressive design of S.S., which is structured to be relatively more generous with low-income households. In Figure 7, the detailed decompositions show a similar pattern for the racial gaps. One remarkable difference is that education has a smaller contribution relative to income. Indeed, racial differences in wealth and saving rates are mostly driven by differences in income. This reflects that on average Mexican Americans are more disadvantaged relative to Blacks in terms of educational attainment than in terms of income. Table A.1 shows that there are 38% less Hispanics than Black household heads that completed high school and 66% less with a college or postcollege degree. On the other hand, Mexican Americans' mean income is only 9% lower than Blacks' income.

A measure of dispersion of the data is the interquartile range (IQR) -the difference between the 75th and 25th percentiles-, which eliminates the influence of outliers by removing the highest and lowest quarters. A relatively low IQR is an indication of low dispersion in the estimated gaps. Looking at this measure for wealth in levels, both Hispanics and African Americans present a similar gap with Whites (near USD300 thousand) and the composition effect explains more of the ethnic than of the racial gap (84% vs. 67%). Despite the similarities at the median, the 75-25 racial gaps in total saving rates (15.7%) and in active saving rates (4%) are considerably larger than the corresponding ethnic gaps (2.2% and -2.3%). This suggests that the racial gaps in saving rates are more spread than the ethnic gaps. This feature can be seen by comparing Figure 5, where the racial gap in saving rates is positively sloped, with Figure 4, where the ethnic gap is relatively flatter.

The role of capital income

The large role played by income in the decompositions could be due to using total household income as a proxy for lifetime resources. The life-cycle model states that saving rates are determined by permanent income, which originates from all human and non-human wealth. Since non-human wealth includes property and financial assets, capital income

originated from such sources, $r_{is-1}W_{is-1}$, needs to be included in the definition of permanent income. However, some previous studies for the racial wealth gap have excluded asset income (Barsky et al., 2002; Altonji and Doraszelski, 2005). As noted by Piketty (2007), the mechanisms explaining inequality of labor income (demand and supply of skills, labor market institutions, etc.) can be very different from those explaining inequality of capital income (past accumulation decisions, affected in turn by credit constraints, taxation, etc.). Returns may be correlated with wealth if rich households are able to spot more profitable investment opportunities, giving rise to a mechanic correlation between income and wealth or saving rates. Thus, in Appendix Table A.4 and Table A.5 I present the same decompositions as in Table 3 and Table 4 but excluding capital income from the right-hand side.[23] Note, however, that this implies excluding entrepreneurial income present in the HRS capital income measure.

Relative to Table 3, Table A.4 shows a drop in the contribution of the composition effect of near 10p.p. across most measures of wealth and saving rates. In the case of total saving rates, its contribution declines from 77% to 65% of the gap, but it does not change after including S.S. and pensions. As expected, the detailed decomposition shows a smaller role for income, especially in active saving rates, partially compensated by a larger role for education. These results imply that capital income is a non-trivial source of differentials in wealth and saving rates across ethnic groups. However, even excluding such source, differences in characteristics are still the main component of the ethnic gaps in wealth and in active saving rates. The contribution of the structure effect increases in all decompositions but is not statistically significant.

The same issues arise in the decompositions of the racial gap excluding capital income (Table A.5). The estimated composition effects decline (except for saving rates including retirement assets) whereas the structure effects increase. In particular, only 85% of the wealth gap and 64% of the total savings gap are explained by differences in

[23] Capital income is taxed significantly less than labor income and therefore may be an important source of inequality if Whites are more likely to earn it than Hispanics or Blacks.

endowments versus 93% and 80% including capital income. Thus, racial differences in conditional wealth and saving rates cannot be fully explained by differences in non-asset income and demographics, even though they remain the main source of the gaps. These estimates are in line with Altonji and Doraszelski (2005), who explain between 68% and 85% of the median wealth gap and 84% of the mean gap in saving rates. Barsky et al. (2002) explain 64% of the mean wealth gap with lifetime earnings, much more than the 15% estimated here for non-capital income. This difference could be partly attributed to the fact that the mean gap is larger than the median gap, and a larger fraction of the mean gap can be explained by observable characteristics (see Altonji and Doraszelski, 2005). Also, by excluding other observable characteristics correlated with lifetime earnings, Barsky et al. (2002) may be overestimating the contribution of earnings.

The decompositions by decile in Figure A.1 and Figure A.2 reveal that the importance of capital income is much larger at the upper middle of the wealth, and to a smaller extent, of the savings distributions. The total composition effect does not change substantially, but the portion of the gap explained by income in Panels B exhibits a dramatic decline at high quantiles relative to Figure 6 and Figure 7. This decline is compensated by an increase in the contribution of education and, for wealth in levels, demographic characteristics. Two reasons may explain this pattern. One is that the coefficient of total income in the White model is larger than the coefficient of non-capital income. That is, wealth holdings and saving rates are more sensitive to increases in total than in non-asset income. The other is that capital income is a more important source of inequality among the wealthier households and the ones that save more: At the 75th percentile, the ratios of Mexican to White and Black to White capital income are 32% and 6%, whereas the ratios for non-capital income increase to 47 and 59% .

5 Conclusion

While there is a broad literature looking at the reasons for differences in wealth between Black and White families, differences in saving rates have not been thoroughly explored

to date. In this study I examine racial as well as ethnic differences in wealth accumulation. If Hispanics and Blacks accumulate wealth at a different pace than Whites, a reduction in income inequality will not lead to an equivalent reduction in wealth inequality. Thus, conditional differences in saving rates may amplify wealth disparities across groups.

I find that income and education generally explain the ethnic and racial median gaps in active saving rates. Only at the upper middle of the distribution, where the gap between African Americans and Whites widens, racial differences in active saving rates are not fully explained by households' endowments. These results dwarf the importance of socio-demographic characteristics, such as being born abroad, in accounting for wealth disparities. Ethnic and racial differences in passive saving rates double those in active savings but there is suggestive evidence that they are not fully explained by observable characteristics. Including retirement assets, the differences in total saving rates disappear for Blacks, reflecting the equalizing role of S.S.. For Mexican Americans, who save less in private pensions than Whites and Blacks, some differences remain and are attributed to educational attainment and, to a smaller extent, income. Mexican Americans have lower education even than African Americans, and education is correlated with tastes toward savings and with the ability to plan for retirement.

Considering that the benefits of policies directly encouraging asset accumulation are captured by those with higher income (Woo et al., 2004), who are predominantly Whites, these results provide support to the traditional focus on income and education to fight ethnic and racial wealth inequality. The decompositions provide less support to interventions targeting other household choices, such as family size, which do not explain differences in saving behavior. Even though minority groups can save once they have the resources, they may not be saving in the right type of assets. An area for future research is to decompose the gaps in passive saving rates using direct rather than residual measures of capital gains and of changes in asset prices. Differences in portfolio composition and in asset-specific rates of return can result in different ex-post rates of return on savings that cannot be accounted by differences in socio-demographic characteristics. Finally, the

present results also highlight the need for interventions aimed at closing the ethnic gap in pension savings. Since S.S. offers a higher replacement rate to low-income people, the lower individual savings for retirement among Mexican Americans leave them more vulnerable if the generosity of public funds diminishes.

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Appendix A. Additional tables and figures

Table A.1: Descriptive statistics by ethnicity and race pooled across HRS panels, 1998-2004

	Mexican Americans		Other Hispanics		African Americans		Whites	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Total household income ($)	35,598	(32,201)	40,402	(56,758)	38,943	(41,067)	86,623	(132,987)
Non-capital income ($)	29,445	(28,941)	28,834	(33,336)	35,130	(33,970)	63,485	(73,653)
Education of head (%)								
No high school	66.4	(47.3)	59.0	(49.4)	38.5	(48.7)	16.5	(37.1)
High school	28.1	(45.0)	31.1	(46.5)	45.4	(49.8)	49.4	(50.0)
College/post-college	5.5	(22.9)	10.0	(30.1)	16.2	(36.8)	34.1	(47.4)
Education of spouse (%)								
No high school	42.7	(49.6)	22.3	(41.8)	8.4	(27.7)	10.1	(30.1)
High school	21.1	(40.9)	12.1	(32.7)	17.6	(38.1)	38.5	(48.7)
College/post-college	0.5	(7.2)	6.5	(24.8)	7.7	(26.7)	20.4	(40.3)
Age of head	56.5	(2.8)	57.0	(2.8)	56.9	(2.7)	56.6	(2.9)
Number of children	3.8	(2.3)	3.0	(1.8)	3.2	(2.2)	2.7	(1.8)
Marital status of head (%)	64.3	(48.0)	40.9	(49.4)	33.7	(47.3)	69.0	(46.3)
U.S. born (head, %)	61.9	(48.7)	23.8	(42.7)	93.8	(24.1)	96.2	(19.2)
Region of residence (%)								
Region 1	0.7	(8.3)	42.3	(49.6)	16.0	(36.7)	18.6	(38.9)
Region 2	6.0	(23.8)	3.2	(17.7)	19.0	(39.3)	26.9	(44.4)
Region 3	53.0	(50.0)	38.4	(48.8)	58.0	(49.4)	36.2	(48.1)
Region 4	40.3	(49.2)	16.1	(36.9)	6.9	(25.4)	18.3	(38.6)
Number of observations	234		126		895		3,439	

Notes. Calculations are based on HRS 1998 and 2004 panels. Sample consists of HRS households whose head and spouse were the same between 1992-1998 (1998-2004) and were not claiming S.S. during those years and the head was between 50 and 65 years old in 1998 (2004). Households with mixed-ethnicity couples are excluded. Data are weighted using the HRS household weights for 1998 and 2004.

Table A.2: Median RIF-regression coefficients on wealth levels

	Level of wealth			Level of wealth (incl. S.S. and pensions)		
	Whites	Mex Amer	Afr Amer	Whites	Mex Amer	Afr Amer
	(1)	(2)	(3)	(4)	(5)	(6)
Log income	-4,148	242	1,105	-15,975**	2,058	2,919
	(5,028)	(3,311)	(2,399)	(7,108)	(10,398)	(4,475)
Log income'	191,287***	50,146**	103,622***	438,346***	88,368*	300,101***
	(22,426)	(23,899)	(14,481)	(33,751)	(51,470)	(32,554)
Log income"	-777,568***	-288,830	-678,027***	-2,151,359***	-462,103	-2,153,906***
	(135,471)	(210,596)	(110,865)	(203,013)	(389,000)	(258,084)
No high school (head)	-77,673***	-15,567	-25,897***	-91,409***	-79,774***	-34,793**
	(12,734)	(13,842)	(6,886)	(19,738)	(29,648)	(13,972)
College/postcollege (head)	59,142***	45,973**	13,546	100,671***	31,721	52,897**
	(10,932)	(18,372)	(10,447)	(18,239)	(38,222)	(23,147)
No high school (spouse)	-43,448***	-31,448***	-12,311	-116,479***	19,839	-12,309
	(15,115)	(11,965)	(11,862)	(26,576)	(27,783)	(23,783)
College/postcollege (spouse)	13,902	30,096	-10,782	28,633	137,534**	-21,452
	(13,934)	(25,640)	(12,638)	(20,495)	(66,131)	(30,727)
Age	12,690***	7,742	3,241	7,921	18,482**	1,080
	(4,647)	(5,450)	(4,141)	(7,264)	(8,907)	(9,406)
Age'	3,828	-17,723	-3,624	52,107**	-16,840	4,301
	(15,887)	(20,884)	(12,879)	(26,345)	(37,740)	(28,194)
Age"	-19,613	32,484	13,176	-214,903**	-18,946	9,247
	(49,655)	(67,521)	(38,484)	(86,330)	(133,210)	(85,374)
Number of children	-14,133***	-3,201	-1,251	-24,815***	-11,134**	-9,801***
	(2,859)	(1,982)	(1,384)	(4,048)	(4,322)	(3,455)
Married	82,725***	60,660***	20,380**	114,305***	52,115	34,407*
	(13,370)	(15,862)	(8,558)	(21,374)	(33,839)	(20,471)
US born	-10,434	-541	-8,470	-50,767	-7,135	9,368
	(26,093)	(10,046)	(13,646)	(38,085)	(19,212)	(29,861)
1998-2004	11,404	466	1,661	56,773***	794	17,110
	(9,555)	(11,221)	(6,571)	(15,557)	(21,780)	(14,483)
Constant	-699,341***	-385,354	-196,061	-217,571	-818,411	-9,797
	(256,027)	(297,000)	(225,226)	(401,993)	(502,644)	(513,142)
Region of residence	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	.284	.294	.261	.350	.323	.377
Observations	3,446	234	901	3,241	205	786

Notes. The table reports the RIF-regression coefficients on median wealth levels by ethnicity and race. Household data is from the HRS for the period 1992-2004. Sample restrictions and the set of covariates are the same as in Table 3. In columns 4 to 6 household income is adjusted for earnings corresponding to employer contributions to DB and DC plans and to S.S. Bootstrapped standard errors (200 reps.) are in parenthesis.

Table A.3: Median RIF-regression coefficients on saving rates

	Total saving rate			Active saving rate			Total saving rate (incl. S.S. and pensions)		
	Whites	Mex Amer	Afr Amer	Whites	Mex Amer	Afr Amer	Whites	Mex Amer	Afr Amer
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log income	.041	.010	.019	-.000	.032	.013	-.058	-.124	-.074
	(.025)	(.070)	(.019)	(.013)	(.038)	(.018)	(.039)	(.110)	(.048)
Log income'	.070	-.110	.010	.053**	-.066	.001	.188**	-.156	.216
	(.047)	(.184)	(.045)	(.025)	(.114)	(.034)	(.073)	(.325)	(.137)
Log income"	-.420*	-.211	-.026	-.296**	-.016	.107	-.919**	1.868	-1.296
	(.253)	(1.786)	(.364)	(.143)	(1.111)	(.223)	(.418)	(3.499)	(1.103)
No high school (head)	-.040**	.034	-.020	-.011	.033	-.013	-.036	.011	-.001
	(.018)	(.062)	(.016)	(.009)	(.038)	(.010)	(.027)	(.107)	(.044)
College/postcollege (head)	.003	.207	.023	.002	-.013	-.001	-.026	.314	.019
	(.014)	(.152)	(.021)	(.008)	(.069)	(.014)	(.023)	(.267)	(.063)
No high school (spouse)	-.028	-.043	-.003	-.014	-.036	.021	-.034	-.033	-.000
	(.022)	(.070)	(.027)	(.010)	(.045)	(.014)	(.031)	(.134)	(.073)
College/postcollege (spouse)	-.021	.063	-.010	-.008	.191**	.010	.030	.320	-.138
	(.019)	(.247)	(.032)	(.009)	(.096)	(.019)	(.028)	(.569)	(.086)
Age	.008	-.005	.007	.002	.022	.004	.001	.023	.027
	(.006)	(.027)	(.008)	(.003)	(.014)	(.005)	(.009)	(.050)	(.025)
Age'	-.016	.007	-.018	.003	-.097*	-.020	.006	-.006	-.057
	(.023)	(.099)	(.027)	(.012)	(.058)	(.018)	(.034)	(.197)	(.087)
Age"	.042	.004	.063	-.017	.299	.062	-.073	-.187	.168
	(.075)	(.312)	(.085)	(.038)	(.190)	(.057)	(.110)	(.663)	(.273)
Number of children	-.006	-.001	.002	-.003*	-.009	.000	-.004	-.007	.002
	(.004)	(.011)	(.003)	(.002)	(.006)	(.002)	(.006)	(.021)	(.009)
Married	.008	.063	-.004	.010	.047	-.026*	-.041	.067	-.010
	(.018)	(.082)	(.022)	(.008)	(.052)	(.013)	(.029)	(.167)	(.062)
US born	-.056*	-.013	-.014	-.013	-.028	.011	-.101**	-.111	-.066
	(.031)	(.055)	(.028)	(.014)	(.032)	(.018)	(.047)	(.104)	(.087)
1998-2004	.016	.046	-.003	-.005	-.025	.003	.057***	.225**	.131***
	(.012)	(.060)	(.015)	(.006)	(.033)	(.009)	(.018)	(.099)	(.044)
Constant	-.748*	.147	-.624	-.103	-1.423*	-.404	.752	.063	-.655
	(.426)	(1.617)	(.459)	(.214)	(.839)	(.307)	(.603)	(2.953)	(1.399)
Region of residence	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	.048	.042	.032	.026	.072	.030	.022	.122	.029
Observations	3,443	232	900	3,443	232	900	3,192	199	761

Notes. The table reports the RIF-regression coefficients on median saving rates by ethnicity and race. Household data is from the HRS for the period 1992-2004. Sample restrictions, saving rates definitions and the set of covariates are the same as in Table 3. In columns 7 to 9 household income is adjusted for earnings corresponding to employer contributions to DB and DC plans and to S.S.. Bootstrapped standard errors (200 reps.) are in parenthesis.

Table A.4: Median regression decompositions of the Mexican Americans to Whites gaps excluding capital income

							Including S.S. and Pensions			
	Level of wealth		Total saving rate		Active saving rate		Level of wealth		Total saving rate	
	(1)		(2)		(3)		(4)		(5)	
Total gap	140,286		0.089		0.025		267,286		0.044	
	(6,789)		(0.012)		(0.008)		(13,491)		(.041)	
Composition effect	146,653	(105%)	0.058	(65%)	0.028	(114%)	230,421	(86%)	0.009	(20%)
	(17,380)		(0.017)		(0.009)		(26,646)		(0.025)	
Structure effect	26,203	(19%)	0.062	(70%)	−0.045	(181%)	20,790	(8%)	0.122	(276%)
	(32,269)		(0.043)		(0.027)		(88,082)		(0.073)	
Specification error	11,748	(15%)	0.002	(2%)	0.003	(11%)	30,720	(11%)	−0.004	(−9%)
	(8,606)		(0.008)		(0.004)		(15,853)		0.011	
Contributions to the composition effect by component										
Non-capital income	27,245	(34%)	0.034	(38%)	0.015	(59%)	41,004	(15%)	0.014	(32%)
	(12,007)		(0.007)		(0.004)		(12,441)		(0.009)	
Education	47,715	(59%)	0.036	(40%)	0.017	(69%)	159,879	(60%)	0.031	(71%)
	(36,905)		(0.011)		(0.006)		(22,216)		(0.016)	
Demographic characteristics	9,420	(12%)	0.008	(9%)	0.005	(18%)	29,656	(11%)	−0.005	(−12%)
	(14,491)		(0.005)		(0.003)		(15,783)		(0.008)	
Birthplace	−2,596	(−3%)	−0.015	(−17%)	−0.005	(−20%)	−7,437	(−3%)	−0.020	(−45%)
	(8,657)		(0.010)		(0.006)		(12,520)		(0.015)	
Region of residence	−716	(−1%)	−0.003	(−3%)	−0.003	(−13%)	8,105	(3%)	−0.011	(−25%)
	(7,205)		(0.005)		(0.003)		(6,888)		(0.008)	
1998-2004	−880	(−1%)	0.000	(0%)	0.000	(−1%)	−786	(0%)	−0.001	(−2%)
	(2,659)		(0.001)		(0.001)		(2,402)		(0.003)	

Notes. The table reports the RIF-regression decompositions of the median differences in wealth levels and saving rates between Mexican Americans and Whites, using the White coefficients as reference. Household data is from the HRS for the period 1992-2004. Sample restrictions and savings definitions are the same as in Table 3. Income is a restricted cubic spline with four knots of (log) household income exclusive of capital income (as of 1998 and 2004 for the wealth models and as of 1994-1998 and 2000-2004 for the saving rates models). The remaining predictors are the same as in Table 3. Percent of total variation in parentheses, next to the estimated output. Bootstrapped standard errors (200 reps.) are in parenthesis.

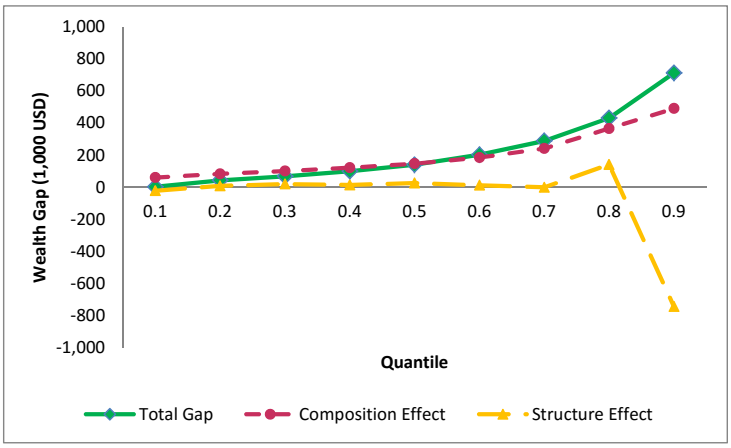
Table A.5: Median regression decompositions of the African Americans to Whites gaps excluding capital income

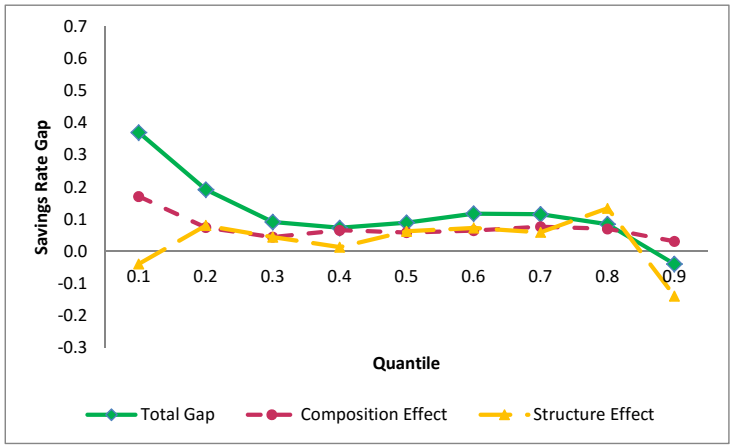
							Including S.S. and Pensions			
	Level of wealth		Total saving rate		Active saving rate		Level of wealth		Total saving rate	
	(1)		(2)		(3)		(4)		(5)	
Total gap	149,142		0.087		0.029		233,069		0.004	
	(6,718)		(0.009)		(0.008)		(13,660)		(0.022)	
Composition effect	126,522	(85%)	0.056	(64%)	0.024	(84%)	168,200	(72%)	0.005	(145%)
	(12,065)		(0.008)		(0.004)		(16,745)		(0.010)	
Structure effect	5,328	(4%)	0.028	(33%)	0.005	(16%)	59,681	(26%)	0.008	(209%)
	(9,358)		(0.011)		(0.009)		(18,748)		(0.024)	
Specification error	−3,027	(−2%)	0.000	(0%)	0.000	(−1%)	−1,753	(−1%)	0.001	(33%)
	(5,651)		(0.003)		(0.001)		(7,129)		(0.002)	
Contributions to the composition effect by component										
Non-capital income	22,453	(15%)	0.027	(31%)	0.012	(42%)	46,131	(20%)	0.012	(316%)
	(4,253)		(0.005)		(0.003)		(6,757)		(0.007)	
Education	47,835	(32%)	0.021	(24%)	0.009	(32%)	74,325	(32%)	0.008	(219%)
	(17,068)		(0.007)		(0.004)		(37,946)		(0.018)	
Demographic characteristics	46,581	(31%)	0.006	(6%)	0.004	(13%)	40,244	(17%)	−0.017	(−466%)
	(18,232)		(0.008)		(0.005)		(37,135)		(0.018)	
Birthplace	−33	(0%)	−0.001	(−1%)	0.000	(−1%)	−704	(0%)	−0.002	(−43%)
	(799)		(0.001)		(0.000)		(1,254)		(0.002)	
Region of residence	9,583	(6%)	0.003	(4%)	0.000	(−1%)	7,521	(3%)	0.004	(94%)
	(2,258)		(0.002)		(0.001)		(3,062)		(0.003)	
1998-2004	103	(0%)	0.000	(0%)	0.000	(1%)	684	(0%)	0.001	(24%)
	(386)		(0.001)		(0.000)		(969)		(0.001)	

Notes. The table reports the RIF-regression decompositions of the median differences in wealth levels and saving rates between African Americans and Whites, using the White coefficients as reference. Household data is from the HRS for the period 1992-2004. Sample restrictions and savings definitions are the same as in Table 3. Income is a restricted cubic spline with four knots of (log) household income exclusive of capital income (as of 1998 and 2004 for the wealth models and as of 1994-1998 and 2000-2004 for the saving rates models). The remaining predictors are the same as in Table 3. Percent of total variation in parentheses, next to the estimated output. Bootstrapped standard errors (200 reps.) are in parenthesis.

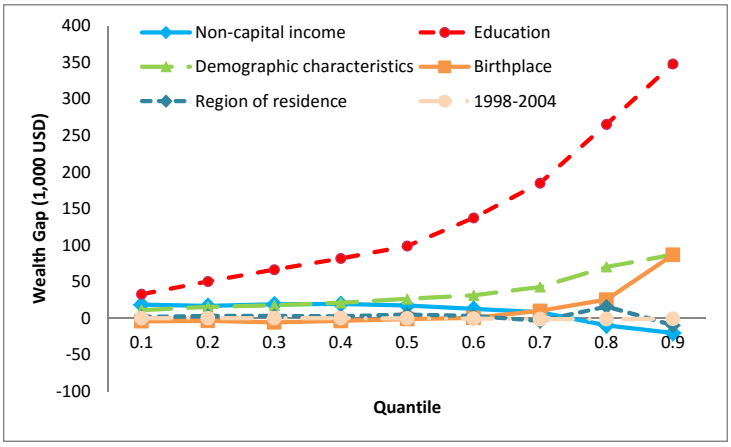
Figure A.1: Quantile decomposition of the Mexican Americans to Whites gaps excluding capital income

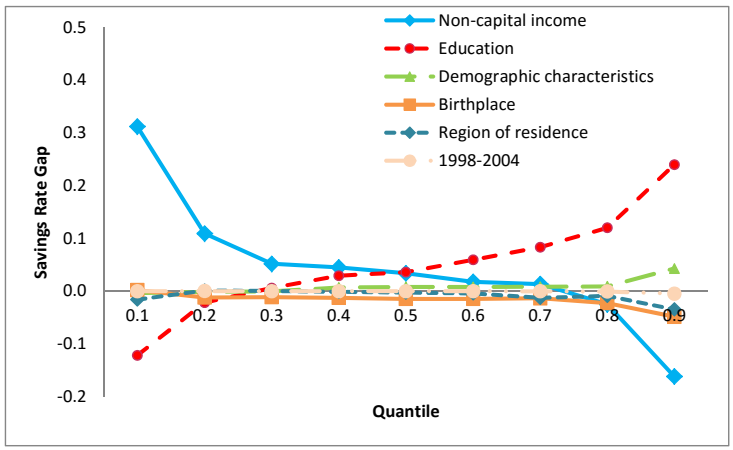
Panel A. Quantile decomposition into composition and structure effects





Panel B. Detailed quantile decomposition of composition effects

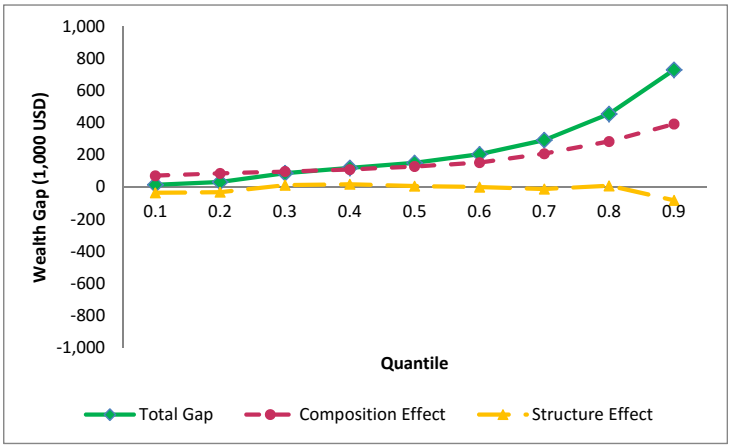


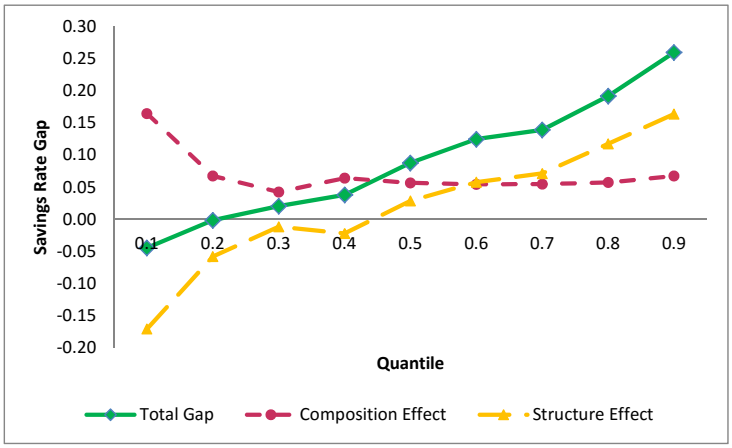


Notes. Panel A shows the RIF-regression decompositions of quantile differences in wealth levels and saving rates between Mexican Americans and Whites, using the White coefficients as reference. The difference between the total gap and the composition and structure effects is the sum of the specification and reweighting errors. The specifications are the same as the first two models in Table A.4. Panel B shows the detailed decompositions of the composition effects corresponding to Panel A.

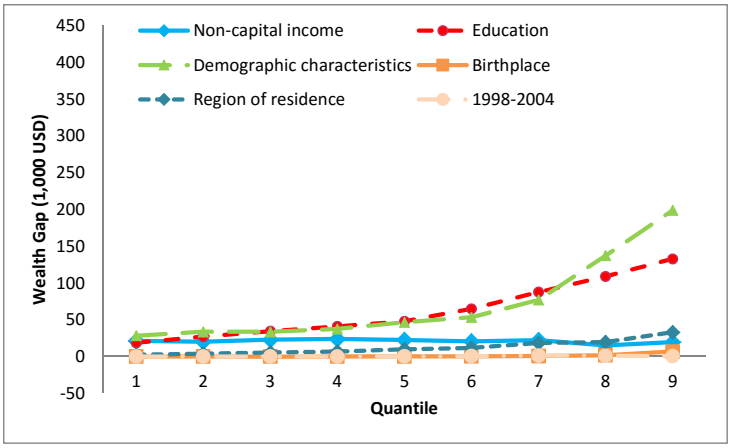
Figure A.2: Quantile decomposition of the African Americans to Whites gaps excluding capital income

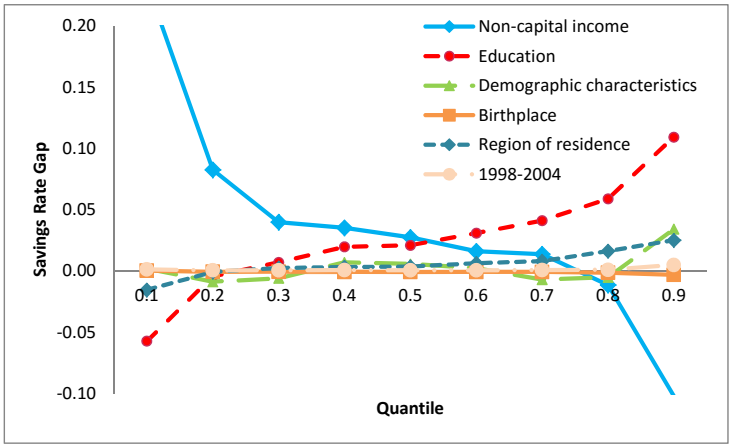
Panel A. Quantile decomposition into composition and structure effects





Panel B. Detailed quantile decomposition of composition effects

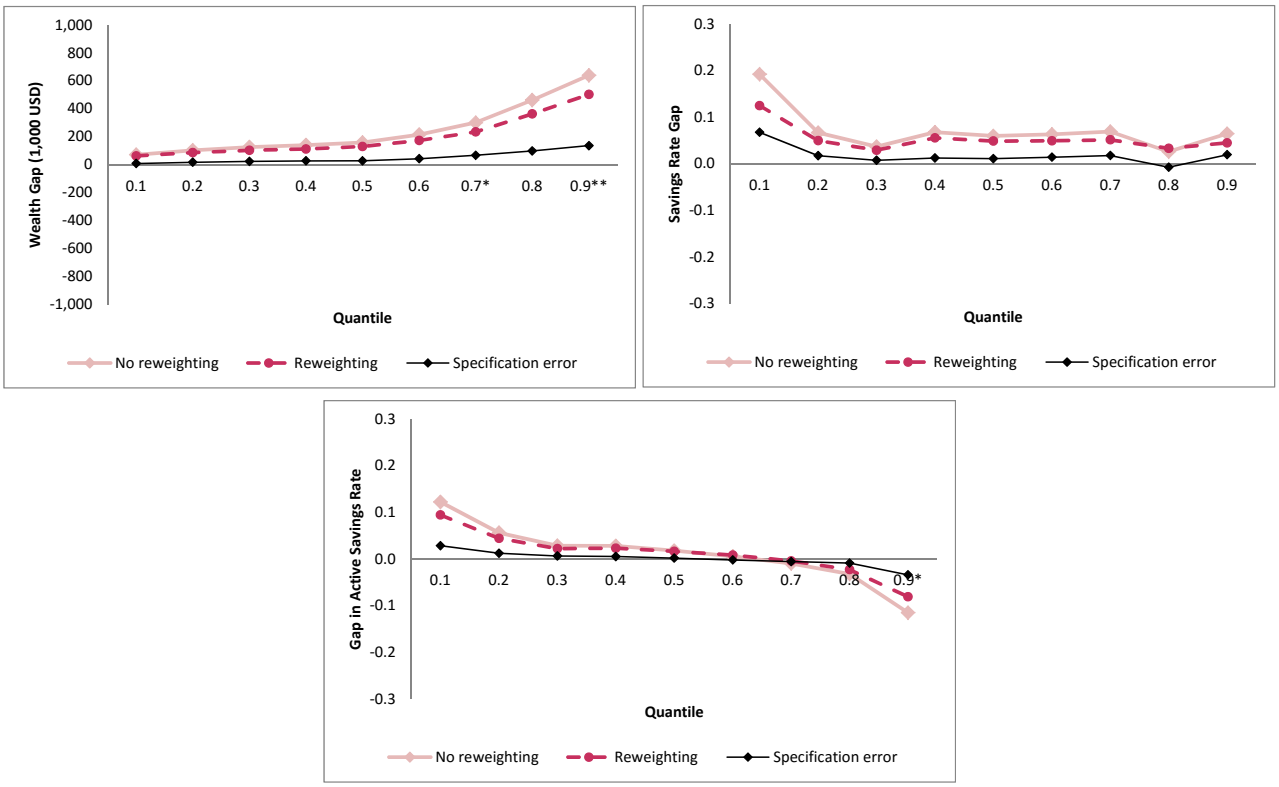




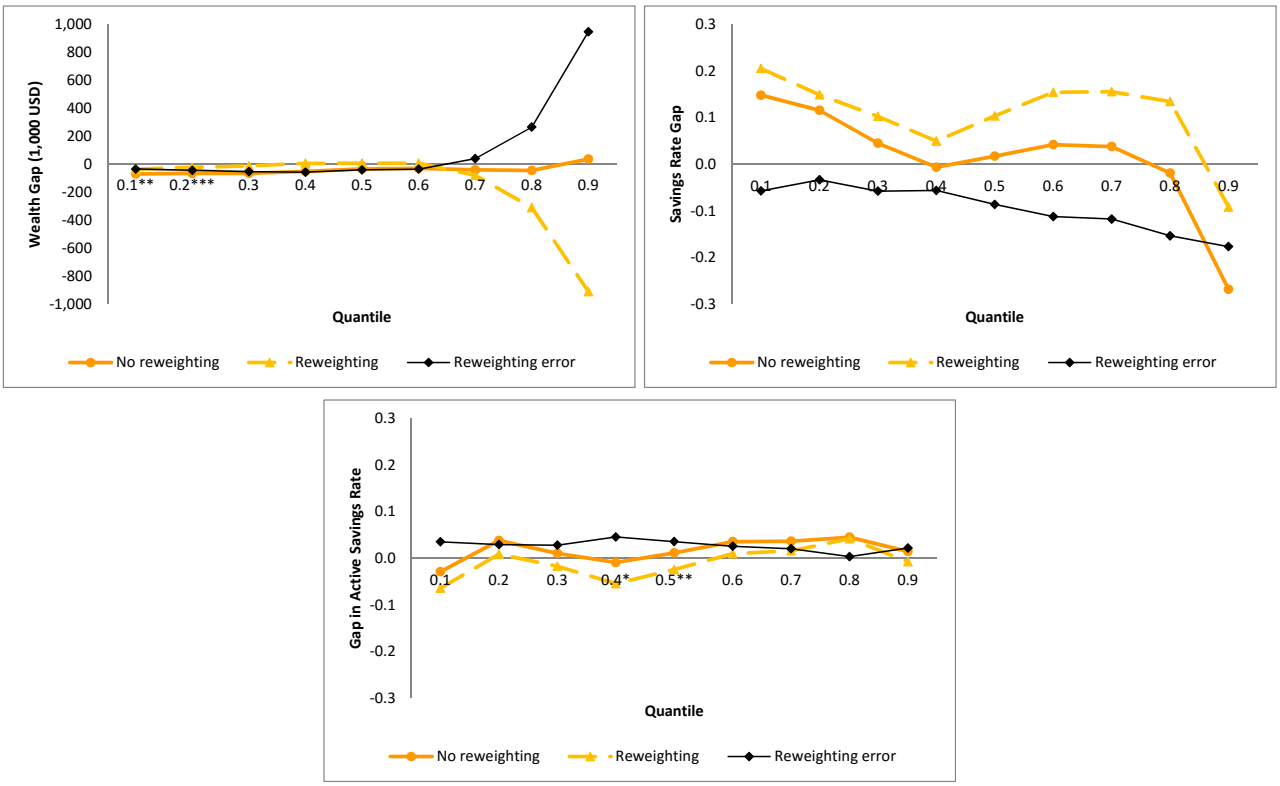
Notes. Panel A shows the RIF-regression decompositions of quantile differences in wealth levels and saving rates between African Americans and Whites, using the White coefficients as reference. The difference between the total gap and the composition and structure effects is the sum of the specification and reweighting errors. The specifications are the same as the first two models in Table A.5. Panel B shows the detailed decompositions of the composition effects corresponding to Panel A.

Figure A.3: Errors in decompositions of the Mexican Americans to Whites gaps

Panel A. Total composition effects



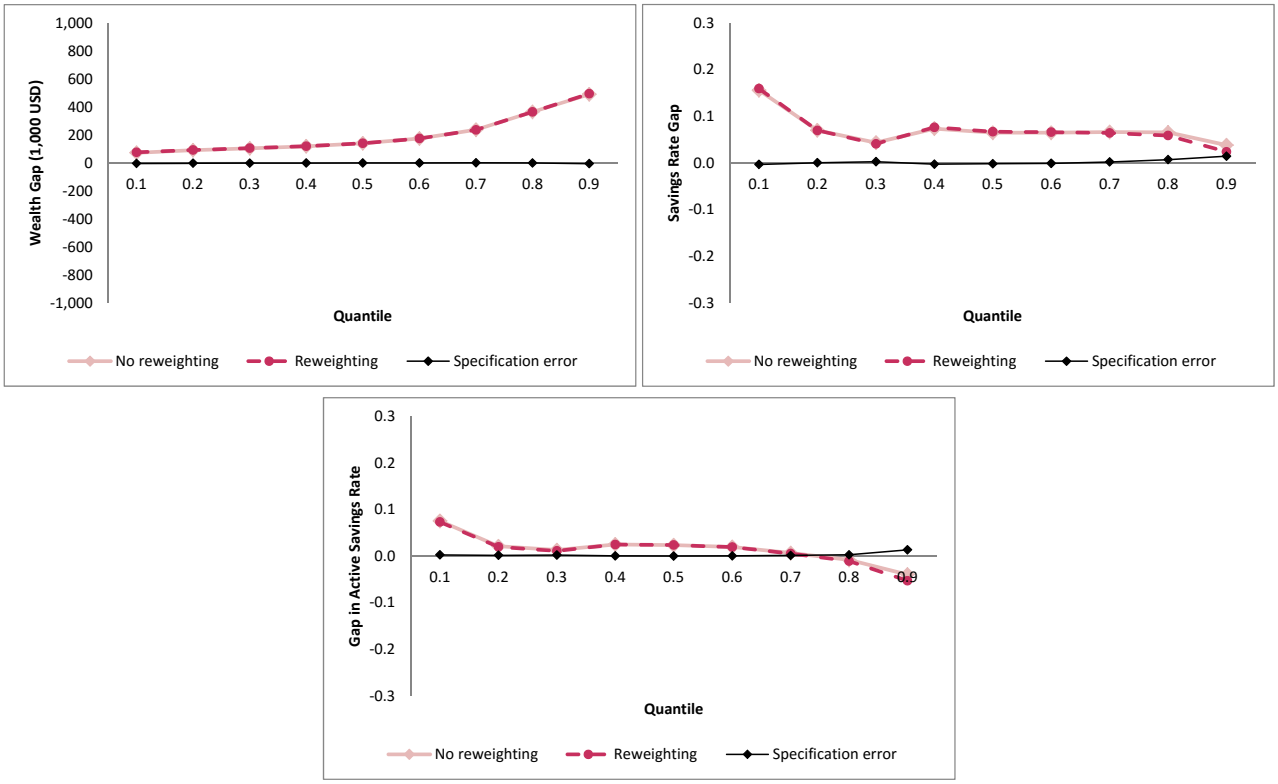
Panel B. Total structure effects



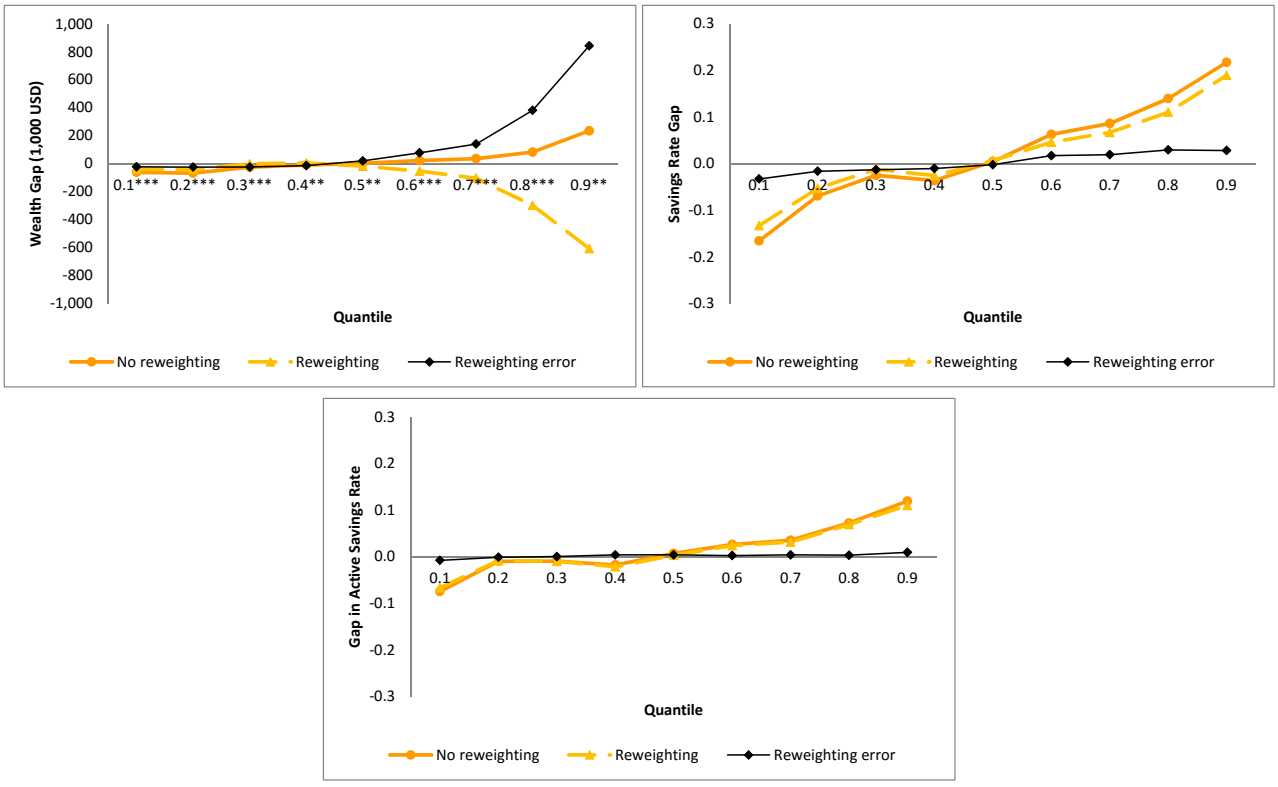
Notes. In Panel A. the specification error is the difference between the total composition effect obtained by the standard and the reweighted RIF-regression. In Panel B. the reweighting error is the difference between the total structure effect obtained by the standard and the reweighted RIF-regression. *error significant at 10%; **significant at 5%; ***significant at 1%.

Figure A.4: Errors in decomposition of the African Americans to Whites gaps

Panel A. Total composition effects



Panel B. Total structure effects



Notes. In Panel A. the specification error is the difference between the total composition effect obtained by the standard and the reweighted RIF-regression. In Panel B. the reweighting error is the difference between the total structure effect obtained by the standard and the reweighted RIF-regression. *error significant at 10%; **significant at 5%; ***significant at 1%.

Appendix B. Data description

I use household data from the Health and Retirement Study (HRS). Most of the data are taken from the 1992, 1998 and 2004 waves, but I also rely on some data from intermediate waves to compute permanent income and active savings. In this appendix I describe in detail the construction of the variables used for the analysis.

1) Sample selection: Respondents in the HRS are defined as the age-eligible individuals (in 1992 the selected birth cohort aged 51-61) and the spouse, regardless of age, when the respondent is married. Thus, in households with married or partnered respondents there are a the primary respondent, the individual with more knowledge about assets, debts and retirement planning, and a secondary respondent, i.e. his/her spouse. Following the standard practice, I treat the male in the couple, rather than the primary respondent, as the household head. The reason is that this facilitates comparison with other studies, and also there are more differences in characteristics affecting earnings behavior between men and women than between the primary and secondary respondent (Moon and Juster, 1995).

I define four groups of households based on ethnicity and race, where both the household head and the head's spouse self-identify as being in the same group. Ethnicity refers to the distinction between Hispanic (Mexican American and Other Hispanic) and non-Hispanic households. According to the US Census Bureau, Hispanic is "a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race". Race refers to the comparison between White and Black households and I restrict to those of non-Hispanic origin to avoid an overlapping with ethnicity that confounds the results.

I impose in the sample the typical restrictions adopted in the empirical literature on savings. The purpose is to limit the sample to stable households, where wealth changes are not explained mostly by changes in family composition. Thus, I select sub-households with the same head over the relevant period (1992-1998 or 1998-2004) and, in case the head has a partner, those where the head's spouse was the same. This leaves 10,283

observations in 1992-1998 and 11,767 in 1998-2004. I also drop observations for sub-households that were in the sample but were not interviewed in a particular wave. This leaves a total of 5,548 observations for the analysis in 1992-1998 and 9,147 observations for 1998-2004. Sub-households that have either income or wealth missing were also dropped (only 10 households were dropped in 1998-2004). Next, I drop households where the head was below 50 or above 65 years old in 1998 and in 2004 (4,197 observations remaining for 1992-1998 and 2,813 for 1998-2004). Then I drop households where the head or the head's spouse started to claim S.S. either in the first or in the last year of each period, which leaves 3,664 and 2,310 observations for 1992-1998 and for 1998-2004 respectively. I exclude households where the spouses are of a different race or ethnicity and so the total number of observations falls to 3,476 in 1992-1998 and to 2,205 in 1998-2004. Finally, I exclude 4 observations in the first period and 5 in the second from Puerto Rico and other US territories that are not part of any census region. For the measures of saving rates including S.S. and pensions, I further drop 334 observations in 1992-1998 and 155 observations in 1998-2004 with missing S.S. data.

2) Weights: All summary statistics for 1992-1998 were obtained using the household level weights provided by the HRS for 1998. Results for 1998-2004 use the weights for 2004.

3) Constructed variables:

A. <u>Total Saving</u>: It is obtained as the difference between real net wealth in 1998 (2004) minus real net wealth in 1992 (1998). The measures of wealth levels for total and individual components are taken from the RAND HRS 2008 Income and Wealth Imputations. Total net wealth comprises main home equity (the value of main house minus all mortgages in the primary residence and other home loans), real estate other than home equity, vehicles, business, Individual Retirement Accounts (IRAs), stocks, mutual funds, checking and savings accounts, CDs, savings bonds, treasury bills, bonds, and other assets (money owed by others, valuable collections, rights in a trust or estate) less other debts (credit card balances, medical debts, life insurance policy loans, loans

from relatives). Pension and Social Security (S.S.) are not directly reported in the survey. These variables were constructed ex-post using information collected in the 1992, 1998 and 2004 waves. Here I add the publicly available pension and S.S. wealth measures to the previous wealth components in order to compute total wealth.

- Pension wealth:[24] Pension wealth is estimated for current jobs from both self-reported and employer data. The method to estimate wealth is determined based on the respondent's self-reported pension plan type.

i) If the respondent is covered by at least one DC plan on his current job at the time of the survey (1992, 1998 or 2004), DC wealth is computed from the self-reported account balance. Note that multiple accounts can be reported from the same job and in that case total DC wealth is the sum of each account balance from the current job.

ii) If the respondent is covered by at least one DB plan at the time of the survey, the HRS Pension Estimation Program is used to compute wealth for each DB plan. This is done by combining self-reported data and pension plan rules obtained from the Summary Plan Description (SPD). SPDs were obtained by different means such as by contacting the employers of HRS respondents, by conducting an employer pension provider survey, by respondents' requests to their employers, by Internet searches and use of commercial databases. DB values were calculated at seven different ages: the expected age of retirement, early age of retirement, normal age of retirement, ages 60, 62, 65 and, only for 2004, age 70. The calculations of the present values from DB plans use the intermediate future real interest rate (2.9%) and the inflation rate (2.8%) forecast by the Social Security Administration (SSA). The present values are then discounted back to the survey year, which allows comparison between DB and DC amounts.

iii) If the respondent is covered by DB and DC plans or a Combination plan, both DB and DC wealth values are calculated.

[24]The procedure to construct this variable for 1992 and 1998 is described in the HRS document 'Imputations for Pension Wealth 1992 and 1998' (Final version 2.0, December 2006. See at: http://hrsonline.isr.umich.edu/index.php?p=avail.), and for 2004 in the document 'Imputations for Employer-Sponsored Pension Wealth from Current Jobs in 2004' (Version 1, July 2009. See at: http://hrsonline.isr.umich.edu/index.php?p=avail.).

Total pension wealth is calculated by adding the total value of all the DC/Combination account balances in the corresponding survey year and DB values at a given age of retirement (expected, early, normal, 60, 62, 65 or 70). I use DB wealth at the expected age of retirement, since this is the only measure discounted back to the survey year in 1992 and 1998. Different imputations methods were used when the data needed for these estimates were missing.

- Social Security wealth:[25] S.S. wealth is calculated for 'pre-retirement' respondents in 1992, 1998 and 2004.[26] Note that benefits are calculated assuming claiming ages (age 62, FRA, and age 70) that the respondent has not yet attained by the survey date. If a respondent is older than a particular age claim or if he has started claiming benefits, missing values are assigned.

First, the ANYPIA program (Office of the Actuary, v 2008.1) determines S.S. eligibility and coverage for each individual based on his/her earnings record. This involves computing the Average Indexed Monthly Earning (AIME) and Primary Insurance Amount (PIA) for each respondent. The AIME is the average of the individual's highest indexed earnings over the appropriate number of 'computation years'. The PIA is the amount payable to the worker at the projected claim date in claim year dollars and it is a function of AIME and 'bend points'. Annual PIAs are calculated as of three claim ages: age 62, full retirement age (FRA) and age 70. To calculate survival probabilities, they use the SSA life tables by year of birth and sex. The interest rates and the inflation rates are taken from the SSA Trustee Reports.

S.S. wealth is calculated on three monthly benefits: i) *retirement insurance benefits* (or old-age insurance benefits), based on lifetime earnings and paid to retired workers age 62 or over who are fully insured ii) *incremental auxiliary spouse benefits*, based on the

[25]The methodology to construct this variable is described in the HRS document 'Prospective Social Security Wealth Measures of Pre-Retirees'. The version 4.0 of the data was prepared by Kandice Kapinos with Charlie Brown, Michael Nolte, Helena Stolyarova, and David Weir. Survey Research Center, Institute for Social Research, University of Michigan, November 2010. See at: http://hrsonline.isr.umich.edu/index.php?p=avail.

[26]This is the information in the publicly available files as of August 2012. Access to the S.S. wealth measures for current retirees is restricted.

spouse's life-time earnings and iii) *incremental survivor benefit*, based on the deceased insured worker's lifetime earnings. Thus, wealth is computed by assuming that the monthly S.S. benefit comprises i) and ii) if both spouses are alive, whereas it comprises i) and iii) if one worker is deceased. By definition, ii) and iii) are zero for the higher earner. Adjustments are made on each period for early or late claiming, and these three components of S.S. wealth are weighted by the survival probabilities. The resulting wealth values are made comparable across individuals by reporting them in wave date dollars. The variable measuring household total S.S. wealth, assuming the same claim age for both respondent and spouse, is the sum of these three components for the respondent and the respondent's spouse. As in the case of other wealth components, missing values were imputed when possible. However, there are some inconsistencies in the household data, which become more evident in the cross-wave analysis and for imputed values. For that reason, I use the respondent's predicted S.S. wealth based on the retirement insurance benefit (calculated based on own earnings records).

Ideally, to compute total wealth one would like to add S.S. and pension wealth assuming the same claim age for both components. Pension wealth at expected age of retirement is the only measure available for all the three waves. Since S.S. wealth is not computed under that assumption, I use the measure assuming claiming at FRA, also called normal retirement age. Under that assumption, S.S. is only computed for individuals that are 67 years or younger.

B. <u>Active Saving</u>:[27] Active savings are defined as the sum of the following components:

. Active savings =

+ change in the value of housing*

+ net amount invested in real estate (excluding main home)*

[27]The specific measures of active savings are taken from the 'Assets and Income' and 'Asset change' modules, using the corresponding HRS imputations.

+ change in the net value of vehicles

+ net amount invested in business*

+ net amount put into IRA or Keogh accounts*

+ net investment into stocks*

+ change in the value of cash assets

+ change in the net value of other assets

− change in the value of other debt

Some of the active savings components were measured using explicit questions in every wave, such as the cost of home improvements, investment in real estate other than the primary residence, business, IRAs, and stocks.[28] I added the values reported for each two-year period in order to get the total active savings between 1992 and 1998 and between 1998 and 2004. For the remaining components, active savings are identical to total savings, which implies that active savings may be overestimated. There are no specific questions on active savings in S.S. and pensions, despite that capital gains may be significant, especially in DC pension plans. Thus, I do not include retirement assets when I distinguish between active and passive savings.

Active saving in housing is computed separately for households living in the same house and households moving between two consecutive waves, as in Juster et al. (2005). For the first group, active saving equals the cost of home improvements plus the change in the mortgage and other home loans if a family owned a house, and zero otherwise. When a family moves between two waves, active saving in housing is computed as the change in home equity. Thus, when a family does not move, the change in house value is imputed to capital gains, whereas for families that move between surveys all saving in housing - including the change in house value - is imputed to active saving.

[28]The components for which there are specific questions about active savings in the HRS are the ones marked with an asterisk.

Finally, following Juster et al. (2005), net wealth transfers are only accounted in total saving rates but not as part of either active nor passive savings. Net transfers into the household consist on inflows and outflows resulting from changes in family composition and inheritances and gifts. In particular, 'assets and debts brought in' and 'assets and debts moved out' capture the fact that, as individuals join the family, they may bring assets and debts with them and, as they leave, they may take assets and debts as well. In addition, inheritances and gifts from family and friends are not savings out of income as in the traditional definition of savings. Since in general the type of assets associated to these flows is unknown, I cannot impute them correctly to active or passive savings.

C. **Passive Saving**: It only accounts for the capital gains of the assets for which the HRS has specific questions about active savings. The aggregate measure of passive savings is the difference between the change in total net wealth during 1992-1998 (1998-2004) minus total active savings over the same period. Since active savings may be over-estimated, passive savings measured as a residual may be underestimated. Since both total and active saving are deflated as described in point 4), passive savings are also in 2004 dollars.

D. **Total household income**: The measure of total pre-tax income computed from the HRS corresponds to the last calendar year and is the sum of respondent and spouse earnings, pensions and annuities, Supplemental Security Income and Social Security disability, Social Security retirement, unemployment and workers compensation and other government transfers, household capital income and other income and lump sums from insurance, pension, and inheritance. Income variables are taken from the same source as the wealth measures, that is, the RAND HRS 2008 Income and Wealth Imputations. The HRS does not collect information on taxes (with a few exceptions, such as taxes on real estate), therefore it is not possible to compute disposable income by subtracting taxes paid by household members. Income is calculated for 1993-1997 by averaging data from the 1994, 1996 and 1998 waves, and for 1999-2003 by taking the mean of the 2000, 2002 and 2004 waves.

Income-adjusted measure to account for employer contributions: To compute saving rates including retirement assets, it is necessary to account for employer contributions to pensions and S.S. in the measure of total income. As Dynan et al. (2004) point out, these contributions are part of pension and SS saving but they are not included in the measure of total income described above. The HRS only asks about the employer contributions to DC plans but not about contributions to DB plans nor to SS. In addition, self-reports on employer contributions are known to be typically measured with error, due mainly to the lack of knowledge of the respondent. Thus, I use the Employer Costs for Employee Compensation (ECEC), produced by the Bureau of Labor Statistics. The ECEC measures the average cost to employers for wages, salaries and benefits, per employee hour worked. In particular, it provides the cost for DB and DC plans and for S.S. as percentages of total compensation. I use the average for the period 1992-2006 of these measures, computed separately for state and local government workers on the one hand, and private industry workers on the other. The percentages of total compensation are 6.2% for DB, 0.6% for DC, and 3.6% for SS in the case of workers in the public sector, and 1.5%, 1.6% and 4.8% respectively for the private sector. Thus, I adjust total household income by adding the fraction of the respondent and spouse earnings that correspond to employer contributions to DB and DC plans and to S.S..

Capital income: Capital income includes business or farm income, self-employment earnings, gross rent, dividend and interest income, and other asset income. Income from trust funds or royalties was also included, but only up to 2002. Before 1996, the survey only asked about total interest and dividend income. Beginning in that year, the questions about interest from bonds, CDs or treasury bills, and checking, savings, or money market accounts are asked separately. In addition, since 1996 the income from assets is asked immediately following questions on whether the asset is owned, which improves reporting. The current definition includes business and farm income and self-employment earnings rather than pure capital income. Finally, note that equities generate not only dividends but also capital gains reflecting, for instance, changes in stock prices. However, the HRS

does not include realized capital gains from the sale of stocks, bonds and other assets in the income measure.

E. Saving Rates: I compute total, active and passive saving rates as the ratio between the corresponding saving measure over 1992-1998 (1998-2004) and six times the average of total adjusted income over 1993-1997 (1999-2003).

F. Other variables:

- Age: Age of the household head is measured in 1995 for the period 1992-1998 and in 2001 for the period 1998-2004.
- Education: Education dummies were built by considering the highest degree of education of the household head. The dummies created are "no high school diploma" if the individual has no degree or a General Equivalence Degree (GED), "high school graduate" if the individual has a high school diploma and "college/postcollege graduate" if the individual has at least a two-year college degree.
- Number of children: The number of children is measured at the beginning of the period, i.e. in 1992 for the period 1992-1998 and in 1998 for 1998-2004.
- Marital status of head: This is a dummy indicating that an eligible sample member in a given wave is coupled (married or living with a partner as if married).
- U.S. born: This is a dummy indicating that the household head is born in the U.S..
- Region of residence: Dummies were built for each of the four statistical regions defined by the United States Census Bureau, namely, Northeast, Midwest, South and West.

4) Deflators: All variables are deflated using the NIPA implicit price deflator for personal consumption expenditures, with the base year adjusted to be 2004. The stock variables such as total wealth and its components and permanent income are deflated by dividing the correspondent balance by the price index for that year. Thus, the change in wealth is

simply the difference of those variables in real terms. The flow variables used to compute active savings are deflated using the 2-year harmonic mean of the NIPA implicit price deflator for personal consumption. Then the real components over each 2-year period are added to obtain the 6-year active saving measure (for 1992-1998 and 1998-2004 separately).