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WEALTH AT BIRTH AND ITS EFFECT ON CHILD ACADEMIC ACHIEVEMENT AND BEHAVIORAL PROBLEMS

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ABSTRACT

In this article, we examine the association between family wealth and academic achievement and socioemotional behaviors of children ages 5 to 12. We examine whether wealth prior to birth and at ages 4 or 5 affects academic test scores and behavioral problems during two periods of childhood, ages 5 to 8 and ages 9 to 12, for a large and relatively recent cohort of children. We also examine associations between different forms of wealth (e.g., home equity) and child achievement and behaviors. Finally, we assess whether wealth prior to birth mediates racial/ethnic disparities in child achievement and disparities in achievement by maternal education/ability (AFQT). Results of our analysis indicate that wealth, particularly financial wealth that is the most liquid, has a modest positive association with achievement test scores. We also find that wealth is associated with fewer behavioral problems, but these results are less robust.

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1. Introduction

There are huge disparities in family wealth in the U.S. As reported recently, the top 10% of families in the U.S. held 76% of all wealth and the bottom 50% of families had less than 1% of all wealth (Hernandez Kent & Ricketts 2020). Racial and ethnic gaps in wealth are also large. On average, white families have eight times the wealth of Black families and nearly five times the wealth of Hispanic families. Socioeconomic gaps in wealth are also present with families headed by someone with a Bachelor's degree having three times the wealth of families headed by a high school graduate.

The consequences of these disparities in wealth for child educational achievement and development may be significant (Sherraden 1991). Wealth is available to the family to use when there are unplanned changes in income and consumption, for example, because of illness or the loss of job (Baugh et al. 2021; Bloemen & Stancanelli 2005; Gruber 2001). Wealth is also available to fund planned investments in children's educational achievement, for example, by choosing a residence in a high-cost area with good schools, or for paying for college.[1] Without wealth, unplanned events can force families to make decisions that disrupt family life and adversely affect children's development and academic achievement. For example, with no wealth to lean on, the loss of a job and the income associated with it can lead to eviction, changes in residence and school, and even homelessness. Changing residences and moving is negatively associated with child achievement (Hutchings et al. 2013; Ziol-Guest & Kalil 2014). Similarly, the absence of wealth, and the financial uncertainty and economic insecurity that goes along with that circumstance, may result in greater stress and affect child academic achievement

[1] There is a literature on how home ownership affects educational attainment (e.g., college attendance): Aaronson 2000, Green and White 1997, Haurin et al. 2002. Also, Pfeffer (2018) documents the wealth gap in educational attainment.

and socioemotional development, for example, through changes in maternal mental health and parenting practices (Huang et al. 2014; Grinstein-Weiss et al. 2014; Lusardi et al. 2011). Family wealth has also been associated with changes in parental expectations about their children's education (Kim et al. 2015).

Finally, wealth also generates interest income that can augment earned income. In this way wealth is similar to income and can fund family expenditures used to invest in child achievement and development. However, this "income" pathway from wealth to child achievement is mainly for wealth held outside of homeownership and retirement accounts and is relevant only for those in the top quintile of wealth distribution (Wolff 2021). Therefore, it is mainly the consumption smoothing and financial security aspects of wealth that are most relevant for child achievement.

While it is widely documented that family income and child achievement are positively correlated, there is relatively little information about the association between family wealth and child academic and emotional development.[2] And it is important to recognize that wealth and income differ and may have different effects on child development. Correlations between income and wealth are relatively low even when income is averaged over several years (Conley 1999; Díaz-Giménez et al. 2011).

There are relatively few studies that have examined how family wealth affects children's academic achievement (Cesarini et al. 2016; Moulton et al. 2021; Elliot et al. 2011; Orr 2003;

[2] For example, in a comprehensive analysis of the association between family income and test scores, Reardon (2013) reported that children in the USA from families in the top decile of the income distribution have test scores that are approximately one standard deviation higher than children from families in the bottom decile, and that this difference has grown in recent decades. Similar evidence has been reported by Gregg and Macmillan (2010) for children in the United Kingdom (UK); children from families in the top quintile of the income distribution have test scores that are approximately 0.75 standard deviations higher than children from families in the bottom quintile, and here too, the income gap has been widening over time.

Phillips et al. 1998; Williams Shanks 2007; Yeung & Conley 2008; Zhan 2006). This is surprising because of the large and widely documented inequality in wealth in our society, particularly by race and ethnicity.[3] Moreover, evidence generated by prior studies is mixed; Zhan (2006), Williams-Shanks (2007) and Orr (2003) find that wealth is positively associated with child achievement whereas other studies show no significant relation (Cesarini et al. 2016; Moulton et al. 2021; Phillips et al. 1998). The effect of wealth on socioemotional behaviors has not been well studied (Williams-Shanks 2007; Miller et al. 2021).

Studying whether wealth is associated with child achievement and development is important for both theory and public policy. Identifying determinants of child achievement, for example, wealth, is an important theoretical issue because of the need to understand the causes of achievement and what factors can be manipulated to alter achievement outcomes. From a policy perspective, child achievement and development are of particular importance because of the documented impact of child outcomes on adult well-being (Feinstein & Duckworth 2006; Goldhaber & Özek 2018; Hanushek 2009; Heckman et al. 2006).

In this article, we examine the association between wealth just prior to the birth of a child and academic achievement and socioemotional behavior of children ages 5 to 12. We focus on wealth prior to birth because it is predetermined and not influenced by expenditures (investments) on child development. In contrast, using contemporaneous, or even post-birth measures of wealth, as almost all prior studies have done, is clearly problematic from an empirical perspective because investments in children may influence wealth (Moulton et al. 2021; Miller et al. 2021; Conwell & Leafia 2021; Orr 2003; Phillips et al. 1998; Williams Shanks

[3] Most of the prior studies in this area focused on how wealth affects racial gaps in academic achievement (Orr 2003; Phillips et al. 1998; Williams-Shank 2007; Yeung and Conley 2008).

2007; Yeung & Conley 2008; Zhan 2006). Focusing on wealth prior to birth eliminates the reverse causality problem. For example, a family may use wealth to buy a house in a high achieving school district. As a result, their net wealth would be low and achievement potentially high, which suggests a negative effect of wealth on achievement despite the opposite direction of causality. Measuring wealth just prior to birth is analogous to what has been done in numerous studies that assess whether family background, for example mother's education, affects child well-being. Of course, there may still be omitted variables that are correlated with both wealth prior to birth and children's achievement that confound estimates of the association between wealth and child achievement, but we address this issue by including an extensive set of pre-determined (prior to birth) family background factors besides wealth (e.g., mother's AFQT score), although this is admittedly not a perfect solution (Doren and Grodsky 2016). We also provide a more comprehensive analysis than previous studies, which is important given the limited amount of prior study, the mixed evidence, and the relatively narrow descriptive nature of previous studies (see Cesarini et al. 2016 for the lone causal analysis). The absence of much descriptive evidence on this salient issue justifies more study, even if it is observational.

We examine whether wealth prior to birth affects child achievement and socioemotional behavior during two periods of childhood, ages 5 to 8 and ages 9 to 12, for a large and relatively recent cohort of children. Stratifying the sample by age is consistent with human capital theory and models of child development that highlight the possibility that investments in child development are likely to have different effects by age (Allen et al. 2015; Cunha & Heckman 2007; Faundez & Kaestner 2024; Fischer & Bullock 1984; Todd & Wolpin 2003). We also examine associations between different forms of wealth (e.g., home equity), which have different degrees of liquidity and relatively low correlations between them (e.g., 0.3), and child

achievement, and associations between wealth measured at different times—prior to birth and at ages 4 or 5—and achievement, although we focus on wealth at birth. Finally, we assess whether wealth prior to birth mediates racial/ethnic disparities in child achievement and disparities in achievement by maternal education and ability (measured by AFQT score). In sum, we provide one of the most comprehensive analysis to date of the relationship between family wealth and child academic achievement and socioemotional behavior.

2. Prior Literature

There are several studies of the association between family wealth and child academic achievement, and two studies of the effect of wealth on socioemotional behaviors. Using data from Children of the National Longitudinal Survey of Youth (CNLSY), Phillips et al. (1998) examined the association between current family net wealth and verbal skills (Peabody Picture Vocabulary Test, PPVT) of children born between 1980 and 1987 and aged 5 and 6. In multivariate regressions that control for family background, the authors reported that family wealth did not have any significant association with verbal test scores. Orr (2003) used the same CNLSY data and similar regression methods to study the association between current family net wealth and children's math test scores (Peabody Individual Achievement Test, PIAT) for a sample of children surveyed in 1996 and aged 5 to 14. Estimates indicated that wealth was positively associated with the standardized math score. Finally, Zhan (2006) used a similar sample of children from the CNLSY (aged 5 to 12 and observed in 2000) and examined the association between family net wealth and math and reading scores. Zhan (2006) reported that wealth was positively associated with math and reading PIAT scores.[4]

[4] Haurin, Parcel and Haurin (2002) examined the association between homeownership and test scores of children ages 5 to 8 born by 1994. In their main analysis, they found no significant association between home ownership (or wealth, which were both included in the model (despite overlap), and achievement test scores. The study was also based on an instrumental variables design that predicted home ownership using housing prices.

Two more recent studies of the association between wealth and child academic achievement also used the CNLSY (Miller et al. 2021; Conwell and Leafia 2021). Conwell and Lefia (2021) focused on racial differences in achievement between ages 5 and 14 and whether wealth mediated those differences. Results indicated that wealth did not mediate racial differences as children aged from 5 to 14. While not highlighted, results also indicated that overall net worth was positively associated with both math and reading recognition test scores. Miller et al. (2021) examined the association between the logaritm of wealth and math test scores and behavioral problems holding constant family income and income shocks. Results indicated that wealth was positively associated with math and reading test scores and negatively associated with internalizing and externalizing behaviors.

Two studies used data from the Child Development Supplement (CDS) of the Panel Study of Income Dynamics (PSID) to study the association between family wealth and child achievement. Williams-Shanks (2007) studied the influence of wealth, measured 3 years prior to test, on reading and math subscales of the Woodcock Johnson Achievement Test and the Behavior Problems Index. In general, regression adjusted estimates indicated that wealth was not significantly associated with achievement test scores, but was associated with fewer behavioral problems. Yeung and Conley (2008) also used the PSID to examine the association between different forms of current family wealth and reading and math tests (Woodcock Johnson subscales). Their sample consisted of children aged 3 to 12 and they stratified the sample into preschool and school-age children. Results from this analysis indicated that measures of family wealth had no significant association with achievement of preschoolers. However, stocks/mutual funds holdings of family were positively associated with reading and math scores among children aged 6 to 12.

Zhan and Sherraden (2003) studied the relationship between contemporaneous family assets and children's academic performance among female-headed households. The authors used data from the National Survey of Families and Households (NSFH) and focused on children aged 12 to 18. The authors found that savings were not associated with children's academic performance (mother's report of her child's grades). They also found that homeownership was positively associated with child's high school graduation.

More recent evidence from the UK was provided by Moulton et al. (2021) who used the Millennium Cohort Study to examine the association between contemporaneous wealth and children's achievement at age 11. Their results showed that, once family income was included in the model, total net wealth and other forms of wealth (e.g., financial wealth, home equity, and home value) were not associated with verbal ability.

Perhaps the most compelling prior study is by Cesarini et al. (2016) who studied the association between family wealth and child achievement in Sweden. This study exploited plausibly exogenous (as good as random) variation in family wealth from winning three different lotteries in Sweden and combined these data with administrative data on children's academic achievement. Estimates from regression analyses indicated that wealth had no significant effect on academic achievement as measured by a test similar to the AFQT. Similarly, they found no effect of wealth on 9th grade GPA and standardized test scores.

The review of prior literature highlights several issues. First, prior evidence is mixed even when the same data and similar samples are used. Orr (2003) and Zhan (2006) reported that wealth was positively associated with child academic achievement, but Phillips et al. (1998) found no significant association, and all three studies used the CNLSY. Similarly, Yeung and Conley (2008) reported that some measures of wealth (e.g., stocks) were significantly associated

with child (ages 6-12) achievement whereas Shanks-Williams (2007) found no association; both studies used the PSID. Other studies based on non-US samples reported no significant association between wealth and achievement. Moulton et al. (2021) reported that family wealth was not associated with child achievement in a sample of children from the UK and Cesarini et al. (2016) found the same result for Swedish children.

Second, except for Cesarini et al. (2016), all studies used measures of wealth that are potentially caused by, instead of being a cause of, child development (e.g., academic achievement). Families may use wealth to fund investments in children that affect academic achievement and, if so, then this would build in a negative association between wealth and academic achievement. In addition, much of the prior literature includes a limited number of family background variables and often includes contemporaneous measures such as income and maternal employment that can be caused by child achievement and affected by wealth. For example, Miller et al. (2021) included contemporaneous income and income shocks in the regression model, as well as current family characteristics such as maternal employment. Conwell and Leafia (2021) include virtually no family background measures.

Third, all studies except Yeung and Conley (2008) and Miller et al. (2021) examined samples of children with a wide range of ages, for example, aged 5 to 12. However, wealth and its influence may have different effects on academic achievement at different ages, as suggested by foundational theories in developmental psychology (Allen et al. 2015; Fischer and Bullock 1984), as well as economic theory (e.g., Cunha and Heckman 2007).

Our study addresses all of these issues. We use a large, recent cohort of children ages 5 to 12 and born between 1985 and 2004. Our data source is the CNLSY but updated relative to earlier studies to exploit a much larger sample of children including children born in later years

to a more representative sample of mothers instead of the sample of relatively young mothers included in earlier studies. We also stratify the sample by age (5-8 and 9-12). Perhaps most importantly, we focus on family wealth prior to birth that is clearly exogenous, and in some cases, limit the sample to first-born children, which further bolsters the plausible exogeneity of family wealth. Another notable contribution is that we use several measures of wealth that differ by their liquidity and how accessible the wealth is for families to use to invest in children. We also allow the effect of wealth measures on child achievement to differ at the top and bottom of the wealth distribution by using categories for each form of wealth instead of assuming a linear relationship. Finally, we assess whether wealth mediates racial and socioeconomic disparities in academic achievement.

3. Data

Data for the analysis come from the National Longitudinal Survey of Youth (NLSY79) and from the Children of the National Longitudinal Survey of Youth (CNLSY). The first NLSY wave in 1979 collected information on 12,686 respondents born between 1957 and 1964. Since 1986, biological children of the original female participants have been interviewed biannually. The sample used in the analysis consists of children aged 5 to 12 and observed in the data between 1990 and 2014.[5] We limit the sample to children born in 1985 and beyond because prior

[5] The NLSY79 sample has undergone two significant changes over time (https://www.nlsinfo.org/content/cohorts/nlsy79/intro-to-the-sample/retention-reasons-noninterview). The first was dropping the military sample in 1985. This does not affect our sample because we limit the sample to children (and thus mothers) born in 1985 or later. The second was dropping the economically disadvantaged (non-Black and non-Hispanic) sample in 1991. This reduced the sample by approximately 15% and dropped mothers who were likely to be low-income and low-wealth. It is unclear how these changes affect descriptive statistics. We do not present estimates by year, but only by child age (5-8, 9-12). We also do not claim that the descriptive statistics are representative of US population (we do not use weights). The implications of the sample changes for regression analyses are likely minimal. The low-wealth proportion of the sample of children is likely changing slightly over time becoming more Black and Hispanic because of the loss of the economically disadvantaged sample. We control for calendar year, race/ethnicity and mother's background. These controls along with relatively modest change in sample size makes it unlikely that the change in sample composition would have much of an effect.

to that year, the NLSY79 did not collect information on wealth and therefore, we did not have a measure of wealth at birth. Focusing on children born during this period has the advantage of studying a sample of children born to mothers of a relatively representative age.[6] For the children in our sample, we match them with their mother's information in the NLSY79. Data related to parental wealth and income, as well as family background information, come from the NLSY79 and child's demographics and test scores information come from the CNLSY.

The dependent variables measuring academic achievement are the total raw score for the PIAT Mathematics, Reading Recognition, and Reading Comprehension assessments. An important feature of the PIAT tests is that they are comparable across ages. The same test is given at different ages with scoring based on a basal (5 correct answers) and ceiling (5 of 7 incorrect answers). Socioemotional development was measured by two scales of the Behavioral Problems Index (BPI): externalizing and internalizing. Both the PIAT tests and the BPI and its subscales are widely used and have been validated.[7]

The key independent variable of our analysis is wealth, and we use a variety of measures: total net wealth, financial assets, home equity, and other net wealth.[8] Total net wealth is calculated as the sum of all assets minus all debt. Assets include market value of primary residence, vehicles, farms, businesses, other real estate properties, possessions over $500 each, and financial assets (savings, stocks, mutual funds, trusts, CDs, bonds, and retirement accounts such as IRAs and employer-based accounts). Debt includes mortgage and other debt and back

[6] In 1985, which is the earliest birth year of the children in our sample, women in the NLSY79 were between the ages of 20 and 27. In 2009, which is the latest birth year of children in our sample, women in the NLSY79 were between the ages of 44 and 51. Children born prior to 1985 were born to relatively young mothers.
[7] (https://www.nlsinfo.org/content/cohorts/nlsy79-children/topical-guide/assessments)
[8] We dropped observations with missing values for any wealth component variable as total net wealth could not be calculated for those children. In the case of missing covariate values, we created a missing category for variables that we included as categorical in the analysis (region of residence and family income) and replace the missing value with the mean of that variable, including a missing indicator in the regression for continuous variables (total number of children in household).

taxes associated to the primary residence, debt associated to farms, businesses, and other real estate; debt associated to vehicles, and other debt over $500. Home equity is calculated as the market value of the primary residence minus all debt associated to that property. Other net wealth is calculated as total net wealth minus home equity and financial assets. These wealth variables were measured before child's birth and before child started school (ages 4 or 5). Wealth before birth was derived from the survey immediately prior to birth date, as long as this survey took place between zero and 12 months before child's birth. Wealth before child started school was measured in the survey when the child was 4 years old. If such survey was not available, we use the survey when the child was 5 years old. Wealth and income variables were converted into real dollars using the GDP Implicit Price Deflator, which base year is 2012.

We created four categories for each wealth variable and used dummy variables to indicate the wealth category of the family. To create the four categories of wealth, we examined the distribution of each wealth measure and, based on that distribution, we chose categories that reflected meaningful differences in the level of wealth and that had a sufficient number of observations in the category. Results were very similar if we used quartiles of the distribution of each wealth measure. We chose not to use quartiles because the categories we chose represented more distinct differences in wealth than the quartiles, which divides the sample into wealth categories with equal number of observations. In the case of total net wealth, we created the following categories: zero or less, $1 to $25,000, $25,001 to $100,000, and more than $100,000. For home equity, we categorized it as zero or less, $1 to $15,000, $15,001 to $50,000, and more than $50,000. We considered the following categories for financial assets: zero, $1 to $10,000, $10,001 to $50,000, and more than $50,000. Finally, other net wealth categories are zero or less, $1 to $5,000, $5,001 to $20,000, and more than $20,000. We measured wealth in these

categories because there is a wide range of wealth values, as indicated by the categories above. We thought the dummy variable approach was superior to alternative, for example, using a continuous wealth measure, because the continuous measure is relatively restrictive and in the sense that a dollar increase in wealth would have same effect at very low levels of wealth and very high levels of wealth. A priori, we thought this was an unnecessary restriction. However, in sensitivity analyses (see Appendix Tables 5 and 6), we used a third order polynomial of wealth to assess whether results were sensitive to our choice of measurement. Estimates from this specification were qualitatively the same as those reported in the main text.

Data on a child's demographic characteristics and family background were incorporated into the analysis. Child's demographics include sex, race/ethnicity (White non-Hispanic, Black non-Hispanic, Hispanic), age in months at the time of test assessment, and region of residence at birth (northeast, north central, south, and west). All family background characteristics were determined prior to child's birth. Family background includes mother's education at birth (less than high school, high school diploma, some college, bachelor's degree), mother's AFQT quartile, mother's Rotter locus of control quartile, grandmother's education (less than high school, high school diploma, some college, bachelor's degree), whether grandmother worked when mother was 14, whether there were magazines, newspapers or a library card in the household when mother was 14, and mother's family structure when she was 14 (lived with both biological parents, lived with others, or lived with mother only). We also control for family income prior to birth and, in some specifications, we include contemporaneous income and other contemporaneous variables: mother's marital status (married, separated/divorced, never married), education (same categories as above), and total number of children at the assessment. We created five categories for family income in real dollars representing the following amounts:

$0 to $15,000, $15,001 to $40,000, $40,001 to $60,000, $60,000 to $80,000, and more than $80,000.

Appendix Table A1 provides summary statistics. The sample includes 3,232 children with valid test scores and wealth data, 973 of which are first-born children. Most children in our sample took the PIAT assessments several times, giving us over 11,100 observations considering all children, and over 3,400 observations considering only first-born children. Approximately 50% of the children in our sample are White, 28% are Black and 22% are Hispanic. Black children are born to younger mothers, especially compared to white children. There are large differences among racial/ethnic groups in terms of maternal education/ability and financial resources. Mothers of Black and Hispanic children score significantly lower on the AFQT test than white mothers: 24^{th}, 28^{th} and 57^{th} percentile, respectively. While 27% of white mothers had a bachelor's degree at the time of child's birth, less than 10% of Black and Hispanic mothers had completed college by the time of the child's birth. Unsurprisingly, Black children's family income is only 46% of white children's family income. Similarly, in terms of wealth, Black children's families are significantly less likely to have high amounts of any form of wealth. For example, close to 60% of Black families have no financial assets compared to only 18% of White families, and only 1% of Black families have more than $50,000 in financial assets versus 11% of white families.

4. Methods

4.1. Wealth at Birth

The objective of our research is to provide a comprehensive, analysis of the association between wealth at birth and child achievement test scores. We do so by estimating a series of regression models that sequentially control for a greater number of potentially confounding

factors and, in some specifications, potential mediators of the association between wealth and child achievement.

We start with a basic regression model:

$$(1)\quad TEST_{ijt} = \gamma_j + \delta_t + a_1 WEALTH_i + \sum_{k=1}^{4} a_k REGION_{kijt} + \sum_{m=21}^{44} \lambda_m MOMAGE_{mijt} + \sum_{l=1}^{3} \rho_l RACE\_ETH_{lijt} + e_{ijt}$$

In equation (1), the PIAT test score (e.g., math) of child "i" who is age "j" in year "t" depends on fixed effects for each month of child age, year fixed effects, region indicators (West, South, East, Midwest), fixed effects for each year of mother's age, and indicators of a child's race/ethnicity (non-Hispanic Black, non-Hispanic White, Hispanic). The key variable of interest in equation (1) is WEALTH, which is measured in the year prior to birth and described earlier. As previously noted, we estimate equation (1) using different measures of wealth: total net worth in one specification and home equity, financial assets and remaining net wealth in a second specification. Because we observe most children several times between ages 5 and 12, in all models we cluster standard errors at the child level.

As indicated in equation (1), wealth is measured at the child level and other family background factors are likely confounders. To assess the extent of this confounding, we augment the regression model with an extensive set of pre-determined (relative to birth) family background factors also measured at the child level: dummy variables for grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile measured in 1980, and mother' locus of control (ROTTER) quartile measured in 1980. That model is:

$$(2)\quad TEST_{ijt} = \gamma_j + \delta_t + \beta_1 WEALTH_i + \sum_{k=1}^{4} a_k REGION_{kijt} + \sum_{m=21}^{44} \lambda_m MOMAGE_{mijt} + \sum_{l=1}^{3} \rho_l RACE\_ETH_{lijt} + \sum_{c=1}^{C} \phi_m FAMBACK_{cijt} + e_{ijt}$$

The only new variable in equation (3) is FAMBACK, which is a vector of variables characterizing a child's family background and are described above. This model estimates the association of wealth at birth conditional on other family background factors. These other variables are confounders because they are not caused by wealth at birth.

We estimate two more model specifications. The third model adds total family income prior to birth and the fourth adds several contemporaneous (i.e., at time of test assessment) variables: mother's marital status, mother's education, total family income and number of children in the household. Family income at the time of birth may be a confounder or a mediator of the association between wealth and child achievement test scores whereas the contemporaneous variables are potential mediators of the association between wealth prior to birth and child cognitive achievement.[9] The most comprehensive model is:

$$TEST_{ijt} = \gamma_j + \delta_t + \beta_1 WEALTH_i + \sum_{k=1}^{4} a_k REGION_{kijt} + \sum_{m=21}^{44} \lambda_m MOMAGE_{mijt} + \sum_{l=1}^{3} \rho_l RACE\_ETH_{lijt} + \sum_{c=1}^{C} \phi_m FAMBACK_{cijt} + \sigma FAMINC\_BIRTH_{ijt} + \sum_{s=1}^{S} \theta_s CONTEMP_{sijt} + e_{ijt} \quad (3)$$

The regression model given by (3) includes confounders (*FAMBACK*) and potential mediators (*CONTEMP*) of the association between wealth at birth and child achievement test scores. We acknowledge that some of the contemporaneous variables may be endogenous and jointly determined with child outcomes. Nevertheless, we include them because these variables may also be potential mediators of the relationship between wealth at birth and child achievement. It is also of interest to assess whether, from a conditional regression perspective, these variables change estimates related to wealth.

[9] We use the term mediator loosely to indicate that the variable is potentially influenced by wealth. It is not necessarily the case that the variable is a mediator even if the addition of that variable alters the association between wealth and child achievement, as there may be other mediators correlated with the variable that are omitted.

Our analysis is an observational study and not based on an experimental or quasi-experimental design. Therefore, the interpretation of our estimates merit discussion. At one end of the spectrum, estimates may be interpreted as causal if, conditional on measured variables, wealth is random (ignorable). The conditional exogeneity of wealth may be too strong of an assumption, and if so, then estimates from our study should not be interpreted as causal. However, we include an extensive set of pre-determined factors that are known to influence strongly both child development and wealth. Further, as we demonstrate below, there is positive selection on observed variables so that inclusion of these variables greatly reduces the positive association between wealth and child development. Therefore, it seems reasonable to assume that there is positive selection on unmeasured variables. If so, then our estimates represent an upper bound on the true causal estimate, and since estimates of the effect of wealth on child development tend to be small, it is likely that the true causal estimates are smaller. We acknowledge, however, that this interpretation is based on the assumption of positive selection on unmeasured variables. In addition, the complexity of the family choice problem related to wealth, fertility and child human capital investments suggests that there is a need for a great deal of descriptive information that can be used to formulate and estimate causal models. At a minimum, we provide such information.

4.2. Wealth at Ages 4 and 5

We also conducted analyses using the same models as just described but replaced wealth at birth with wealth at ages 4 or 5—the age just before the child assessments were conducted. These measures of wealth are post-birth and therefore may reflect, as opposed to cause, investments in children that affect achievement test scores. They are not as exogenous (pre-

determined) as wealth at birth, but they are a measure of wealth closer in time to the achievement tests and therefore may more accurately measure the extent of wealth and its influence. [10]

4.3. First Born v. All Children

We estimate all the models described above for a sample of first-born children and all children of the relevant age. We limit the sample to first-born children to ensure that wealth is a pre-determined variable. For example, if a child has an older sibling, then the wealth at birth of the younger sibling could reflect investments/spending on the older children (reverse causality).

4.4. Mediation of Disparities by Race/Ethnicity and Maternal Education/Ability

There are widely documented racial and ethnic disparities in achievement (Paschall et al. 2018; Reardon et al. 2015). There are also great inequalities in wealth by race and ethnicity (Bhutta et al. 2020; Blau & Graham 1990; Brown 2016). Similar variation in wealth and child achievement is found by maternal education. These facts motivate an analysis of whether wealth at birth (or ages 4 and 5) mediates racial/ethnic and SES disparities in child achievement. Our assessment of this hypothesis is straightforward. We estimate equation (2) above with and without a measure of wealth to examine whether racial and ethnic disparities in achievement are altered by the inclusion of wealth.

4.5. Heterogeneous Effects

Because wealth affects child development mainly by smoothing out family consumption due to unplanned events, there may be differences in associations between wealth and child achievement by family characteristics that are correlated with income volatility and other factors that (e.g., health) affect earnings and consumption. To explore this hypothesis, we obtain estimates of models (1) through (3) for samples stratified by mother's AFQT score, marital status

[10] The correlation between wealth prior to birth and wealth at ages 4 or 5 in our sample is 0.53.

at birth and race/ethnicity. AFQT score is a powerful predictor of economic well-being as is marital status, and it is for this reason that we stratified the sample by these characteristics.

5. Results

5.1. Descriptive Evidence on the Association between Wealth and Child Achievement

To begin the analysis, we provide descriptive information about the association between wealth at birth and child academic achievement and how that association varies by demographic group. To the best of our knowledge, there is no previous descriptive analysis that provides a basic set of facts about the association between family wealth (measured at birth or contemporaneously) and child achievement for a national sample of children. We divide the sample of children into four categories based on the total net worth (TNW) of the parents prior to birth of each child. Tables 1 and 2 present the results.

Table 1 shows the data for children ages 5 to 8 and for two assessments: the Peabody Individual Achievement Test (PIAT) for math and for reading comprehension. Focusing on the differences between children in the top and bottom wealth (TNW) categories, it is clear that there is a positive and significant association between wealth and achievement test scores. Generally, children from families in the top wealth category score between 3 to 6 points higher on math and reading than children in the bottom wealth category. These differences are approximately one-third to one-half of a standard deviation difference in test scores. The difference in test scores between the top and bottom wealth groups is found for all demographic groups shown in the table and there is not a marked amount of heterogeneity in the wealth differences across groups. The other notable fact about the figures in Table 1 is that even a relatively small positive amount of wealth can make a meaningful difference in test scores, especially among the most disadvantaged groups. Black children, children whose mothers do not have more than high

school diploma, or mothers with AFQT score in the lower two quartiles. For these groups, test scores of children in families with up to $25,000 of wealth have significantly higher achievement scores than their counterparts with zero or negative family wealth.

Table 2 presents similar information for children ages 9 to 12. The pattern of estimates is similar to that of Table 1. The difference in test scores between children in the top and bottom wealth categories is somewhat larger at these ages—between 5 and 10 points, which represent a difference of between one-half and eight-tenths of a standard deviation. Thus, the wealth gap in test scores tends to grow with age in this sample. There is also a bit more evidence that the gradient between wealth and test scores is more linear in this age group than in the younger sample, as test scores tend to increase with each increase in wealth.

In the Appendix we provide a similar set of tables (Appendix Tables 2 and 3) but we use wealth at the time of the assessment instead of wealth at birth. This analysis using contemporaneous wealth shows similar differences in test scores between children in the top wealth category and children in the bottom wealth category. The main difference between the two analyses is that contemporaneous wealth does not seem to have an effect until a family has $25,000 or more of total net worth.

Overall, the figures in Tables 1 and 2 show that there is a strong positive association between wealth measured at birth and child achievement test scores. Whether this association persists after adjustment for likely confounding variables is the question we turn to next.

5.2. Estimates for First Born Children and Wealth Prior to Birth

The first set of results are for a sample of first-born children and wealth measured prior to birth. Math results, which are presented in Table 3, show that the unadjusted differences in scores by wealth displayed in Table 1 and Table 2 (and Appendix Tables 2 and 3) persist after

adjusting for children's demographics, mother's age, and year fixed effects. This basic model shows a positive association between total net worth above $25,000 and PIAT math scores and this association is stronger for higher levels of TNW and among older children. Having parental net worth over $100,000 is associated with an increase of almost 3 points (0.23 of a standard deviation) in math score among children aged 5 to 8 and with an increase of 4 points (0.35 of a standard deviation) in math score among children aged 9 to 12. Adding potential family background confounders and income prior to birth to the regression substantially reduces magnitudes of estimates by approximately 75% and estimates are no longer statistically significant.

In analyses that examined associations between wealth components and math scores, estimates from the basic model show that having over $10,000 in financial assets is associated with math scores over 3 points higher among younger children. In the case of children aged 9 to 12, results also show that only financial assets have a statistically significant association with math scores. The association is stronger as parental financial assets increase. While financial assets up to $10,000 increase math scores by 2.8 points (0.24 of a standard deviation), financial assets greater than $50,000 are associated with an increase of 5.2 (0.45 of a standard deviation) points in math score. However, these significant positive associations are greatly reduced and no longer statistically significant when family background and family income prior to birth variables are included in the regression. Estimates from these models are relatively small (e.g., less than 0.1 of a standard deviation).

Results for reading comprehension and reading recognition scores reveal a similar pattern to that of math scores and are shown in Tables 4 and 5. Estimates from the basic model specification indicate a positive and statistically significant association of TNW with both

reading recognition and reading comprehension scores. In both cases, the association is stronger among older children and for TNW between $25,001 and $100,000. For example, children with parental wealth above $25,000 score as much as 4.2 points (0.36 of a standard deviation) higher in the reading comprehension test than children with zero or negative parental wealth. The addition of pre-determined family background variables, however, greatly reduces magnitudes of these associations and renders all estimates statistically insignificant. Perhaps more importantly, estimates are also small (e.g., less than 0.1 of a standard deviation) and not economically meaningful.

Like with math scores, the positive association between wealth and reading scores revealed by the basic model is driven variation in financial assets. Neither home equity nor other net wealth are associated with reading recognition and reading comprehension scores. Higher levels of parental financial assets are associated with progressively higher reading recognition scores between 1.4 and 3.8 points among younger children and between 2.3 and 4.7 points in the case of older children. Including family background and family income prior to birth eliminates all significant associations for both younger and older children. The positive association of financial assets with reading comprehension scores also is virtually eliminated and often negative after controlling for family background and adding other controls to the model.

We also estimated models for each test and child age range that added contemporaneous variables (e.g., mother's marital status and education, total number of children and family income) to the specification that includes family background and income prior to birth. These results are presented in Appendix Table A4. All estimates are small and not statistically significant, in line with our previous results.

Overall, our results show that after accounting for family background and family income prior to birth, wealth measured at birth is not significantly associated with test scores, although estimates are generally positive. These results contrast with most of the existing literature that has generally found positive and significant associations between wealth and test scores, but are in line with causal estimates documented by Cesarini et al. (2016). In the next part of the analysis, we study whether these results hold using wealth at ages 4 or 5 as the main explanatory variables and in analyses that expand our sample by using all children in the CNLSY as opposed to using only first-born children.

5.3. Estimates for First Born Children and Wealth at Ages 4 and 5

Table 3 also displays the associations between wealth at ages 4 or 5 and PIAT math scores (columns labeled Ages 4-5). The pattern of results is similar to analyses that used wealth at birth. There are no statistically significant associations between TNW at ages 4 and 5 and math test scores after controlling for family background and family income prior to birth. Estimates of the effect of wealth are quite small (e.g., less than 0.1 of a standard deviation). Like in the previous analysis, wealth seems to matter more for older children's scores.

The one notable difference between estimates for wealth at ages 4 or 5 and the analogous estimates for wealth at birth, is that associations between financial assets and math scores among older children are relatively substantial and statistically significant even after controlling for family background and family income prior to birth.

The pattern of estimates just described in regard to wealth at ages 4 and 5 and math scores is largely repeated for the other two achievement tests: reading recognition and reading comprehension. These estimates are presented in Table 4 (reading comprehension) and Table 5 (reading recognition).

Although the effects of total net wealth at ages 4 and 5 are in line with estimates of the effects of wealth at birth, the current results suggest that financial assets at ages 4 or 5 are an important correlate of child cognitive achievement. This is the case even after controlling for income prior to birth and family background. Parents may be using this financial wealth to fund planned investments in children, or to respond to unplanned shocks that adversely affect children in families with less financial wealth.

5.4. Estimates for All Children

While we consider the sample of first-born children to be preferred in terms of research design, we also conducted analyses using a sample of all children. This sample is larger and estimates more precise. For this sample too, we conducted analyses for both wealth prior to birth and wealth at ages 4 or 5. Estimates for the sample of all children are included in Tables 3 through 5 (columns labeled All Children). Estimates in Table 3 indicate that TNW is positively and significantly related to math scores. For children ages 5 to 8, estimates suggest that a TNW of $25,000 or more is associated with an of approximately 0.1 standard deviation increase in math scores and for older children a TNW of $25,000 or more is associated with an of approximately 0.15 standard deviation increase in math. Associations are generally stronger when wealth is measured at ages 4 or 5. The analysis of the effects of various components of wealth on test scores shows that it is financial wealth that accounts for the positive and significant association with math scores. Indeed, there tends to be a positive gradient between financial assets and test scores.

We note that we are cautious in our interpretation of estimates obtained using wealth at ages 4 or 5 and for a sample of all children. Both aspects increase the chances that the conditional exogeneity of wealth assumption is invalid. This is particularly true for financial

assets, which are the most liquid and the most likely to be used to finance investments that would tend to cause there to be a negative association. However, associations remain positive and economically meaningful, which suggest that the exogeneity assumption may be reasonable.

Tables 4 and 5 present estimates for the sample of all children for the reading test scores. The pattern of results is the same as it was in Table 3. TNW is positively associated with reading test scores and estimates are larger when wealth at ages 4 or 5 is used than when wealth at birth is used. It is also the case that the positive associations between wealth and reading scores is being driven by the association between financial assets and reading scores. Estimates indicate that greater financial wealth is associated with reading scores that are 0.2 to 0.25 standard deviations higher.

5.5. Does Wealth Mediate Disparities in Achievement by Race/Ethnicity and Maternal Education/Ability?

Next, we present an analysis of whether wealth mediates racial/ethnic disparities in achievement. Unsurprisingly, given the previous results that wealth is not a strong correlate of test scores, wealth does not seem to have a mediating effect on the racial/ethnic gap in test scores. The first 6 columns of Table 6 displays the results for children aged 5 to 8. The addition of wealth at birth to the model has little effect on the coefficient estimates for Black and Hispanic. Interestingly, there are few significant racial/ethnic disparities in test scores even in models without wealth. The only significant association is between math test scores and Black children.[11]

[11] Analyses that use wealth at ages 4 or 5 among first-born children and wealth prior to birth among all children also show that the inclusion of wealth variables to the model has little effect on Black and Hispanic coefficients even in cases where the conditional racial gap is as large as 45% of a standard deviation.

Results for children ages 9 to 12 are presented in the last 6 columns of Table 6. For this sample, Black children are observed to have significantly lower math and reading comprehensions scores. However, the addition of wealth to the model has relatively little impact, which again is not surprising because wealth itself is not a strong correlate of test scores.

Results in Table 6 also show that wealth does not mediate disparities by maternal education and ability level. Differences in test scores given by mother's ability level measured by the AFQT are almost unchanged after including wealth at birth in the model. The higher the mother's AFQT quartile, the higher children score in all tests. Similarly, differences in achievement by mother's education level at birth are not significantly altered by adding wealth to the model. However, in this case, only children of mothers with a bachelor's degree score significantly higher than children of high-school-dropout mothers.

5.6. Are there Heterogeneous Effects of Wealth on Child Achievement?

We assessed whether there were heterogenous associations between wealth and test scores for samples stratified by race/ethnicity and by two maternal characteristics: AFQT score and marital status at the time of birth of her first child. We selected these characteristics because they are correlated with earnings volatility and other factors that affect consumption volatility, such as illness that are potentially mitigated by wealth. For this analysis, we use the sample of all children because the sample of first-born children is too small to obtain estimates precise enough to be informative.

Math results for samples stratified by maternal characteristics are presented in Figure 1 and show that net wealth above $25,000 is associated with higher scores, with larger effects for the less advantaged groups: children of mothers with low AFQT and children of mothers not married before childbirth. Financial assets are positively associated with math scores and the

association is generally larger among children of mothers with lower AFQT and children of mothers not married before childbirth.

Appendix Figure A1 shows that wealth significantly increases reading recognition scores among children of mother with low AFQT and older children of mothers married before childbirth. Financial assets are associated with higher scores among children of mothers with low AFQT and children of mothers married before childbirth. Other net wealth and home equity are not significantly associated with reading recognition scores, except for the lower scores among younger children of mothers with high AFQT who had home equity above $50,000 prior to birth.

Results in Figure 2 show that higher levels of net wealth have a larger effect on reading comprehension scores among children of mothers with low AFQT and children of mothers not married before childbirth. Financial assets are positively and significantly associated with scores among children of mothers with low AFQT and older children of mothers not married before childbirth. Home equity and other net wealth are significantly associated with comprehension scores only among older children of mothers with low AFQT. These results show that wealth, especially financial assets, have a more important role among less advantaged groups such as children of mothers with lower abilities and children of mothers not married before childbirth. These results also provide support to the thesis that wealth affects children's cognitive achievement mainly by smoothing out family consumption, especially among groups that are likely to face higher income volatility.

Results for the sample stratified by race/ethnicity are shown in Figures 3 through 5. Results are similar across all three test scores. There is some evidence of significant associations between TNW above $25,000 and test scores among the Black and Hispanic samples, especially among older children. Similar to our main results, there is evidence of positive associations

between financial assets and test scores for all subsamples, with larger associations for Black and Hispanic children and older children. Unlike our main results, estimates stratified by race/ethnicity suggest positive associations of home equity and test scores among Black and Hispanic children.

5.7. Does Wealth Affect Non-Academic Outcomes?

We assessed whether there were associations between wealth at birth and socioemotional behaviors measured by the Behavior Problem Index. We examined two different subscales: externalizing and internalizing behaviors. Results are shown in Table 7. Overall, estimates suggest that TNW is associated with fewer externalizing and internalizing behaviors, particularly for the larger sample of all children ages 5 to 8 and 9 to 12. Estimates suggest more of a threshold effect than a gradient with TNW of $25,000 or more associated with fewer behavioral problems up to 0.4 standard deviations in the case of externalizing behaviors and up to 0.28 standard deviations in the case of internalizing behaviors. Estimates are noticeably smaller and not statistically significant for the sample of first-born children. The analysis of wealth components shows significant negative associations of home equity above $50,000 and other wealth above $5,000 with both subscales.

6. Discussion

Results of our analysis suggest that wealth at birth, or at ages 4 or 5, has a modest positive association with achievement test scores and (better) socioemotional behavior. Evidence also suggest that it is financial assets that account for much of the positive association between wealth and child development. Associations are economically meaningful, if not large. For example, having $50,000 or more in financial assets, which puts a family in the top 10% of the distribution in the sample of families in our analysis, is associated with math and reading scores

that are 0.10 to 0.25 standard deviations higher than math and reading scores of families with no financial wealth. One caveat to this conclusion is that it was only among the sample of all children that we found statistically significant effects. For the sample of first-born children, associations between wealth and child academic achievement were positive, but smaller and not statistically significant.

We also found that wealth does not mediate racial/ethnic disparities in achievement or disparities in achievement by maternal education/ability (AFQT). This finding is consistent with the modest effects of wealth on achievement scores. While there are large wealth differences by race and ethnicity, the association between wealth and test scores is not sufficiently strong to mediate racial and ethnic differences in test scores. That said, we did find that financial wealth had a positive effect on test scores of all racial and ethnic groups.

Finally, results suggested that wealth was also associated with fewer behavioral problems, although only in analyses that used the larger sample of all children. The estimates suggested larger improvements in externalizing behavior problems than in internalizing behavior problems. That is to say, wealth plays a larger role in behaviors such as interpersonal relationships and rule breaking than in behaviors such as demand for attention and dependency.

Overall, our results are consistent with some prior studies that found positive associations between wealth and test scores, especially math scores (Moulton et al. 2021; Orr 2003; Phillips et al. 1998; Williams Shanks 2007). Unlike previous studies, however, our measures of wealth are more likely to be exogeneous and largely eliminate the problem of reverse causality. Also, our extensive set of pre-determined family background controls reduce the potential of omitted variable bias. These improvements over past stuy approaches suggest that our findings are likely to be closer to true causal estimates than those found in previous studies. And as argued earlier,

if we assume that selection on unmeasured variables is positive, which is reasonable because of the positive selection on measured characteristics, our estimates represent an upper bound on the true causal estimates.

The finding that financial assets, particularly at ages 4 or 5, is a significant correlate of children's academic achievement suggest that the liquidity of a family's wealth matters. The liquidity of financial wealth makes it much like income and can be used to fund investments in child development or to smooth over unplanned losses of income to maintain investments. Our results also suggest that financial assets have a more important role among less advantaged groups such as Black and Hispanic children, and children of mothers with lower abilities and children of mothers not married before childbirth. Children in those types of families are more likely to face income volatility[12], and having positive financial wealth might help families smooth consumption when negative income shocks occur, thereby affecting children's academic achievement.

Our findings have important implications for both theory and public policy. If true, the fact that wealth is, at most, a modest correlate of child academic achievement suggests that child achievement is not particularly affected by the problems associated with the inability to smooth consumption. From a policy perspective, the modest association between wealth and child academic achievement suggests that the inequality in child achievement by race and socioeconomic status will not be significantly mediated by policies that augment family wealth. There was some evidence that greater financial wealth, which is the most liquid form of wealth, may mediate deficits in achievement among disadvantaged groups such as female-headed

[12] In our sample, children of mothers with low AFQT and children of mothers not married before childbirth not only have lower family income, but their families are also more likely to experience a drop in income and the drop is larger than that experienced by families with a high-AFQT mother and with parents that married before childbirth.

households and families with low-educated parents, although these results were not robust. Targeted Child Development Accounts (CDA) that include government-matched funds along with financial education for both parents and children may be effective in some domains, but our results suggest that academic achievement may not be one of those domains. Of course, our estimates pertain to achievement during school years and stands in contrast to studies that show that home ownership and wealth are positively associated with educational attainment, for example, college attendance (e.g., Aaronson 2000; Pfeffer 2018). The latter result may reflect the benefits of wealth in terms of being liquidity constrained to finance post-secondary education. For primary and secondary education, liquidity constraints are less important and it is more the consumption smoothing aspect of wealth that is arguably more important.

Declarations

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Table 1. Math and Reading Test Scores by Family Wealth Prior to Birth and Other Characteristics Among Children Ages 5 to 8

	PIAT Math				PIAT Reading Comprehension			
	TNW <=0 (N=1,320)	TNW 1-25,000 (N=2,235)	TNW 25,001-100,000 (N=1,325)	TNW >100,000 (N=992)	TNW <=0 (N=1,262)	TNW 1-25,000 (N=2,142)	TNW 25,001-100,000 (N=1,284)	TNW >100,000 (N=964)
All (N=5,872)	20.5	22*	24.7*	26.3*	21.4	22.6*	25.2*	25.8*
NH-Black (N=1,635)	18.9	20.4*	22.9*	21.9	20.7	22*	24.8*	24.8*
NH-White (N=3,010)	23.4	24.3	25.5*	26.9*	22.7	24.1	25.4*	26*
Hispanic (N=1,227)	20.8	20.1	22.5	24.7*	21.5	20.9	24.3*	24.6*
Mother <= HS (N=3,323)	19.7	21.2*	23.1*	24.1*	20.6	21.6*	24*	24*
Mother > HS (N=2,549)	23.1	23.4	25.8*	27.3*	23.8	24.6	26*	26.6*
Mother's AFQT Quartile 1-2 (N=3,613)	19.6	20.7*	22.4*	23.6*	20.7	21.5*	23.4*	23.8*
Mother's AFQT Quartile 3-4 (N=2,259)	24.8	25.5	26.4	27.6*	24.6	25.8	26.5*	26.7*
Mother Married Before Birth (N=3,609)	22.5	23.2	25*	26.4*	23.1	23.8	25.3*	25.8*
Mother Not Married Before Birth (N=2,116)	20	20.6	22.4*	24.3*	20.8	21.3	24.5*	24.3*

Notes: Sample includes all children of mother. TNW is total net worth of the family at interview prior to birth. The number of observations in each TNW category (N=) refers to the sample of all children ages 5 to 8. .* indicates that the mean in the TNW category is statistically different from mean in the TNW<=0 category at 0.05 level.

Table 2. Math and Reading Test Scores by Family Wealth Prior to Birth and Other Characteristics Among Children Ages 9 to 12

	PIAT Math				PIAT Reading Comprehension			
	TNW <=0 (N=1,235)	TNW 1-25,000 (N=2,016)	TNW 25,001-100,000 (N=1,257)	TNW >100,000 (N=899)	TNW <=0 (N=1,232)	TNW 1-25,000 (N=2,006)	TNW 25,001-100,000 (N=1,250)	TNW >100,000 (N=893)
All (N=5,407)	44.3	46.6*	51.6*	53.5*	40.9	43.9*	48.7*	49.9*
NH-Black (N=1,509)	41.8	44.1*	48.4*	49.6*	38.5	40.7*	44.4*	46.8*
NH-White (N=2,783)	48.7	49.7	52.5*	54.3*	44.9	46.9*	49.7*	50.3*
Hispanic (N=1,115)	44.7	44.4	49.9*	50.4*	41.8	42.7	47.8*	48.3*
Mother <= HS (N=3,080)	43.1	45.1*	49.1*	51.5*	39.5	42.1*	46.1*	48*
Mother > HS (N=2,327)	47.8	49.4*	53.4*	54.4*	45.2	47.3*	50.6*	50.7*
Mother's AFQT Quartile 1-2 (N=3,322)	43	44.6*	48.4*	50*	39.3	41.6*	45.7*	46.7*
Mother's AFQT Quartile 3-4 (N=2,085)	50.3	52*	53.9*	55.2*	48.1	49.8	51*	51.4*
Mother Married Before Birth (N=3,281)	47.9	48.6	52.2*	53.4*	45.1	46.2	49.2*	49.9*
Mother Not Married Before Birth (N=1,994)	43.3	44.5*	47.5*	53.9*	39.3	41.4*	45.5*	48.6*

Notes: Sample includes all children of mother. TNW is total net worth of the family at interview prior to birth. The number of observations in each TNW category (N=) refers to the sample of all children ages 9 to 12. .* indicates that the mean in the TNW category is statistically different from mean in the TNW<=0 category at 0.05 level.

Table 3. Estimates of the Association between Wealth and PIAT Math Scores

	Ages 5 to 8					Ages 9 to 12				
Sample	First Born			All Children		First Born			All Children	
Timing of Measure of Wealth	At Birth	At Birth	Ages 4-5	At Birth	Ages 4-5	At Birth	At Birth	Ages 4-5	At Birth	Ages 4-5
Total Net Worth										
Between 1 and 25,000	1.095	0.657	-0.0334	0.274	0.544	0.682	-0.181	0.501	0.407	0.402
	(0.646)	(0.632)	(0.697)	(0.311)	(0.341)	(0.955)	(0.948)	(0.960)	(0.485)	(0.524)
Between 25,001 and 100,000	2.298**	0.610	0.144	0.506	1.540***	3.923***	1.212	1.996	1.645**	2.293***
	(0.734)	(0.765)	(0.787)	(0.403)	(0.390)	(1.112)	(1.124)	(1.050)	(0.595)	(0.578)
More than 100,000	2.827***	0.715	0.370	1.073*	1.853***	3.952***	0.779	0.965	1.430*	2.809***
	(0.801)	(0.818)	(0.786)	(0.459)	(0.433)	(1.175)	(1.205)	(1.123)	(0.668)	(0.632)
Home Equity										
Between 1 and 15,000	-0.656	-0.956	-0.152	0.107	-0.286	0.134	-0.203	1.162	0.386	0.539
	(0.703)	(0.721)	(0.704)	(0.423)	(0.437)	(1.121)	(1.120)	(1.031)	(0.579)	(0.598)
Between 15,001 and 50,000	0.0438	-0.517	0.328	0.192	0.401	1.154	0.367	0.547	0.880	0.266
	(0.590)	(0.585)	(0.624)	(0.344)	(0.360)	(0.907)	(0.898)	(0.970)	(0.507)	(0.529)
More than 50,000	-0.767	-1.126	-0.345	-0.450	-0.0396	0.731	-0.023	-0.347	0.727	0.361
	(0.681)	(0.646)	(0.621)	(0.394)	(0.378)	(1.006)	(0.989)	(1.010)	(0.566)	(0.539)
Financial Assets										
Between 1 and 10,000	1.015	-0.558	0.686	0.604	1.230***	2.751**	0.675	1.941*	1.388**	1.908***
	(0.601)	(0.624)	(0.653)	(0.313)	(0.327)	(0.898)	(1.019)	(0.935)	(0.474)	(0.481)
Between 10,001 and 50,000	3.233***	0.841	2.061*	1.486**	1.773***	3.691**	0.689	3.456**	1.599*	2.600***
	(0.802)	(0.791)	(0.843)	(0.454)	(0.446)	(1.212)	(1.296)	(1.164)	(0.660)	(0.641)
More than 50,000	3.849***	0.482	1.648	1.694**	2.764***	5.155***	1.010	2.271	1.720*	3.889***
	(1.105)	(1.107)	(0.895)	(0.616)	(0.503)	(1.540)	(1.626)	(1.252)	(0.869)	(0.710)
Other Wealth										
Between 1 and 5,000	-0.427	0.100	-0.0492	-0.285	0.303	-1.846	-1.023	0.586	-0.260	0.224
	(0.690)	(0.674)	(0.655)	(0.326)	(0.341)	(1.042)	(1.009)	(1.000)	(0.493)	(0.512)
Between 5,001 and 20,000	-0.111	-0.312	-0.274	0.0756	0.356	-0.431	-0.481	0.107	0.395	0.249
	(0.651)	(0.616)	(0.631)	(0.339)	(0.354)	(1.005)	(0.957)	(0.903)	(0.495)	(0.511)
More than 20,000	0.485	0.0033	-0.676	0.281	0.488	1.028	0.635	0.412	0.694	1.170*
	(0.719)	(0.697)	(0.694)	(0.397)	(0.392)	(1.098)	(1.064)	(1.027)	(0.563)	(0.565)
Standard Dev. Dep. Variable		12.24		12.0			11.35		11.76	
Family Background and Inc. Prior to Birth	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Observations	1798	1798	1685	5824	5280	1604	1604	1494	5365	4771

Notes: Standard errors in parentheses are clustered at the child level. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. Family background variables include dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Total family income prior to birth is measured by 5 dummy variables: 0-15,000, 15,001-40,000, 40,001-60,000, 60,001-80,000, >80,000. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4. Estimates of the Association between Wealth and PIAT Reading Comprehension Scores

	Ages 5 to 8					Ages 9 to 12				
Sample	First Born			All Children		First Born			All Children	
Timing of Measure of Wealth	At Birth	At Birth	Ages 4-5	At Birth	Ages 4-5	At Birth	At Birth	Ages 4-5	At Birth	Ages 4-5
Total Net Worth										
Between 1 and 25,000	0.735	0.201	0.186	0.399	0.456	0.565	-0.555	0.470	0.693	0.00268
	(0.599)	(0.574)	(0.659)	(0.288)	(0.314)	(0.981)	(0.916)	(0.994)	(0.486)	(0.535)
Between 25,001 and 100,000	2.831***	1.036	0.0232	1.125**	1.210**	4.191***	1.038	1.238	1.798**	1.453*
	(0.700)	(0.733)	(0.779)	(0.375)	(0.371)	(1.125)	(1.052)	(1.080)	(0.614)	(0.605)
More than 100,000	2.766***	0.830	-0.459	1.032*	1.250**	3.170**	-0.521	0.277	0.972	1.723*
	(0.769)	(0.793)	(0.817)	(0.444)	(0.416)	(1.226)	(1.161)	(1.117)	(0.698)	(0.671)
Home Equity										
Between 1 and 15,000	-0.825	-0.921	-0.697	0.290	-0.0154	-1.503	-1.576	-0.248	0.297	0.509
	(0.764)	(0.774)	(0.701)	(0.401)	(0.393)	(1.239)	(1.224)	(1.142)	(0.636)	(0.638)
Between 15,001 and 50,000	0.613	0.0912	0.389	0.609	0.511	1.244	0.326	0.498	0.841	0.709
	(0.631)	(0.624)	(0.670)	(0.343)	(0.348)	(0.961)	(0.915)	(1.052)	(0.518)	(0.572)
More than 50,000	-0.332	-0.809	-0.793	-0.0500	-0.110	0.0393	-0.946	-0.676	-0.216	0.619
	(0.695)	(0.668)	(0.660)	(0.393)	(0.359)	(1.044)	(0.987)	(0.996)	(0.597)	(0.574)
Financial Assets										
Between 1 and 10,000	1.624**	0.0654	1.045	0.671*	1.206***	2.592**	-0.0897	3.217***	1.612***	1.570**
	(0.543)	(0.535)	(0.592)	(0.276)	(0.291)	(0.919)	(0.925)	(0.964)	(0.489)	(0.511)
Between 10,001 and 50,000	3.080***	0.851	1.920*	1.195**	1.847***	3.813**	-0.0550	4.319***	1.558*	2.554***
	(0.738)	(0.706)	(0.812)	(0.418)	(0.422)	(1.168)	(1.157)	(1.208)	(0.645)	(0.690)
More than 50,000	3.090**	-0.0055	1.571	0.663	2.200***	4.064*	-1.230	3.560**	1.687	3.068***
	(1.013)	(1.001)	(0.893)	(0.573)	(0.474)	(1.768)	(1.774)	(1.308)	(0.923)	(0.751)
Other Wealth										
Between 1 and 5,000	-0.616	-0.122	-1.151	0.0409	-0.172	-2.016	-1.028	-0.455	0.0832	-0.380
	(0.669)	(0.638)	(0.694)	(0.298)	(0.314)	(1.084)	(0.987)	(1.110)	(0.485)	(0.547)
Between 5,001 and 20,000	0.131	-0.109	-1.311*	0.507	0.0236	-0.369	-0.283	-0.638	0.718	-0.119
	(0.625)	(0.600)	(0.659)	(0.318)	(0.329)	(1.048)	(0.953)	(0.970)	(0.502)	(0.541)
More than 20,000	0.589	0.234	-1.161	0.542	0.111	0.824	0.534	-0.811	0.988	0.216
	(0.710)	(0.711)	(0.745)	(0.382)	(0.381)	(1.171)	(1.083)	(1.094)	(0.582)	(0.585)
Standard Dev. Dep. Variable	11.57			11.08		11.71			11.94	
Family Background and Inc. Prior to Birth	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Observations	1714	1714	1601	5604	5064	1595	1595	1481	5340	4749

Notes: Standard errors in parentheses are clustered at the child level. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. Family background variables include dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Total family income prior to birth is measured by 5 dummy variables: 0-15,000, 15,001-40,000, 40,001-60,000, 60,001-80,000, >80,000. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5. Estimates of the Association between Wealth and PIAT Reading Recognition Scores

	Ages 5 to 8					Ages 9 to 12				
Sample	First Born			All Children		First Born			All Children	
Timing of Measure of Wealth	At Birth	At Birth	Ages 4-5	At Birth	Ages 4-5	At Birth	At Birth	Ages 4-5	At Birth	Ages 4-5
Total Net Worth										
Between 1 and 25,000	0.252	-0.445	-0.372	0.231	0.384	0.864	-0.759	0.493	0.703	0.479
	(0.650)	(0.612)	(0.744)	(0.329)	(0.371)	(1.229)	(1.173)	(1.265)	(0.615)	(0.682)
Between 25,001 and 100,000	2.107**	0.234	-0.513	0.810	0.923*	3.752**	-0.0982	1.245	2.095**	2.333**
	(0.797)	(0.830)	(0.916)	(0.430)	(0.436)	(1.389)	(1.370)	(1.353)	(0.767)	(0.766)
More than 100,000	1.840*	-0.176	-0.762	0.815	0.995*	3.079*	-1.246	-0.0781	1.531	2.438**
	(0.828)	(0.861)	(0.966)	(0.502)	(0.490)	(1.487)	(1.473)	(1.395)	(0.860)	(0.834)
Home Equity										
Between 1 and 15,000	-0.649	-0.748	-0.605	0.196	0.154	-2.471	-2.532	-0.827	-0.417	-0.197
	(0.851)	(0.849)	(0.820)	(0.456)	(0.449)	(1.535)	(1.462)	(1.423)	(0.802)	(0.822)
Between 15,001 and 50,000	0.0801	-0.376	0.660	0.407	0.614	-0.372	-1.249	-0.504	0.945	0.659
	(0.693)	(0.688)	(0.698)	(0.380)	(0.387)	(1.170)	(1.111)	(1.265)	(0.649)	(0.724)
More than 50,000	-1.005	-1.369	-1.173	-0.262	-0.0699	-0.0745	-1.041	-1.741	0.0646	0.00425
	(0.771)	(0.762)	(0.742)	(0.448)	(0.394)	(1.262)	(1.200)	(1.352)	(0.737)	(0.737)
Financial Assets										
Between 1 and 10,000	1.424*	-0.296	0.105	0.753*	0.862*	2.315*	-1.336	1.518	1.611**	1.231
	(0.579)	(0.580)	(0.716)	(0.311)	(0.340)	(1.133)	(1.172)	(1.299)	(0.621)	(0.645)
Between 10,001 and 50,000	3.600***	1.239	1.384	1.464**	1.568**	4.116**	-0.550	4.608**	2.459**	2.787**
	(0.899)	(0.856)	(0.985)	(0.500)	(0.486)	(1.477)	(1.485)	(1.602)	(0.840)	(0.861)
More than 50,000	3.775**	0.630	0.960	0.711	1.832***	4.718*	-1.088	3.290	1.894	3.143***
	(1.216)	(1.200)	(1.058)	(0.676)	(0.541)	(1.994)	(2.025)	(1.760)	(1.094)	(0.952)
Other Wealth										
Between 1 and 5,000	-0.914	-0.470	-0.816	-0.227	0.0698	-2.128	-1.460	-0.612	-0.500	0.176
	(0.748)	(0.698)	(0.755)	(0.347)	(0.359)	(1.395)	(1.294)	(1.306)	(0.621)	(0.686)
Between 5,001 and 20,000	-0.172	-0.448	-0.708	0.256	0.240	-0.0873	-0.371	0.442	0.243	0.882
	(0.720)	(0.693)	(0.756)	(0.365)	(0.372)	(1.276)	(1.146)	(1.245)	(0.633)	(0.691)
More than 20,000	-0.0069	-0.411	-0.860	0.228	0.0116	1.329	0.561	-0.412	1.193	0.977
	(0.802)	(0.792)	(0.863)	(0.428)	(0.432)	(1.407)	(1.292)	(1.345)	(0.718)	(0.743)
Standard Dev. Dep. Variable		12.89		12.45			13.77		14.3	
Family Background and Inc. Prior to Birth	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Observations	1776	1776	1663	5770	5226	1607	1607	1497	5367	4775

Notes: Standard errors in parentheses are clustered at the child level. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. Family background variables include dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Total family income prior to birth is measured by 5 dummy variables: 0-15,000, 15,001-40,000, 40,001-60,000, 60,001-80,000, >80,000. Contemporaneous variables include mother's marital status, education, and total number of children and total family income at assessment. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6. Estimates of the Association of Race/Ethnicity and Maternal Ability with PIAT Scores, Assessment of Mediating Effect of Wealth Prior to Birth

	Ages 5 to 8						Ages 9 to 12					
	Math		Reading Recognition		Reading Comprehension		Math		Reading Recognition		Reading Comprehension	
Child's Race/Ethnicity												
Black	-2.603***	-2.320***	-0.518	-0.300	-0.475	-0.170	-4.011***	-3.463***	-3.180***	-2.632***	-3.863***	-3.417***
	(0.339)	(0.353)	(0.355)	(0.368)	(0.310)	(0.322)	(0.505)	(0.526)	(0.632)	(0.653)	(0.509)	(0.532)
Hispanic	-1.415***	-1.306***	0.272	0.343	0.0327	0.135	-1.311*	-1.094*	1.484*	1.684*	0.228	0.383
	(0.358)	(0.359)	(0.382)	(0.382)	(0.339)	(0.339)	(0.527)	(0.528)	(0.709)	(0.710)	(0.556)	(0.559)
Mother's AFQT Quartile												
2nd Quartile	1.988***	1.931***	2.571***	2.503***	2.032***	1.943***	3.082***	2.913***	5.060***	4.876***	4.048***	3.885***
	(0.310)	(0.309)	(0.327)	(0.326)	(0.284)	(0.283)	(0.479)	(0.478)	(0.620)	(0.619)	(0.492)	(0.492)
3rd Quartile	3.022***	2.946***	3.066***	2.981***	2.980***	2.867***	4.653***	4.408***	6.816***	6.563***	5.451***	5.234***
	(0.382)	(0.382)	(0.404)	(0.406)	(0.360)	(0.359)	(0.576)	(0.576)	(0.747)	(0.750)	(0.584)	(0.584)
4th Quartile	4.250***	4.100***	4.403***	4.287***	4.147***	3.989***	6.993***	6.680***	8.621***	8.325***	7.742***	7.509***
	(0.461)	(0.459)	(0.481)	(0.484)	(0.434)	(0.435)	(0.636)	(0.633)	(0.835)	(0.837)	(0.673)	(0.670)
Mother's Education												
High School	1.812***	1.693***	1.777***	1.662***	1.632***	1.480***	2.612***	2.408***	2.881***	2.641***	2.953***	2.732***
	(0.362)	(0.363)	(0.380)	(0.390)	(0.331)	(0.337)	(0.574)	(0.577)	(0.742)	(0.747)	(0.568)	(0.569)
Some College	2.306***	2.113***	2.788***	2.610***	2.434***	2.193***	3.897***	3.525***	4.378***	3.969***	4.506***	4.148***
	(0.418)	(0.425)	(0.439)	(0.453)	(0.391)	(0.402)	(0.649)	(0.656)	(0.850)	(0.864)	(0.649)	(0.656)
Bachelor's Degree	4.454***	4.160***	3.874***	3.649***	3.424***	3.120***	5.084***	4.545***	5.590***	5.051***	6.338***	5.891***
	(0.496)	(0.501)	(0.524)	(0.535)	(0.462)	(0.467)	(0.741)	(0.743)	(0.967)	(0.982)	(0.746)	(0.760)
TNW at birth												
Between 1 and 25,000		0.409		0.441		0.603*		0.678		0.969		0.978*
		(0.307)		(0.328)		(0.283)		(0.476)		(0.612)		(0.481)
Between 25,001 and 100,000		0.824*		1.022*		1.404***		2.286***		2.587***		2.313***
		(0.378)		(0.398)		(0.350)		(0.558)		(0.722)		(0.581)
More than 100,000		1.415***		0.830		1.135**		2.148***		1.961*		1.497*
		(0.415)		(0.463)		(0.401)		(0.620)		(0.794)		(0.651)
Standard Dev. Dep. Variable	11.91		12.39		11.03		11.76		14.39		11.97	
Observations	5824	5824	5770	5770	5604	5604	5365	5365	5367	5367	5340	5340

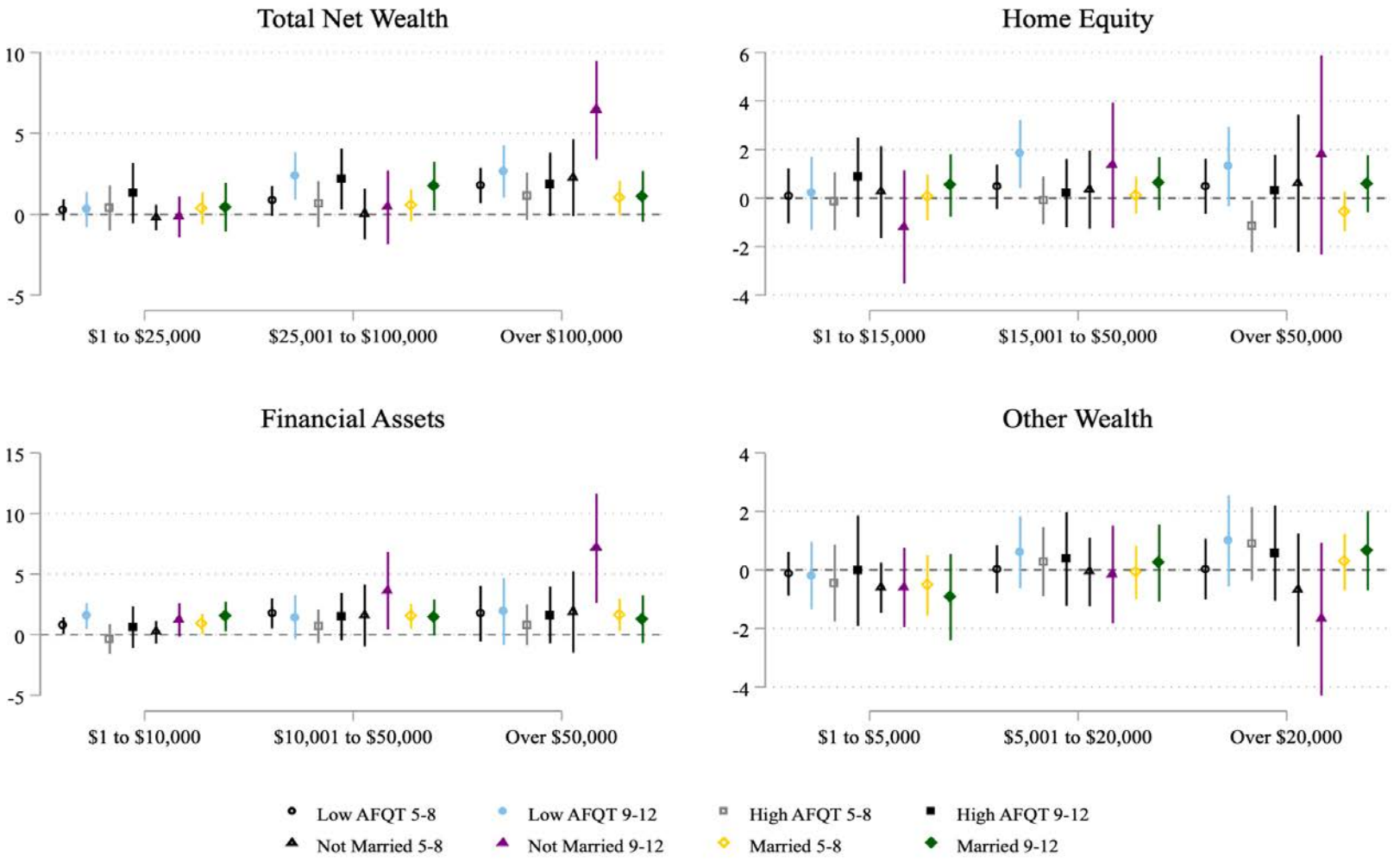
Notes: Standard errors in parentheses are clustered at the child level. Sample includes all children of mother. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. All models also include family background dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Reference category for TNW is zero or less. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 7. Estimates of the Association between Wealth at Birth and Externalizing and Internalizing Behaviors

	BPI Externalizing Score				BPI Internalizing Score			
	Ages 5 to 8		Ages 9 to 12		Ages 5 to 8		Ages 9 to 12	
Sample	First Born	All Children	First Born	All Children	First Born	All Children	First Born	All Children
Total Net Worth at Birth								
Between 1 and 25,000	-0.836	-0.809**	0.115	-0.683*	-0.285	-0.134	0.204	-0.143
	(0.574)	(0.292)	(0.659)	(0.317)	(0.267)	(0.132)	(0.274)	(0.132)
Between 25,001 and 100,000	-1.351*	-1.924***	-0.753	-1.959***	-0.536	-0.604***	-0.280	-0.700***
	(0.633)	(0.339)	(0.726)	(0.385)	(0.293)	(0.155)	(0.297)	(0.157)
More than 100,000	-1.204	-2.125***	-0.933	-2.495***	-0.206	-0.632***	-0.150	-0.773***
	(0.679)	(0.365)	(0.766)	(0.401)	(0.329)	(0.171)	(0.319)	(0.167)
R-squared	0.167	0.111	0.141	0.110	0.142	0.085	0.150	0.099
Home Equity at Birth								
Between 1 and 15,000	0.466	-0.185	0.130	0.0108	0.426	0.0699	0.0966	-0.0279
	(0.602)	(0.323)	(0.684)	(0.395)	(0.281)	(0.155)	(0.301)	(0.162)
Between 15,001 and 50,000	-0.430	-0.409	-0.287	-0.466	0.0131	-0.0719	-0.219	-0.105
	(0.444)	(0.285)	(0.528)	(0.322)	(0.219)	(0.137)	(0.236)	(0.141)
More than 50,000	-0.708	-1.004***	-0.499	-1.211***	-0.0835	-0.241	-0.177	-0.355*
	(0.499)	(0.298)	(0.620)	(0.331)	(0.244)	(0.142)	(0.260)	(0.139)
Financial Assets at Birth								
Between 1 and 10,000	-0.0175	-0.801**	-0.0180	-0.655*	-0.138	-0.274*	0.357	-0.145
	(0.471)	(0.262)	(0.589)	(0.307)	(0.221)	(0.126)	(0.234)	(0.128)
Between 10,001 and 50,000	0.650	-0.456	0.568	-0.518	-0.0756	-0.223	0.538	-0.140
	(0.589)	(0.340)	(0.697)	(0.382)	(0.289)	(0.166)	(0.285)	(0.162)
More than 50,000	2.113*	0.178	1.556	0.0995	1.035*	0.102	0.791*	0.0578
	(0.840)	(0.451)	(1.002)	(0.502)	(0.417)	(0.213)	(0.403)	(0.209)
Other Wealth at Birth								
Between 1 and 5,000	-0.401	-0.446	0.892	-0.278	-0.241	0.0284	0.144	-0.0483
	(0.571)	(0.298)	(0.711)	(0.331)	(0.264)	(0.137)	(0.289)	(0.141)
Between 5,001 and 20,000	-0.738	-0.930***	-0.618	-1.146***	-0.345	-0.344**	-0.222	-0.436***
	(0.482)	(0.274)	(0.558)	(0.308)	(0.226)	(0.127)	(0.238)	(0.128)
More than 20,000	-1.936***	-1.872***	-1.795**	-1.902***	-0.813**	-0.704***	-0.666*	-0.654***
	(0.515)	(0.297)	(0.631)	(0.340)	(0.248)	(0.140)	(0.261)	(0.138)
Standard Deviation Dep. Variable	5.47	5.74	5.87	6.18	2.67	2.79	2.64	2.74
Family Background and Inc. Prior to Birth	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1843	5911	1663	5471	1867	6043	1689	5597

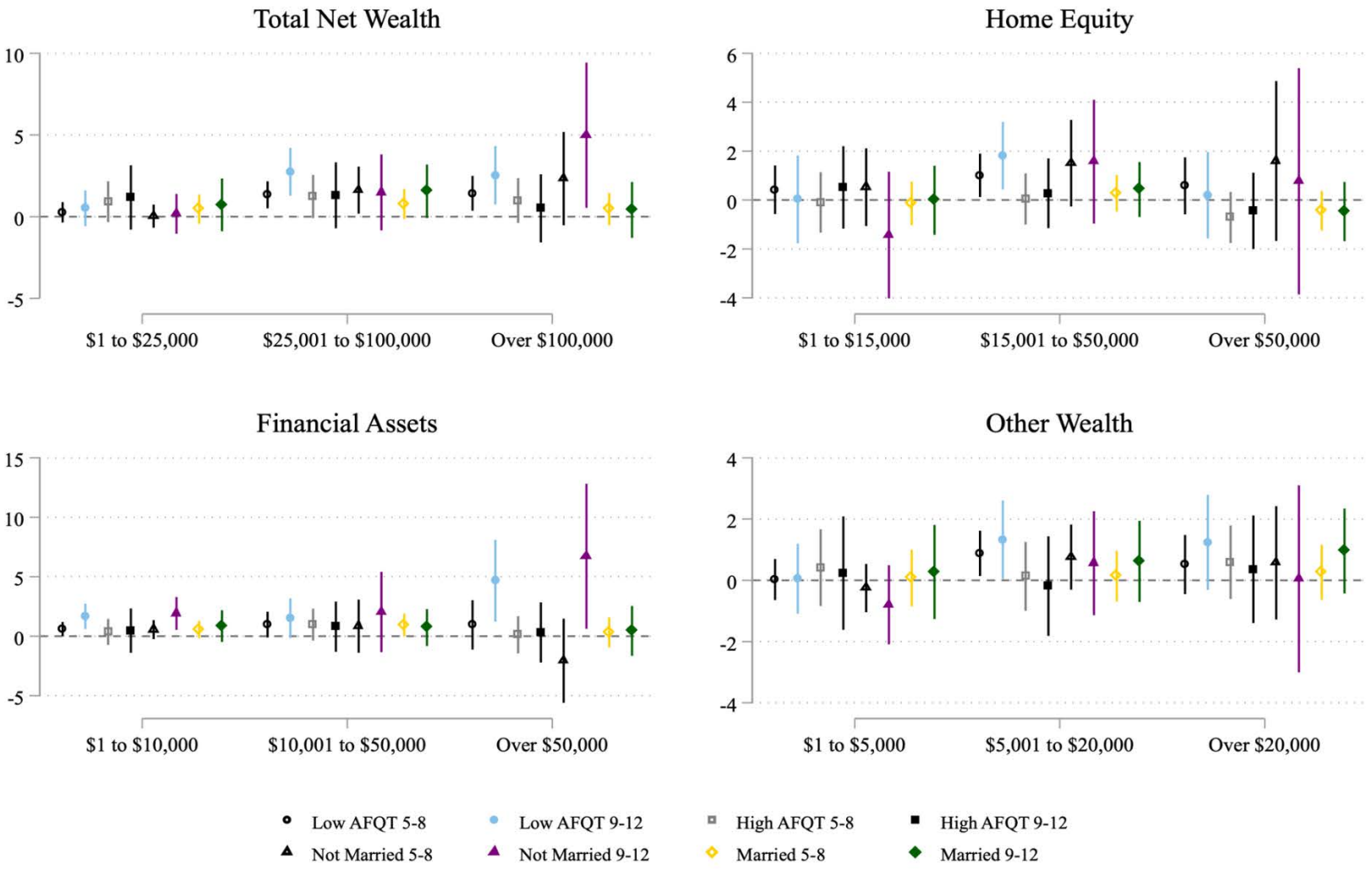
Notes: Standard errors in parentheses are clustered at the child level. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. Family background variables include dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Total family income prior to birth is measured by 5 dummy variables: 0-15,000, 15,001-40,000, 40,001-60,000, 60,001-80,000, >80,000. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 1. Estimates of the Association between Wealth Prior to Birth and PIAT Math Scores by Child Age and Mothers AFQT and Martial Status



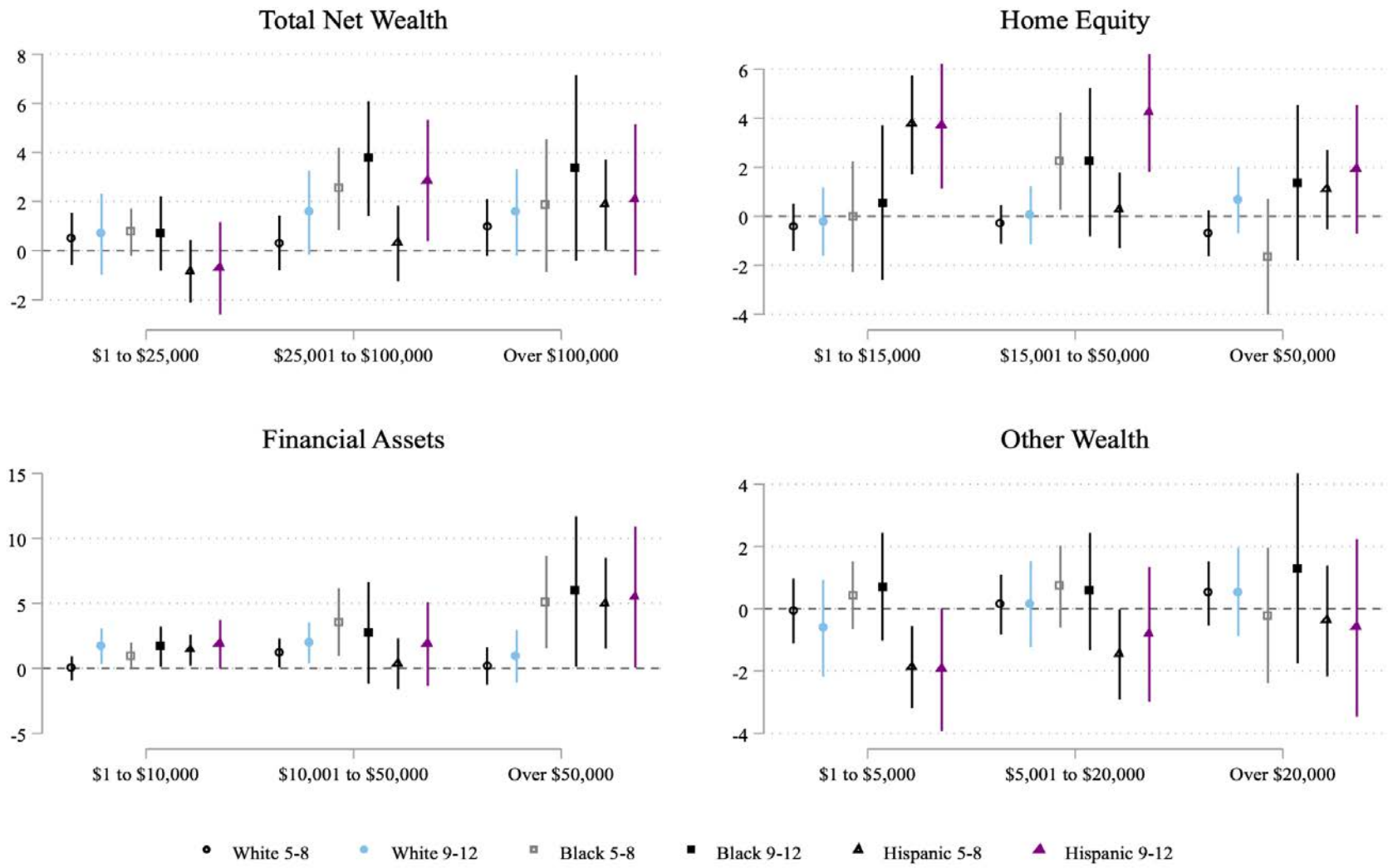
Notes: Standard errors clustered at the child level. Sample includes all children of mother. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. All models also include family background dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Low(high)-AFQT indicates being in bottom (top) two quartiles of AFQT distribution. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 2. Estimates of the Association between Wealth Prior to Birth and PIAT Reading Comprehension Scores by Child Age and Mothers AFQT and Martial Status



Notes: Standard errors clustered at the child level. Sample includes all children of mother. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. All models also include family background dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Low(high)-AFQT indicates being in bottom (top) two quartiles of AFQT distribution. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 3. Estimates of the Association between Wealth Prior to Birth and PIAT Math Scores by Child Age and Race/Ethnicity

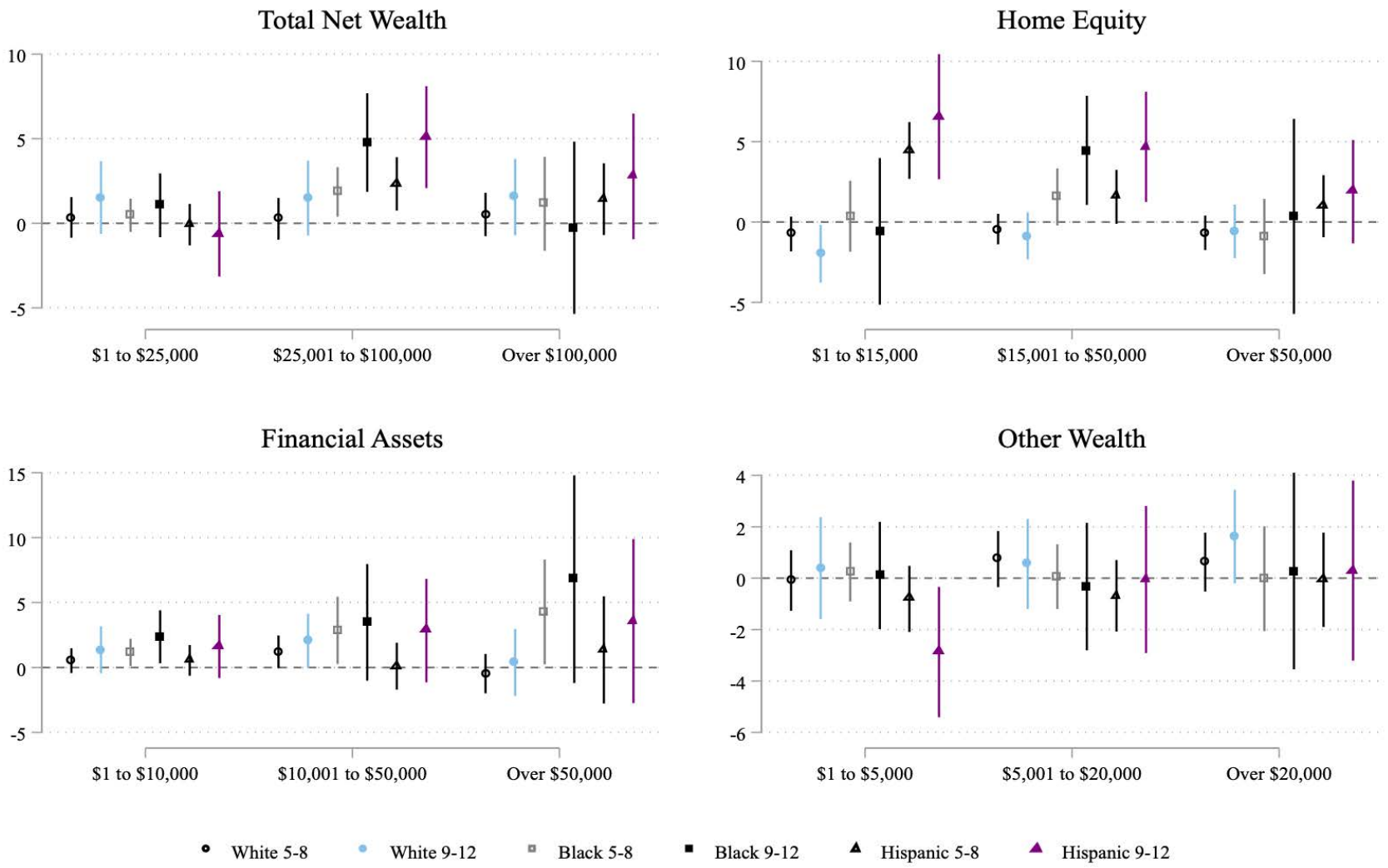


Notes: Standard errors clustered at the child level. Sample includes all children of mother. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. All models also include family background dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Low(high)-AFQT indicates being in bottom (top) two quartiles of AFQT distribution. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 4. Estimates of the Association between Wealth Prior to Birth and PIAT Reading Comprehension Scores by Child Age and Race/Ethnicity

Notes: Standard errors clustered at the child level. Sample includes all children of mother. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. All models also include family background dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Low(high)-AFQT indicates being in bottom (top) two quartiles of AFQT distribution. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 5. Estimates of the Association between Wealth Prior to Birth and PIAT Reading Recognition Scores by Child Age and Race/Ethnicity



Notes: Standard errors clustered at the child level. Sample includes all children of mother. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. All models also include family background dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Low(high)-AFQT indicates being in bottom (top) two quartiles of AFQT distribution. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix

Table A1. Summary Statistics

	Full Sample	White	Black	Hispanic
Female	0.487	0.491	0.503	0.457
Mother's age at childbirth	28.3	28.7	27.7	28.2
Number of children	1.8	1.5	2.1	2.0
Percentile AFQT score	41.9	57.5	24.3	28.9
Rotter score	8.8	8.5	9.2	9.1
Mother's education at childbirth				
Less than High School	0.138	0.070	0.181	0.241
High School Diploma	0.435	0.440	0.430	0.430
Some College	0.242	0.214	0.291	0.244
Bachelor's Degree	0.184	0.276	0.098	0.085
Mother's family structure at age 14				
Lived with biological parents	0.676	0.790	0.465	0.685
Lived with mom only	0.172	0.088	0.325	0.166
Lived with others	0.153	0.122	0.209	0.149
Magazines/newspapers/library card in household when mother was 14	0.886	0.965	0.821	0.790
Grandmother worked when mom was 14	0.511	0.519	0.549	0.447
Grandmother's education				
Less than High School	0.429	0.259	0.513	0.712
High School Diploma	0.421	0.517	0.400	0.227
Some College	0.085	0.120	0.064	0.031
Bachelor's Degree	0.065	0.104	0.023	0.030
Family Income at birth	64,081	82,382	38,422	50,087
TNW at birth				
Zero or less	0.230	0.114	0.429	0.240
Between 1 and 25,000	0.379	0.319	0.434	0.445
Between 25,001 and 100,000	0.226	0.304	0.109	0.197
More than 100,000	0.166	0.264	0.028	0.118
Home Equity at birth				
Zero or less	0.614	0.438	0.860	0.704
Between 1 and 15,000	0.095	0.129	0.049	0.078
Between 15,001 and 50,000	0.151	0.214	0.066	0.113
More than 50,000	0.140	0.219	0.025	0.105
Financial Assets at birth				
Zero	0.357	0.183	0.581	0.470
Between 1 and 10,000	0.417	0.465	0.350	0.393
Between 10,001 and 50,000	0.155	0.235	0.057	0.096
More than 50,000	0.071	0.117	0.012	0.041
Other Net Wealth at birth				
Zero or less	0.293	0.181	0.495	0.292
Between 1 and 5,000	0.218	0.171	0.246	0.292
Between 5,001 and 20,000	0.257	0.308	0.182	0.237
More than 20,000	0.231	0.340	0.077	0.179
Observations	3232	1620	907	705

Table A2. Math and Reading Test Scores by Family Wealth Prior to Test and Other Characteristics Among Children Ages 5 to 8

	PIAT Math				PIAT Reading Comprehension			
	TNW <=0 (N=1,051)	TNW 1-25,000 (N=1,593)	TNW 25,001-100,000 (N=1,260)	TNW >100,000 (N=1,698)	TNW <=0 (N=1,008)	TNW 1-25,000 (N=1,525)	TNW 25,001-100,000 (N=1,212)	TNW >100,000 (N=1,648)
All (N=5,602)	20	20.4	23.2*	26.8*	20.9	21.4	24*	26.3*
NH-Black (N=1,545)	18	19.7*	22.6*	24.7*	20	21.5*	24.6*	25.6*
NH-White (N=2,880)	23.2	22.4	24.1	27.5*	23.1	22.3	24.3	26.6*
Hispanic (N=1,177)	20.7	19.1	21.2	24.3*	20.8	20.1	22.6	25.3*
Mother <= HS (N=3,169)	19.3	19.8	22.5*	25.2*	20.2	20.5	23*	25.3*
Mother > HS (N=2,433)	22.1	22.1	24.1*	27.6*	23	23.8	25.1*	26.8*
Mother's AFQT Quartile 1-2 (N=3,445)	19.3	19.6	22.2*	23.7*	20.3	20.7	23.1*	24.2*
Mother's AFQT Quartile 3-4 (N=2,157)	23.9	24.1	24.5	28.4*	24.3	24.5	25.1	27.4*
Mother Married Before Birth (N=3,480)	21.9	21.5	23.6*	27.2*	22.7	22.6	24.2	26.6*
Mother Not Married Before Birth (N=1,992)	19.3	19.6	22*	23.8*	20.2	20.4	23.3*	24.1*

Notes: Sample includes all children of mother. TNW is total net worth of the family at interview of test assessment or interview prior to test assessment for years 2002, 2006, 2010 and 2014. The number of observations in each TNW category (N=) refers to the sample of all children ages 5 to 8. .* indicates that the mean in the TNW category is statistically different from mean in the TNW<=0 category at 0.05 level.

Table A3. Math and Reading Test Scores by Family Wealth Prior to Test and Other Characteristics Among Children Ages 9 to 12

	PIAT Math				PIAT Reading Comprehension			
	TNW <=0 (N=923)	TNW 1-25,000 (N=1,147)	TNW 25,001-100,000 (N=1,036)	TNW >100,000 (N=1,946)	TNW <=0 (N=917)	TNW 1-25,000 (N=1,147)	TNW 25,001-100,000 (N=1,029)	TNW >100,000 (N=1,936)
All (N=5,052)	43.7	45.1*	47.6*	53.2*	40.1	42.3*	45*	49.8*
NH-Black (N=1,387)	41.5	43.1*	45.7*	49.6*	37.9	39.5*	43*	45.4*
NH-White (N=2,615)	48.8	48.9	49.1	54.2*	45.3	46.3	46.7	50.6*
Hispanic (N=1,050)	43.3	43.8	46*	50.4*	39.8	42.2*	43.2*	48.3*
Mother <= HS (N=2,848)	42.6	44*	46.2*	51.1*	39	40.9*	43.3*	47.4*
Mother > HS (N=2,204)	47.8	48	49.6*	54.3*	44.7	45.9	47.5*	51*
Mother's AFQT Quartile 1-2 (N=3,100)	42.7	43.4	46.1*	49.8*	39.1	40.3*	43.1*	46.5*
Mother's AFQT Quartile 3-4 (N=1,952)	49.2	52.3*	50.2	55.2*	46.5	50.6*	48.4	51.8*
Mother Married Before Birth (N=3,121)	45.9	47.9*	47.9*	53.8*	43.3	45.8*	45.4*	50.5*
Mother Not Married Before Birth (N=1,820)	42.8	43.4	46.8*	49.2*	38.7	40*	44.2*	44.8*

Notes: Sample includes all children of mother. TNW is total net worth of the family at interview of test assessment or interview prior to test assessment for years 2002, 2006, 2010 and 2014. The number of observations in each TNW category (N=) refers to the sample of all children ages 9 to 12. .* indicates that the mean in the TNW category is statistically different from mean in the TNW<=0 category at 0.05 level.

Table A4. Estimates of the Association between Wealth Prior to Birth and PIAT Scores of First-born Children

	Ages 5 to 8			Ages 9 to 12		
	Math	Reading Comprehension	Reading Recognition	Math	Reading Comprehension	Reading Recognition
Total Net Worth at Birth						
Between 1 and 25,000	0.571	0.0610	-0.630	-0.094	-0.710	-0.399
	(0.631)	(0.576)	(0.619)	(0.959)	(0.908)	(1.183)
Between 25,001 and 100,000	0.479	0.732	-0.174	1.173	0.660	0.170
	(0.765)	(0.737)	(0.840)	(1.114)	(1.048)	(1.402)
More than 100,000	0.393	0.432	-0.780	0.432	-1.154	-1.225
	(0.830)	(0.796)	(0.870)	(1.168)	(1.145)	(1.491)
Home Equity at Birth						
Between 1 and 15,000	-0.972	-0.836	-0.717	-0.256	-1.710	-2.571
	(0.715)	(0.766)	(0.832)	(1.118)	(1.210)	(1.438)
Between 15,001 and 50,000	-0.502	0.0396	-0.428	0.220	0.0382	-1.310
	(0.591)	(0.628)	(0.686)	(0.901)	(0.909)	(1.109)
More than 50,000	-1.197	-0.893	-1.486	-0.243	-1.324	-1.191
	(0.650)	(0.667)	(0.757)	(0.981)	(0.984)	(1.202)
Financial Assets at Birth						
Between 1 and 10,000	-0.665	0.0832	-0.291	0.762	0.212	-0.930
	(0.618)	(0.540)	(0.588)	(1.019)	(0.909)	(1.171)
Between 10,001 and 50,000	0.624	0.854	1.136	0.546	0.191	-0.271
	(0.784)	(0.703)	(0.850)	(1.315)	(1.142)	(1.492)
More than 50,000	0.197	-0.0701	0.397	0.747	-1.096	-1.047
	(1.100)	(1.001)	(1.185)	(1.635)	(1.774)	(2.061)
Other Wealth at Birth						
Between 1 and 5,000	0.0115	-0.262	-0.601	-1.042	-1.199	-1.314
	(0.675)	(0.643)	(0.701)	(1.029)	(0.962)	(1.277)
Between 5,001 and 20,000	-0.393	-0.220	-0.635	-0.587	-0.577	-0.341
	(0.617)	(0.610)	(0.702)	(0.955)	(0.945)	(1.139)
More than 20,000	-0.198	0.0465	-0.667	0.678	0.481	0.828
	(0.695)	(0.714)	(0.809)	(1.040)	(1.060)	(1.284)
Standard Deviation Dep. Variable	12.24	11.57	12.89	11.35	11.71	13.77
Family Background and Inc. Prior to Birth	Yes	Yes	Yes	Yes	Yes	Yes
Contemporaneous Variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1798	1714	1776	1604	1595	1607

Notes: Standard errors in parentheses are clustered at the child level. All models include dummy variables for: each calendar year, each region (4 regions), each

year of mother's age, each month of age of the child, and for each race/ethnic category. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. Family background variables include dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Total family income prior to birth is measured by 5 dummy variables: 0-15,000, 15,001-40,000, 40,001-60,000, 60,001-80,000, >80,000. Contemporaneous variables include mother's marital status, education, and total number of children at the assessment, and total family income at assessment. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A5. Marginal Effects of the Association between Wealth Prior to Birth and PIAT Math Scores of First-born Children (third-degree polynomial estimation)

	Ages 5 to 8				Ages 9 to 12			
Total Net Worth at Birth								
25th Percentile ($2,589)	0.0249**	0.0055	0.00028	-0.0037	0.046***	0.019	0.0074	0.0021
	(0.009)	(0.0089)	(0.0091)	(0.0093)	(0.013)	(0.013)	(0.0134)	(0.013)
50th Percentile ($19,159)	0.183**	0.041	0.0029	-0.026	0.332***	0.137	0.054	0.016
	(0.066)	(0.064)	(0.066)	(0.068)	(0.098)	(0.096)	(0.097)	(0.095)
75th Percentile ($70,845)	0.656**	0.154	0.020	-0.080	1.172***	0.483	0.192	0.057
	(0.229)	(0.224)	(0.231)	(0.235)	(0.339)	(0.332)	(0.338)	(0.329)
Home Equity at Birth								
75th Percentile ($28,125)	0.054	-0.188	-0.285	-0.287	0.350	-0.066	-0.259	-0.328
	(0.221)	(0.207)	(0.204)	(0.209)	(0.394)	(0.367)	(0.364)	(0.361)
Financial Assets at Birth								
25th Percentile ($83)	0.00092*	0.00017	0.000068	0.000044	0.0010*	0.00018	0.000087	-0.000016
	(0.0004)	(0.00038)	(0.00037)	(0.00037)	(0.00047)	(0.00047)	(0.00044)	(0.00045)
50th Percentile ($2,369)	0.026*	0.0048	0.0019	0.0012	0.029*	0.0051	0.0025	-0.00046
	(0.011)	(0.011)	(0.0106)	(0.011)	(0.013)	(0.0133)	(0.012)	(0.013)
75th Percentile ($12,351)	0.135*	0.024	0.0098	0.0062	0.150*	0.026	0.013	-0.0025
	(0.059)	(0.056)	(0.055)	(0.055)	(0.070)	(0.069)	(0.065)	(0.067)
Other Wealth at Birth								
25th Percentile ($370)	0.0045	0.0030	0.0022	0.0015	0.0090*	0.0078*	0.0063	0.0061
	(0.0027)	(0.0024)	(0.0024)	(0.0025)	(0.0039)	(0.0039)	(0.0039)	(0.0038)
50th Percentile ($7,375)	0.087	0.057	0.042	0.029	0.175*	0.151*	0.122	0.118
	(0.053)	(0.048)	(0.048)	(0.048)	(0.077)	(0.076)	(0.076)	(0.075)
75th Percentile ($22,233)	0.251	0.163	0.119	0.079	0.504*	0.429	0.346	0.333
	(0.156)	(0.139)	(0.139)	(0.141)	(0.224)	(0.223)	(0.223)	(0.219)
Standard Deviation Dep. Variable	12.24				11.35			
Family Background	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Income Prior to Birth	No	No	Yes	Yes	No	No	Yes	Yes
Contemporaneous Variables	No	No	No	Yes	No	No	No	Yes
Observations	1798	1798	1798	1798	1604	1604	1604	1604

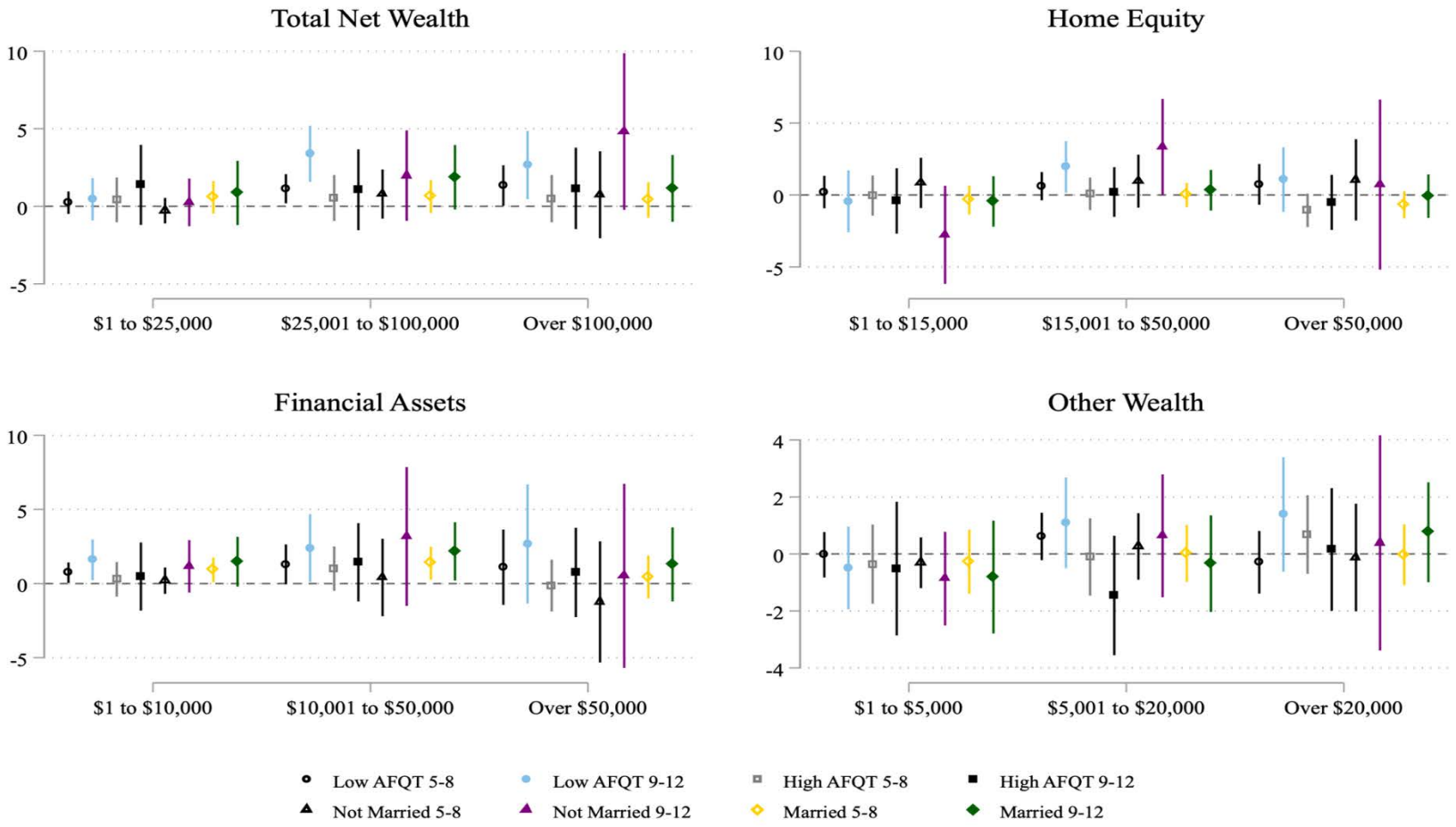
Notes: Standard errors in parentheses are clustered at the child level. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. Family background variables include dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Total family income prior to birth is measured by 5 dummy variables: 0-15,000, 15,001-40,000, 40,001-60,000, 60,001-80,000, >80,000. Contemporaneous variables include mother's marital status, education, and total number of children at the assessment, and total family income at assessment. 25th and 50th percentiles of home equity at birth are zero. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A6. Marginal Effects of the Association between Wealth Prior to Birth and PIAT Reading Comprehension Scores of First-born Children (third-degree polynomial estimation)

	Ages 5 to 8				Ages 9 to 12			
Total Net Worth at Birth								
25th Percentile ($2,589)	0.020*	-0.00067	-0.0051	-0.0091	0.030*	-0.0034	-0.012	-0.020
	(0.0094)	(0.0089)	(0.0094)	(0.0094)	(0.014)	(0.014)	(0.013)	(0.013)
50th Percentile ($19,159)	0.142*	-0.0049	-0.037	-0.066	0.216*	-0.025	-0.087	-0.145
	(0.068)	(0.065)	(0.068)	(0.068)	(0.103)	(0.100)	(0.098)	(0.096)
75th Percentile ($70,845)	0.503*	-0.018	-0.130	-0.231	0.767*	-0.089	-0.306	-0.511
	(0.238)	(0.226)	(0.238)	(0.238)	(0.357)	(0.348)	(0.339)	(0.334)
Home Equity at Birth								
75th Percentile ($28,125)	0.514*	0.240	0.143	0.100	0.473	-0.057	-0.214	-0.361
	(0.219)	(0.208)	(0.206)	(0.210)	(0.386)	(0.364)	(0.378)	(0.379)
Financial Assets at Birth								
25th Percentile ($83)	0.00066	-0.0000007	-0.000069	-0.000074	0.00050	-0.00058	-0.00065	-0.00073
	(0.00034)	(0.00033)	(0.00032)	(0.00033)	(0.00056)	(0.00055)	(0.00054)	(0.00055)
50th Percentile ($2,369)	0.019	-0.00021	-0.0020	-0.0021	0.014	-0.017	-0.019	-0.021
	(0.0096)	(0.0093)	(0.0092)	(0.0094)	(0.016)	(0.016)	(0.015)	(0.016)
75th Percentile ($12,351)	0.097	-0.0013	-0.010	-0.011	0.074	-0.086	-0.096	-0.107
	(0.050)	(0.048)	(0.048)	(0.049)	(0.082)	(0.082)	(0.080)	(0.082)
Other Wealth at Birth								
25th Percentile ($370)	0.0029	0.0015	0.0011	0.00061	0.0058	0.0046	0.0039	0.0037
	(0.0029)	(0.0026)	(0.0027)	(0.0027)	(0.0044)	(0.0041)	(0.0041)	(0.0041)
50th Percentile ($7,375)	0.057	0.029	0.022	0.012	0.113	0.091	0.076	0.072
	(0.057)	(0.051)	(0.052)	(0.052)	(0.087)	(0.081)	(0.081)	(0.080)
75th Percentile ($22,233)	0.168	0.081	0.062	0.032	0.332	0.264	0.219	0.209
	(0.165)	(0.148)	(0.151)	(0.150)	(0.253)	(0.236)	(0.235)	(0.234)
Standard Deviation Dep. Variable	11.57				11.71			
Family Background	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Income Prior to Birth	No	No	Yes	Yes	No	No	Yes	Yes
Contemporaneous Variables	No	No	No	Yes	No	No	No	Yes
Observations	1714	1714	1714	1714	1595	1595	1595	1595

Notes: Standard errors in parentheses are clustered at the child level. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. Family background variables include dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Total family income prior to birth is measured by 5 dummy variables: 0-15,000, 15,001-40,000, 40,001-60,000, 60,001-80,000, >80,000. Contemporaneous variables include mother's marital status, education, and total number of children at the assessment, and total family income at assessment. 25th and 50th percentiles of home equity at birth are zero. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure A1. Estimates of the Association between Wealth Prior to Birth and PIAT Reading Recognition Scores by Child Age and Mother's AFQT and Martial Status



Notes: Standard errors clustered at the child level. Sample includes all children of mother. All models include dummy variables for: each calendar year, each region (4 regions), each year of mother's age, each month of age of the child, and for each race/ethnic category. All models also include family background dummy variables for: grandmother's and mother's education, for mother's family structure at age 14, for mother's AFQT quartile, and mother's locus of control (ROTTER) quartile. Low(high)-AFQT indicates being in bottom (top) two quartiles of AFQT distribution. Reference category for TNW, Home Equity, and Other Wealth is zero or less, and for Financial Assets is zero. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.